AN HISTORICAL CASE STUDY OF THE LITERATE IMPACT OF THE
BOOMTOWN ARSENAL ON THE COMMUNITY OF FIELDVIEW, OHIO FROM
1940-1960

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Chapter 1

Introduction

“Exploring creatively the need for social connectedness of institutions, such as schools and youth organizations, as well as the workplace, offers us ways to create and tell new stories. As we do so, we have to acknowledge that what may seem limits or losses can be beginnings as well as endings.”

(Shirley Brice Heath, Ways With Words, “Epilogue 1996”, p. 376)

Background of Problem

With these final words to her 1996 edition of Ways with Words, Shirley Brice Heath invites researchers to consider the implications that workplace literacy practices have on home and community literacy patterns and vice-versa. Heath and others (see, for example, the collections edited by Hull and Schultz, 2002 and Huot, Stroble and Bazerman, 2004), including Gee (1996), observe distinctions between literate practices at home, at school and in the workplace. Home literate practices tend to revolve around communications related to intimate levels of communication including familial relationships, coordinating routine tasks such as grocery shopping or taking someone to see a doctor; and it can include talking about current events on a very subjective level. At home, children learn to communicate with others with a close social bond. School literate practices tend to emphasize learning how to write Standard Written English and developing basic reading skills ranging from poetry to longer pieces of literature. Workplace literacy practices focus on task-related activities, such as reading instructions
on how to perform a given task, to communicating with a co-worker about a work-related issue or project and composing reports addressing a work-oriented problem or audience. Several studies since Heath’s study and call have documented relationships between home and school literate practices. A recent collection edited by Hull and Schultz (2002) illustrates such studies. Generally, these studies suggest the need for a closer link between home literate practices and those practiced in educational settings; the more literate practices are linked across settings and assimilate home literacy practices, which are the most frequently practiced and with which people are most familiar, the better learning and application of practices become.

Much of the early scholarship in literacy studies suggested that literacy is an autonomous phenomenon—free of bias and manipulation-- and that literacy within a culture was the path to economic development and individually to the path toward improved socio-economic status. However, Brian Street (1984) argues that literacy is best considered within an ideological model that includes the understanding of the meaning of literacy as embedded within the institutions in which it is practiced, including home, school, community and workplace. Street asserts the following characteristics of literacy within this model:

1) The meaning of literacy depends on the social institution in which it is embedded;

2) Literacy can be known to us in forms that already have political and ideological significance and cannot be separated from that significance;
3) The particular practices of reading and writing that are taught in any context depend upon such aspects of social structure as stratification and the role of educational institutions;

4) The processes whereby people learn reading and writing construct the meaning of it within particular practices;

5) Referring to “literacies” is more appropriate than to a single “literacy”

Street observes an economic connection to literacy, but this connection is heavily context-dependent. Street points out Graff’s own conclusion that, “literacy is not an independent nor determining factor [of socio-economic position within a society] but served rather to mediate these primary processes and interacted with them” (p. 106). Street observes in his own experience in Iran that, “entrepreneurs could run complex enterprises, record transactions, and make profits without having reached levels of literacy that could be guaranteed, via formal testing, to figure in the national statistics. Literacy, then, is only important for specific positions if that is how they are defined by the particular society” (p. 107). That is, political and economic institutions espouse certain forms of literate practices; and, consequently, these forms become idealized within those settings. The ideological position of these forms, then, is what encourages them to be taught in educational settings.

According to Street and many other New Literacy Scholars such as Graff (2003), Hull and Schultz (2002), Brandt (2001), and Gee (1996), literacy, then, is understood to be a situated practice that cannot be defined uniformly across the settings of work, home,
school and community. Forms of literacy accepted at home such as letter-writing or diary writing that include colloquialisms or vernacular may be considered too informal to be accepted practice at school or work. For example, African-American Vernacular is a recognized home literacy practice among African Americans; however, phenomena associated with it are discouraged in school-related practices (Farr, 2003; Ogbu, 1988; Heath, 1983). Also, the way one reads at home (for leisure) may differ from the way one reads at work (task-oriented). Further, Street espouses the concept of multiple literacies—that it is inaccurate to esteem one literacy over any other; though, he recognizes that there are political, economic and social implications associated with these meanings of literacy. Because of the connections between the political, economic and social, a metaphor of literacy that has emerged within New Literacy scholarship is that of an ecology of literacy (Barton, 2007; Cooper, 1986). Literacy is affected by the culture and environment in which it is practiced, and it affects that environment as well. Literate practices are motivated by certain environmental factors, and a culture’s practices can affect environmental dynamics.

As a social phenomenon, literacy, in the ideological model, facilitates interaction and meaning-making among people in a variety of settings. This communication and meaning-making potential carries political and economic implications with it. Because institutions carry with them the meaning of literacy, different institutions may espouse particular forms of literacy such that practices that are accepted in one setting may be inappropriate to use in another setting. Relative to literacy’s political and economic implications within society, Deborah Brandt (1999) has observed that certain entities act
as sponsors of literacy, and that sponsorship depends on the political environment and can influence economic dynamics of a given time period. She acknowledges that, “the history of a period is apprehended through the life span, which sets the material and cultural boundaries within which people live out social and economic relationships with others” (p. 3). Political and economic dynamics of a given period affect how people and institutions make use of literacy practices within that environment. Because of their positions of power and influence within the economic and political environments of a culture, particular institutions such as government, business and industrial entities and schools can affect literacy practices.

Brandt describes literacy sponsors as those institutions or entities that encourage, facilitate, regulate, limit or control literacy development for their own benefit. Such entities use literacy as a form of capital. One example that she presents is that of Dwayne Lowery (see pages 52-57). Before Lowery became involved in union activities, he did not read much beyond newspapers. As he became involved in union activities, though, the union funded a trip for him to Washington DC to learn skills needed to be a field representative and to negotiate contracts. Further, when companies shifted to using attorneys to represent them at the negotiation table, the union again provided funding for Lowery to attend a workshop where he could learn to read and prepare legal briefs. The union, in this case, acted as a literacy sponsor, supporting Lowery’s literacy development so that he could better represent the union’s interests when negotiating with companies while also contributing to his own professional development, increasing his value as an asset for the union. As such, the literacy that Lowery learned benefited him, and it
became capital for the union. The union benefited by encouraging literacy development and facilitating it with economic support. With the Lowery example, Brandt notes that sponsorship can come in the form of economic support for education and training as well as in the form of encouraging and facilitating a particular practice in the workplace environment. She also demonstrates the evolution of literacy demands relative to the changing nature of bargaining, which moves from discussion with company representatives toward discussions with attorneys representing the company.

Literacy standards have evolved over time as the economy and its related technologies change. In addition to noting Street’s consideration of multiple literacies, rather than a single form of literacy, this dynamic also calls attention to historical issues associated with literacy and the study of it. Both Brandt and Kress (2003) observe multiple literacies at work across time. For example, where a college degree in the 1960s suggested that one had strong print-text reading and writing skills, a college graduate today is expected to have considerable computer literacy skills. With each generation and time period, certain economic, political and social factors impact what kinds of literacies major institutions choose to facilitate. Brandt calls such changes “accumulation” of literacy (p 7). Yet few historical studies that examine particular literate practices exist. Observing a lack of historical perspective in literacy studies, Graff (2003) and Bazerman (2008) called for studies that examine literacy in historical context. Such studies provide a lens that permits researchers to consider economic, political, and social dynamics in hindsight. Relative to taking the historical perspective toward researching literacy, Brandt (1999) notes that “of key significance in this approach are similarities and differences in
the lives of people who have experienced the same set of structural relations and have lived through the same events. This method is useful for gathering information about changes in the material networks through which people have learned and practiced literacy across time” (p. 3). An analysis that focuses attention on a particular ecology can inform theories of literacy and contribute to reshaping literacy instruction. It can also close gaps in practices across locations of literacy practices—home, school, community and work.

Further, historical studies in literacy have observed patterns relative to what have been identified as “literacy crises;” periods when there was a perceived gap between the literate levels people had and the literate levels people needed to meet social and economic demands. Bazerman et al (2005) and Brandt (2001) have noted the perceived crises that emerged in the United States around periods of war and political and economic change.

Statement and Importance of Problem

Home, school, community and workplace environments interact to influence a given ecology of literate practices. Heath (1983) considers, among various sociolinguistic dynamics within three communities in a particular locale, how the literate practices at a textile mill relate to the literate practices at home and in school. Generally, she finds that there is a considerable disconnect between the practices at work and those espoused in school. Teachers in Heath’s study attempted to encourage students to learn Standard Written English by inviting workers from the mill to talk to students about the reading and writing practices at the workplace, hoping that as the workers talked about those
practices students would become motivated to learn reading and writing skills. However, the teachers came to understand that “there were few occasions for writing or reading extended prose in these jobs…they usually filled out forms or summarized orally to someone else who ‘wrote up’ the ‘final’ report” (p. 311). As the children do not see how the literacy they are taught in school will help them get a job, this disconnection sabotages literacy learning efforts at school and home. Considering these intersections of literacy practices across the sites of home, community, school and workplace and how practices within each can affect practices in others, I propose the representation shown in Figure 1.1 as an illustration of this ecological relationship.

Figure 1.1

While some scholarship, such as Heath’s study, considers schools and community programs as literacy sponsors, few studies related to the examination of a particular workplace as a literacy sponsor exist. Studies that examine workplace literacy practices, like Winsor (2000), have considered relations between workplace practices and certain community-related literacy practices. Others, such as Haas (1994), consider professional discourse development in academic environments to facilitate transition into a professional discourse community. Staggers (2006) provides the most systematic analysis
of the relationship between certain communication practices within a given workplace and their affect on a particular geographic community in her James Berlin Award-winning dissertation about risk communication and the development of the atomic bomb. Heath’s study seems to be the only remarkable study integrating consideration of the intersection of literacy practices across a particular workplace and geographic community and practices in that community’s homes and in a given school program. That examination is limited because it focuses on how children’s language acquisition and practices at home affect their performance in school.

Hull (1997) examines the relationship between workplace practices and literacy. Generally, she observes several connections between literacy and the economy. These include: a growing number of workers are considered to be illiterate as economic and technological changes occur, and illiteracy affects productivity and product quality as people need time to learn how to perform their job correctly and effectively. Throughout the collection, the theme that emerges is one of finding ways to train workers for particular jobs as demand for some jobs weakens and demand for other jobs increases. In Hull’s collection, Merrifield (1997) considers the economic impact that layoffs due to a changing market have on communities and the role the government plays in facilitating development through legislation that provides financial assistance to particular groups in high-risk social categories. Merrifield calls attention to the 1982 Job Training Partnership Act that provided funding to displaced workers (p. 277), and Brandt has alluded to the G.I. Bill that was used to help returning Veterans fund their pursuits into higher education and professional training (p. 87).
Graff, Heath, Hull and Brandt note themes associated with historical influences that affect literacy practices. Such themes are part of the literate ecology; certain economic and political dynamics that are part of a given time period influence the literate ecology. The field of literacy studies includes research that considers ecological dynamics of literacy within social environments, but it lacks close examinations of historical treatments and implications of certain forms of sponsorship. Heath makes some observations in the Epilogue to the 1996 version of her work about political consequences of her study. However, these are limited to observations of how government policies did not support the changes she implemented in the school on the basis of her study. Also, the observations are made ten years after her study is published. Contextual dynamics are affected temporally, and more studies of factors that contribute to a given temporal ecology of literacy are needed. Further, Graff (1979) asserts that any definition of literacy must be able to account for cultural and temporal differences in literacy dynamics.

Also, many recent studies of literate practices have discussed multiple literacies and multimodality (New London Group, 1996; Mayer and Moreno, 2000; Mayer, 2005; Mishra and Sharma, 2005, Gee, 2003; and Huot, Strobel and Bazerman, 2004). Modes of representation include the print-linguistic, visual, aural, experiential, spatial and gestural (New London Group). While it is generally inappropriate to esteem one literacy or modality over any other, the New London Group (1996) and Kress and van Leeuwen (2003) observe that there may be contexts in which certain modes “are more powerful than other modes” (New London Group, p. 63). For example, Mayer and Moreno found
that multimodal instruction that integrates narration and images (aural and visual modes) facilitates better learning than using either mode individually. Heath and others (see for example, Hull and Schultz, 2002) have espoused integrating home-related literacies into educational settings to help students assimilate into the politically and economically esteemed literacies.

Because of the context-bound nature of literate practices, it is impossible to value one form of literacy over any other generally; however, as cultural and economic dynamics change over time, certain literacies emerge as more valued than others in particular contexts. Brandt (2005) suggests that literacy may be considered a form of capital, observing that literacy opportunities are “configured … in rationales of production and profit-making” (p. 194). Scholarship such as that of Scribner and Cole (1981), Heath (1983) and Street argues that certain literacies are better suited for certain purposes and certain settings within a given culture. Scribner and Cole, Heath and Street were among the first to observe multiple forms of literacies at work in a given culture and contexts in which different literacies worked in those cultures. Further, studies report various kind of literacies needed to be able to function in certain professional settings as professional specialization continues (Cicourel, 1981; Haas, 1994; Northey, 1990; Olsen, 1993). Yet, more studies that consider questions of sponsorship and ecological dynamics such as economics, politics and ideology that affect literacy sponsorship and practices are needed.

In the “Introduction to Historical Studies of Literacy,” Harvey Graff espouses historical studies of literacy in context that may illuminate repercussions of certain
practices; he asserts that, “Social attributes…and historical contexts, which are shaped by
time and place, mediate literacy’s impacts, for example, on chances for social or
geographic mobility” (p. 125). Much literacy research, in fact, describes literacy using the
ecology metaphor; that is, the context in which literacy occurs needs to be considered
within the analysis of literacy itself. Cooper (1986) explains that writers, as part of an
ecological system, interact with each other to form systems (p. 368). She argues that
characteristics of an individual piece of writing determines and is “determined by the
characteristics of all the other writers and writings in the systems” (p. 368). The writing
that one does in one context (e.g.: the home) interacts with writing one does in other
contexts (e.g.: school), and the writing others do in those contexts affects one’s writing as
well. Phelps (1991) acknowledges a geography of knowledge relative to writing. She
describes the knowledge-product of a given local community may be evidenced in
documents immediately located in that community as found in particular local case
studies (p. 876). As Heath found, when there are disconnections in literacy practices
across contexts, the result may be one of confusion, affecting literacy practice and
learning. Further, Brandt (2005) continues to observe the esteem given to print-linguistic
literacies in workplaces, suggesting a link between certain literacies and economic
potential generally. However, studies document the use of visual literacies in the
workplace as well (Brumberger, 2008). The particular workplace environment and
ecology beyond the workplace environment affect what literacies are valued.

By considering the original context in which certain workplace literacy practices
occurred and studying the relationship between those practices and practices within the
community, literacy scholars can understand a specific case in which employers adjusted literacy expectations to workers’ skills and benefits associated with that. Such an historical study can also uncover any ideologies at work within that ecology and consequences associated with this adjustment; this study attempts to ascertain those consequences in addition to understanding sponsorship dynamics within the political and economic environment of the time period.

Purpose of Study

This is a study of the literate ecology and sponsorship dynamics at work in a particular locale in Ohio during World War II and shortly after using an historical case study approach that will include interviews with members of the particular community who lived there during the time period of study and after that period and some of whom worked at the workplace during the time period as well as through analyses of archived workplace documents. Studying a particular temporal and geographic ecology of literacy practices and sponsorship can shed light on ecological factors that affect a workplace’s influence as a literacy sponsor and implications associated with that sponsorship. Indeed, the historical dynamics at the time created the particular employer and caused a large migration to the area. Because of the anticipated migration the federal government constructed a housing development that included a school. Further, because of the literate traditions and limited skills of the employees, the employer used a certain program to train employees. These particular attributes—the creation of the institutions, the migration, and the literate backgrounds of the employees—create an ecology in which certain literacies are sponsored. When people from different literate backgrounds migrate
to other areas of the country, these literate practices can be accounted for in various ways. School districts can adjust the school curriculum to help children assimilate into a given community’s school system, and communities can facilitate a sense of community through various activities, further helping people assimilate into the community generally. Also, employers can make an effort to accommodate literate levels in the workplace. This site and its study represent an historical approach to the ecological metaphor of literacy study.

Specifically, the study considers the literate ecology involved when the government built an arsenal near Fieldview, Ohio (names are pseudonyms), which was a farming community and to which many people from various literate backgrounds, including Appalachians and African Americans, migrated for work during World War II. The arsenal and community under study comprise two excellent research sites. The arsenal maintains an extensive archival collection of document artifacts, and the community has an historical society that engages members of the community and their historical significance. The sites were significant locations during WWII and the effects of the arsenal and various dynamics were felt beyond the end of the Korean War.

The primary research question associated with this study is: As a major employer in Fieldview Ohio, how did the government and operators of the Boomtown Arsenal sponsor literacy for its employees and for the community of Fieldview, Ohio from 1940-1960, and what ecological factors influenced this sponsorship? Related questions include:

What literacy practices were required in the workplace?

What relationship between print-linguistic literacies and visual literacies existed
at the workplace?

What literacy-related institutions or programs did the government or operators fund?

What literacy practices occurred in school?

What literacy practices occurred at home?

What literacy practices occurred in the community?

What intersections between these practices exist?

Inferences from answers to these questions can address the following questions:

What groups may have benefited from this sponsorship?

What groups may have been negatively affected by this sponsorship?

Literacy practices include print-linguistic forms of literacy as well as other modes of representation used for communication purposes, including the visual, aural, experiential, spatial and gestural. This study examines relationships between these modes and related literacies and intersections thereof within this case study. Of particular note is discussion of a catastrophic event that happened at the Arsenal in which eleven people lost their lives. A report of an investigation of that event suggests that a disconnection between these literacy practices dynamics that occurred at the Arsenal prior to the event may have contributed to causing it. Further, there is evidence that suggests that part of the effort to assure such an event never occurred again included attempts to link the different practices so they re-enforced each other.

Scope of Study
My analysis focuses on the literacy dynamics at home, within the community, at school and at the Arsenal from 1940, when the Arsenal was built, to 1960, by which time operations at the Arsenal had declined dramatically and children of migrants who stayed in the area had finished high school.

Because of the location of the Arsenal and its housing, Fieldview experienced the largest population growth of any locale in the country between 1940 and 1950—approximately 1100% (Time Magazine). Until the Arsenal’s construction, Fieldview was primarily a farming community. As stated previously, the Arsenal displaced over two hundred family farms. The federal government invested much financial support for Fieldview’s infrastructure. It financed the construction of the Village’s fire station, a school and library in addition to housing. Further, the demographic makeup of the community changed around 1960, by which time the government-supported housing development was sold to a private company and converted to “section 8 housing.” During this twenty year period, many people who lived in this development, which was built as the Arsenal was being constructed to facilitate workers who migrated there for work and makes up a large portion of the community itself, were either employees of the Arsenal or veterans who returned from WWII or the Korean War and were pursuing higher education opportunities at nearby institutions with help from the G.I. Bill.

Indeed, during the height of WWII the Arsenal employed over 12,000 people, which fell to under 3,000 shortly after the War. The Arsenal never employed more than 3,000 during the Korean War; and, during peace times, it employed a few hundred personnel, mostly in storage operations. Because the ecology changes dramatically after
1960, the focus is on the particular ecology from 1940-1960. There is some data from just beyond these parameters that is considered because it overlaps with the parameters. For example, if a study participant studied within the Fieldview school district just prior to 1940 information from that experience may be included; likewise, if a participant arrived in the Fieldview community in 1959 or 1960, their experiences may be included as well.

Specifically, this analysis examines the relationship between modes of representation and exigencies involved in the particular historical context. As I acknowledged earlier, The New London Group and Mayer and Moreno argue that certain modes of representation and certain combinations of modes may be more powerful for certain purposes and in certain contexts. Modes used in literacy practices are considered part of the sponsorship dynamics in this study.

Methodologically, this study uses content analyses of interviews and of documents archived at the particular workplace. Much research in literacy studies uses ethnographic approaches, in which the researcher observes and possibly participates in the literate activities of those studied (Szwed, 1982). As Krippendorff (2004) observes, content analysis is the best approach to research in the absence of actual observations of physical activities. I use interviews and document analyses. Brandt (2001) focuses on interviews in which people share their stories about experiences with literate activities. She relies exclusively on content analyses of these narratives to facilitate her analysis.

I interviewed those who lived the historical literate experience; however, I also reviewed documents from the particular workplace involved to better understand what kinds of literate practices actually occurred there. I use the interviews to understand
practices outside of the workplace as well as inside it. These interviews represent the participants’ recollections of their practices, and the interview questions are open-ended; so, people can share their stories freely. Furthermore, reviewing documents from the workplace provides a more comprehensive picture of literacy practices there. I also take a thematic approach to analysis. Case study designs integrate the local contextual considerations. More on this approach, generally and as applied in this particular study, is presented in Chapter 3.

Contributions to the Field

This is an historical case study of the literate relationship between the Arsenal and the primary community in which it operated, Fieldview, Ohio, during a certain time frame. Literacy scholarship generally recognizes literacy as a social phenomenon (Barton, 2007; Gee, 1996; Cooper, 1986; Graff, 1979). The relationship between the project and the field’s conceptions of literacy sponsorship and literacy as an ecological phenomenon make this project a study that will contribute to the field’s understanding of the social and material consequences of certain forms of sponsorship. This study can contribute to the field of literacy studies in no fewer than three (3) ways:

1) offer insight into the dynamics associated with a specific ecology of literacy, informing theory and practice;

2) consider potential implications of a balancing act pertaining to multiple modes of representation and their related literacies associated with certain forms of literacy sponsorship; and
3) identify implications associated with literacy sponsorship and multimodality relevant to today’s economy and visual culture. As literature finds benefits to integrating visual forms of representation in various literate practices, this study examines relationships between print-linguistic and visual forms of representation within the related ecology.

The purpose of this study is to offer insight into the interrelationships of home, community and workplace literate activities in terms of the influence that literacy sponsors have on that ecology. Sponsors must react to certain environmental dynamics. Sponsors may accommodate certain literacy practices to their benefit. However, decisions sponsors make about valuing certain literacies over others and how they attempt to negotiate practices they value with those less-valued carry serious implications for sponsors as well as those affected by the sponsorship. While Brandt’s study emphasized print-linguistic literacies because of their importance in the 20th Century, I consider various modes of representation identified by the New London Group and sponsorship of those literacies. As such, I expand on Brandt’s conception of literacy sponsorship, and I discuss connections between sponsorship and the ecology of literacy metaphor.

There is a rhetoric embedded within literacy practices, and this study suggests potential dangers when disconnections between literacies and related modes of representation occur. This insight may shed light on how locales and business entities can prepare to accommodate literacy needs associated with similar migrations/relocations in the future, especially considering that the current global market environment fosters relocation of workers at various levels of an organization’s hierarchy. This study, also,
may lead to development and discussion of how communities can work with employers as sponsors ethically to foster an environment that supports responsible literacy training and communication across levels of the organization.

While the Arsenal is no longer operational as it once was, given Heath’s observation that “what may seem limits or losses can be beginnings as well as ends,” an historical study may inform new directions in literacy studies and literacy learning. An examination of the literacy dynamics at work within the particular ecology of a given historical period can provide a better understanding of how practices intersect locations of home, school, community and work, and operating and learning efficiencies associated with these intersections may occur. Such an understanding can effect improvements in literacy learning, workplace operations and minimize economic hardship.

This study may also be able to inform literacy policy development and long-term community literacy planning. My study contributes further to studying such relationships by examining more closely the relationship between workplace literacy practices and community literacy practices. This study also supports Heath’s findings, which would suggest the need for closer relationships between workplace literacy practices and literacies taught in school, which already are being assimilated with literacies associated with home Discourses.

The study has implications in the current economic environment in which workers need to relocate to areas and adjust to new language dynamics while learning to perform their work. Similarly, various literacy demands change in a dynamic technological environment where virtual game systems that assimilate behavioral and physical/gestural
modes of representation are used to facilitate training and other workplace practices. Also, the current global economy encourages workplaces to relocate jobs to different parts of the world. Multimodal forms of training facilitate learning in such environments. Workplaces also want employees to be able to transition quickly into their job without needing much training.

The major sponsorship elements studied are the government and the contractors who operate the Arsenal. Literacy policies are developed and implemented at the federal level and include input from business and industry, considering the makeup of the Spellings’ Commission on the Future of Higher Education and its recent Report (2006). This study, consequently, can inform future policy development. As recently as 2009, there are reports of an economic crisis in which major local employers are closing, affecting hundreds of jobs and local economics (Mackinnon and Towell, 2009). In this same economy certain kinds of employers are having difficulty filling positions; jobs are available, but people lack certain skills necessary to be hired for them (Schleis, 2009). Such reports signal, once again, that literacy demands are shaped by political and economic dynamics and that literacy is truly context-dependent. As economic demands shift the kind of work that people do, literacy demands change as well.

The study reported here, then, is an effort to advance a theory that recognizes the intersections that affect a given ecology of literacy and ways that institutions that act as literacy sponsors affect that ecology. Also, this study recognizes the value of historical studies of literacy that can inform current policies and practices.
Chapter 2

Literature Review

In Chapter One I identified the problem this study addresses, primary theories associated with the study and the framework that facilitates data collection and the analysis of that data. In order to understand how this study fits into the extant literature of literacy studies I provide a review of relevant literature in the field inclusive of and beyond that presented in Chapter One. First, I present information about historical trends in the conceptualization of literacy—how scholarship has treated literacy studies generally. Second, because the field of literacy studies has grown to recognize various factors that affect literacy practices, I review literature associated with the ecology of literacy. Also, as the field observes different practices in different settings, all of which are considered within the scope of my study, I describe some scholarship regarding home-based literacy practices, school-related practices and workplace practices and implications associated with these practices for pedagogy. The field also recognizes the value of using various modes of representation, including the visual, to effect meaning-making, and these modes are part of the analysis in my study. Consequently, I review literature related to scholarship in multimodal forms of representation, calling attention to a particular model of multimodal representation in instructional settings. Because this study’s primary focus is the concept of literacy sponsorship, I review Brandt’s (2001) conception of literacy “sponsor.” Within each of these sections, I first present theoretical
underpinnings of related empirical studies, and then I review some of those relevant studies.

The Evolution of Scholarship in Literacy Studies

Considering literacy from an historical perspective, Goody and Watt (1963) argued that civilizations advance economically as they become more literate. These researchers use marriage and other historical legal records to document evolutions of civilizations over long periods of time and equate the literate development to economic growth those cultures realized during the period covered. Literacy, they and Ong (1986) argue, contributes to fundamental differences in cognitive ability; that is, as a culture moves from primarily oral to literate, the writing down of information and attributes of writing contribute to changing the way people think about the world. This cognitive distinction between orality and literacy came to be known as “the great divide” or the “great leap” theory (Daniell, p. 394).

For example, Goody and Watt observe that literacy facilitates categorization of concepts and logical thought (p. 44). Drawing on his work with Watt, Goody (1977), for example, examines uses of lists in documents associated with ancient Egypt and Mesopotamia. He explains that lists exemplify the distinction between literacy and orality in that they reflect a “mode of thought” (p.33). He states that lists facilitate arithmetic and, “the sorting of information according to number of parallel criteria” (p. 39). Further, he observes that lists enable civilizations to maintain a record of events, and categorization or classification of phenomena (pp. 41-47). Finally, he acknowledges that
lists are, “an example of the kind of decontextualisation that writing promotes, and one that gives the mind a special kind of lever on ‘reality’” (p.49).

Ong also argues that literacy facilitates different cognitive processes from those associated with orality. He states,

The critical and unique breakthrough into new worlds of knowledge was achieved within human consciousness not when simple semiotic marking was devised but when a coded system of visible marks was invented whereby a writer could determine the exact words that the reader would generate from the text… It is not a mere appendage to speech. Because it moves speech from the oral-aural to a new sensory world, that of vision, it transforms speech and thought as well…

(p. 78)

Ong uses the example of the literacy instruction in ancient Greece and the expansion of their culture to support this assertion. Calling upon arguments that Plato makes in his Phaedrus as well as Homer’s works, Ong identifies several differences between cultures that rely on oral literate practices and cultures that use literate practices. Ong acknowledges that “[p]rimary oral culture also keeps its thinking close to the human life world, personalizing things and issues, and storing knowledge in stories. Categories are unstable mnemonically” (p. 20). He further observes that “[w]e know that totally oral peoples, intelligent and wise though they often are, are incapable of protracted, intensive linear analysis that we have from Plato’s Socrates” (p. 22). These kinds of studies and assertions sparked considerable debate about cognitive and economic implications of literacy.
In a survey in which he reports the “historiography and history of literacy” scholarship, Graff (2003) observes that initial studies such as those reviewed above (1960s-1970s) focused on “easy (if poorly documented) generalizations of the distribution of literacy across populations” (p. 124). These studies emphasized an argument for the requirement of certain levels of literacy within a population toward economic and civic development. In addition to treating notions of literacy uncritically, these studies also relied on weak anecdotal data. However, he notes that studies of the 1970s-1980s treated the earlier studies more critically, calling attention to weaknesses in arguments associated with generalizations of literacy’s impact on socio-economic development among individuals and populations. Studies during this period also considered more reliable data, reviewing various aggregate census and marriage records and particular documents, rather than relying on anecdotal evidence. Such records served to document literate abilities relative to basic writing and reading skills with a focus on the signature as a sign of writing literacy and the act of completing certain legal forms as a sign of literacy generally across a population (p. 124). Graff observes that most studies of literacy since 1980 have considered that literacy “by itself—is now seldom conceptualized as independently transformative” (p. 125); that is, literacy in and of itself cannot transform a person’s or population’s socio-economic condition. Rather, the impact literacy has is context-dependent. In addition to understanding the historical variability and context-dependence of literacy, Graff notes that the institutions in which one learns literacy can affect one’s socio-economic position. He asserts, “we recognize that the environment in which one learns to read or write has a major influence on the level of
ability to use and the likely use of those skills” (p. 125). This relationship between literacy and the institutions in which it is practiced is an attribute of Brandt’s notion of “literacy sponsorship,” which I describe below. Further, Graff acknowledges that current studies of literacy take historical contextual factors into consideration, and he concludes that the field’s current perception of literacy is,

The view that literacy’s importance and influences depend on specific social and historical contexts – which, in effect, give literacy its meanings: that literacy’s impacts are mediated and restricted, that its effects are social and particular, that literacy must be understood as one among a number of communication media and technologies – replaces an unquestioned certainty that literacy’s powers were universal, independent, and determinative. (p. 126)

The treatment of literate practices as contextualized phenomena characterizes “New Literacy Studies,” a term that represents the approach to literacy scholarship since the 1980s.

The “New Literacy Studies”

In research that espouses the “New Literacy Studies” approach, the focus of study tends to be the relationship between particular literate practices and contextual factors that affect those practices. Scribner and Cole (1981), Heath (1983) and Street (1984) are among the earliest researchers to document the variety of institutions in which literacy is learned and practiced. All employ mainly ethnographic research practices that call attention to differences in how literacy is used across different settings—home, school, church and workplaces—and economic implications thereof. Ethnography provides a
unique research perspective because the researcher is able to observe, and participate, in
the literacy practices he or she is studying in order to gain a better understanding of the
particular contextual factors that affect a given practice or text.

Scribner and Cole study the Vai community of Liberia who practice three
different “scripts” languages in their daily life. Using anthropological fieldwork and
experimental psychological methods, they collect extensive data about literacy practices
in this community (p. 57). For their study, they interview approximately seven hundred
adults about their literacy learning, observe practices and literacy instruction in two
different towns and use document analyses of the scripts used in various documents
associated with those towns (p. 62). They also use experiments with various people to
understand cognitive patterns. They find that, while only 28% of adults in the community
are literate in at least one of the three scripts—English, Vai, and Arabic—many of these
are bi-literate (proficient with two of the scripts) and a few of them are tri-literate
(proficient with all three scripts). Further, they note that the Vai script is generally used
for social and public writing, English is read and written within political and economic
settings and Arabic is used in religious settings. The Vai use different forms of literacy
relative to particular settings.

Using an ethnographic approach over a longer period of time; 1969-1979, Heath
studies three different communities in a particular geographic area in the Carolina
Piedmonts. Befriending several of her students as they discussed language learning in her
classes, she is able to gain access to the homes and communities daily lives and document
her observations. Heath takes extensive field notes as she observes children and adults interact at home, in the community and at school. She acknowledges that:

Often I was able to write in a field notebook while minding children, tending to food or watching television with the families; otherwise, I wrote fieldnotes as soon as possible afterwards when I left the community on an errand or to go to school. In the classrooms, I often audiotaped; we sometimes videotaped; and both the teachers and I took fieldnotes as a matter of course on many days of the year.

Heath observes children moving from home-based literacy practices to school-based practices and the degree of success they have in school relative to the relationship between the literacies practiced in these two settings. She finds that children whose parents read to them and encouraged them to read certain kinds of books that encourage school-related literate practices excelled in school when those practices continued at home (the “Townspeople”). However, if one’s parents did not continue to reinforce the school-related practices once the child entered school (“Roadville”), students eventually fell behind their peers. Finally, children whose parents never encouraged school-related literacies but engaged them in oral literate practices (“Trackton”) did poorly in school from the start. Generally, she finds considerable connection between the literate practices children have at home and their success in school; the more home-based practices encourage the form of literacy practiced in school, the more successful children are in school. As noted in Chapter 1, Heath also considers literate practices at work and how limited they are, such that when the school invites workers to share their literate practices
with students, the workers explain how few literacy skills are needed to be able to work there.

Street (1984) uses field ethnographic methods that include observation, participation and document analyses to study practices in an Iranian community during the 1970s. Much as Scribner and Cole find in their study, the community Street studies seems to use different scripts or discourses in different settings and motivations related to each. Specifically, Street studies the Cheshmeh village in the Iranian mountains. He finds that people in this culture learned “maktab,” or religious, literacy when they went to school for religious purposes prior to his arrival. However, at the time that he arrives to study the literacy practices of the area, state-supported “modern” schooling has replaced “maktab” schooling (p. 132). He finds that adults who learned “maktab” literacy as children adapted the “maktab” literacy as they began practicing business to fit their commercial practices, rather than used the “modern schooling” discourse. Street refers to this adapted literacy form as “commercial” literacy, and his study focuses on how this adaptation illustrates his notion of the “ideological nature of literacy practice” (p. 12). Those businessmen who modify “maktab” skills keep some of the basic literacy skills associate with “maktab” learning. However, they also integrate new features relevant to commercial practices. Consequently, people with whom they do business are able to communicate in a different setting (p. 155).

Heath, Scribner and Cole, and Street represent a new direction in literacy scholarship. They carefully examine specific literacy practices that people experience and the factors affecting those practices. Further, these studies also recognize that certain
literacy practices occur in different settings within a particular geographic community and how practices may intersect or be separated from the different settings. The field of literacy studies now recognizes that literate practices are very much context-bound, varying with particular contextual factors that influence them.

The Ecology of Literacy

Contextual attributes affect literacy dynamics within a given community and the consideration of the various institutions associated with literacy learning. These include home, school, church, and work. Consequently, it is no surprise that some scholars have come to consider a given literate environment as an ecology of literacy, complete with consequences of certain practices being encouraged or discouraged. Much literacy research since the mid-1980s, in fact, describes literacy using the ecology metaphor. The context in which literacy occurs needs to be considered within the analysis of literacy itself. Barton (2007) explains that “ecology is the study of the interrelationship of an organism to its environment” (p. 29). He further acknowledges that, applied to literacy, it concerns how literacy “is part of the environment and at the same time influences and is influenced by the environment” (p. 29).

As cited in Chapter One, Cooper (1986) and Phelps (1991) also used this metaphor, relating it to knowledge created within a literate environment. Cooper concludes that “language and texts…are essentially social activities, dependent on social structures and processes not only in their interpretive but also in their constructive processes” (p. 366). Readers interpret information using certain strategies that are “constitutive of interpretive communities” (p. 365). Accordingly, “readers link new
information to old information in order to comprehend texts” (p. 365). Cooper explains that “writing is an activity through which a person is continually engaged with a variety of socially constituted systems” (p. 367). She goes on to explain that social systems are dynamic, “made and remade by writers in the act of writing” (p. 368). Writers modify how they present information relative to a given audience’s expectations. Finally, she observes that for each instance of writing, “one can specify the domain of ideas activated and supplemented, the purposes that stimulated the writing and that resulted from it, the interactions that took place as part of the writing, the cultural norms and textual forms that enabled and resulted from the writing” (p. 369). One must consider the purposes associated with the writing and cultural norms at work in the social system in the valuing or sponsoring of certain literacies over others when studying literate activities.

Besnier (1995) uses ethnographic methods that include document analyses and interviews in an effort to study motivations for certain text-based literate practices—letter-writing, specifically—among members of a Polynesian Atoll. Besnier explains that the historical development of a literate practice is necessarily part of the ecology and ethnographic context under study (p. 17). Members of the community have relatives who live on the mainland, and they exchange letters with each other on a regular basis. He describes the use of letters in this culture as “mediating tools between emotions and material transactions, and the site where emotionality and economic transactions are ‘translated’ into one another” (p. 16). In addition to interviewing members of the community, Besnier studies motivations for this correspondence by reviewing a “large corpus of letters” (p. 18). While all members of the community have access to primary
schooling, very few (4%) had any secondary schooling, due largely to the lack of access to such schooling because of distance between the island and the nearest place that has a secondary school (p. 60). So, members of the community have reading and writing skills; though, these are limited; he calls these limited literate skills “restricted literacy,” and calls for its use as an analytic category (p. 171). However, the community also espouses oral forms of literacy in their writing. He finds that the most important reason for writing among islanders is to motivate and record economic transactions between the islanders and their mainland relatives as well as to exchange gossip or other socially-oriented information. Besnier notes four functional categories associated with letters: moral, economic, informational, and affective; and he acknowledges how each is “interwoven with one another” (p. 93). He notes the emotion evident in the tone of letters that reflects to some degree features of orality. Such pathos is expected of writers from readers and the letters serve a social purpose. An interesting attribute of letter-writing as a literate activity is their reciprocal nature; letters invite responses from the reader (p. 31, p. 36). Letters, he observes, also “are a medium in which affect is given considerable prominence” (p. 107). This ecology encourages forms of writing that reflect elements of orality such as pathos.

Several studies report about how the American culture tends to esteem print-linguistic forms of Standard English over other forms of literacy, negatively affecting certain minority groups within the general U.S. literate ecology (Ball, 2004; Farr, 1993; Hamilton, 2001; Kirsch, Jungeblut, Jenkins, and Kolstad, 1993; Ogbu, 1988; Prendergast,
2003; and Purcell-Gates, 1996). These studies also call attention to how certain literacy practices are used within a particular social system at odds with a larger cultural system.

Observing how the media treated a particular form of literacy as inferior to Standard English, Ball (2004) examines how Alis Ben Johns’ literacy is characterized during coverage of a manhunt for him. Ball explains that Johns grew up in the Ozark hills in Missouri and stopped attending school after the sixth or seventh grade. He describes Johns as one who enjoyed “‘playing Indian’ as a child” and who possesses “woodsmarts.” Ball also acknowledges that Johns was wanted by police for multiple murders and other crimes. During the manhunt, Johns survived by breaking into homes and stealing food (pp 362-363). Ball examined newspaper reports as well as television broadcasts of the search, documenting descriptions of Johns’ intelligence and educational background. While noting Johns’ proficiency in eluding several hundred police officers (“400 at its peak”), Ball finds that, “[m]entioned prominently in almost every news story concerning the manhunt, Johns’ illiteracy thus served as an obvious marker for a lack of cultural sophistication and a justification for dehumanizing him” (p. 364). Generally, Ball finds that the fugitive is considered unintelligent because of his literate background. Even though, Johns exhibits considerable talents in understanding survival in the wilderness, he is, nevertheless, considered within the realm of U.S. literate culture, as represented by the popular media, as unintelligent.

Using Actor-Network Theory, Hamilton (2001) studies how adult literacy surveys are created and measured. Hamilton uses the development of the International Adult Literacy Survey as an example of how certain institutions create an ideology associated
with literacy policy. She identifies several actors involved in its development: social research agencies, professional societies, funding agencies, educational institutions, and the media among them. She observes that the survey covers twenty countries that represent over 50% of the world’s wealth (p. 185). In her analysis of the test’s development, she observes that texts are taken from their country of origin and recontextualized in the test, while some items are eliminated because of cultural biases. This elimination, she states, is an example of how the test’s creators shape what may be considered culturally acceptable (p. 187). She also acknowledges that the test is designed by research agencies; consequently, “the testing process defines and enforces the status of experts and non-experts” (p. 187). Further, she claims that media delete considerable information in their reporting of results and findings of the test, providing “superficial” information (p. 189). Hamilton asserts that findings of the survey tend to be used by governments to shape policy (p. 190). She also observes that the methodologies employed in its creation are “contested within the academic domain, but still command huge respect in media and public domains” (p. 185). She finds that the notion of “literacy” is shaped in a variety of ways by the different institutions that develop and interpret it. She argues that these institutions are able to define what may be considered literacy standards through the survey.

Kirsch, Jungeblut, Jenkins, and Kolstad (1993) review findings of the National Adult Literacy Survey and report several correlations across the data. Findings of this analysis include: many of the 23% of adults who were in the lowest level of prose, document, and qualitative proficiencies were able to perform routine tasks involving brief
and uncomplicated texts; 25-28% were categorized into the second level of proficiency; respondents demonstrating higher levels of literacy were more likely employed more than those at lower levels; participants at lower levels of literacy were more likely to be receiving food stamps, and nearly half at the lowest level were living in poverty (pp. 646-648). However, they also find that some who are considered to be low-literate have high-paying jobs, suggesting that a perceived low level of literacy may be irrelevant to economic potential (p. 649). So, within their own, personal situation, people can adjust to literate expectations of them; however, the larger cultural system may label people who do not exhibit valued literacies as low-literate.

Purcell-Gates (1995) studies the literate practices of a family of Appalachians as she tries, also, to help them become literate. Using case study ethnography, Purcell-Gates acts as a literacy teacher for the family of urban Appalachians, primarily the mother and son. Like many Appalachians, this family uses oral skills more proficiently that reading or writing skills espoused in the mainstream U.S. culture. Purcell-Gates acknowledges that both Jenny and her husband, Big Donny, dropped out of school in the seventh grade; and, while Big Donny has accepted his illiteracy, Jenny wants to learn to read. They use familiar landmarks to travel to and from some locations around the city and Jenny relies on her friends to tell her about things going on around town. Jenny’s son, “little Donny”, is struggling in the first grade, and Jenny fears the same will happen to her son. While they are able to function within their community, Jenny is compelled to help her son do well in school so that he can make more of his life. She calls on Purcell-Gates to intervene in her child’s education to help him and the mother become literate. Purcell-
Gates tutors both and becomes involved in their lives. Re-enforcing the situated nature of literate practices, Purcell-Gates uses the experiential, developmental approach to literacy learning, which assumes that reading is learned as it is used to fulfill meaningful functions, not for its own sake and the components of language (semantics, sounds, syntax, pragmatics) are learned as they transact during use (p. 71). While books exist at home, none are read; and the child’s parents are not able to engage him or help him practice reading or writing at home. Furthermore, she finds that the school system advances low-literate children in spite of the continued and additional challenges they will encounter because they have not learned the skills necessary in earlier grades.

Ogbu (1988) conducts an extensive meta-analysis of several studies pertaining to schooling among African-Americans and challenges they face in literacy education generally along with review of related census data, and he conducts survey research regarding perceptions that African Americans have of the education system. Using the framework of cultural ecology, he examines the systemic failure of the education system for African Americans. He defines cultural ecology as “the study of institutionalized and socially transmitted patterns of behavior interdependent with features of the environment” (p. 234). In order to fit into a given ecology members of populations must adapt to the “instrumental competencies and related behaviors” needed for achievement (p. 235). He asserts that “childrearing and formal education are culturally organized to insure that children in a given population meet these criteria for adaptation” (p. 235) He finds that African-Americans are placed at a disadvantage in school because of systemic, cultural practices that assure that prepares African Americans for “inferior roles” (p.
Further, he finds that African Americans perceive that “whites and their institutions cannot be trusted to benefit blacks equitably” (p. 238). Ogbu concludes that the education system has been designed to disqualify African Americans for high paying jobs and that African-American children are culturally oppressed within the American literate culture.

Farr (1993) studies the uses of literacy practices associated with public speaking events that are affected by audiences, considering Cooper’s observation about the relationship between audience and speaker/reader and writer. She calls school-favored literacy “essayist literacy” and calls for attention and respect given to community-based literacies. She uses discourse analysis to analyze linguistic styles of two different communities in Chicago—mexicanos and Mexican-Americans. She observes and records each group in public meetings varying from meetings between an alderman and his constituents to block club meetings, annual conventions and school council meetings (pp. 17-18). Further, she interviews Mexican immigrants about their perceptions of effective public speaking. These interviews result in identification of four particular features of what constitutes effective oral performance: grace/wittiness, eloquence, sincerity/ethos of the speaker, and pathos (p. 20). Certain meetings are lead by and attended by Mexican-Americans, who display the essayist form of literacy. However, mexicanos display a more oratorical form that emphasizes “intonation, repetition and parallelism that is more intense in its tone, exhorting listeners to follow a certain course of action” (p. 25). Farr explains that this style is more personal and exemplifies the features valued by those interviewed. With the two examples, Farr finds that different expectations from the audience dictate which discourse is appropriate in a given setting. She finds that verbal
forms of literacy contribute to more personalized forms of language/author’s voice. She perceives essayist literacy as a gatekeeping function within the ecology of the academy, restricting access to higher education. However, she argues that oral performance is more moving.

Prendergast (2003) examines several different legal cases that echo this cultural oppression in the American literate culture. She uses content analysis of case briefs to study rulings and the arguments associated with several relevant cases. Among the cases she reviews are: Brown v Board of Education (1956), Washington DC v. Davis (1976), Bakke v. University of Cal-Davis. Also, she reviews principles associated with the CCCC students’ Rights Resolution (1974). In spite of the ruling in Brown v. Board of Education that desegregation ought to give African-Americans access to literacy education, Prendergast observes that African-Americans still live in certain neighborhoods that limit their access to literacy education. In Washington D.C. v. Davis, the United States Supreme Court sided with the city of Washington D.C., agreeing that its police officer examination, which recruits must pass to be eligible for the police academy, provides a neutral purpose ensuring applicants meet a certain minimum standard. Prendergast, however, asserts that the test is discriminatory against African-Americans and that test skills do not transfer to job skills. Such a ruling re-enforces a certain ideology favoring a particular kind of literacy over others that may be relevant and important.

Though African-Americans, Appalachians and other non-mainstream cultures in these studies are able to practice particular forms of literacy that are common within their own community’s social system, they are placed at a disadvantage within the larger U.S.
social system because of a conflict between what their community expects and what the U.S. social system expects of their literacy practices. African-Americans and Appalachians are part of this study; so, I call particular attention to studies associated with their literate practices. Cooper’s observation about the relationship between new and old experiences is particularly germane, given that many who worked at the Arsenal were shifting from one job sector (farming) to another (industry); these workers had to learn a new form of labor.

Workplace Literacy Practices

In the 1980s, as studies of literacy practices in different settings evolved, some researchers began studying literacy practices in workplace settings. Not only do certain practices occur in workplaces that differ from those practiced at home or school, but certain practices exist in specific workplaces that differ from others. Gee (1996) points out that different professionals use different practices, such that no single form of literacy practice can be esteemed in the workplace generally, much less across these different settings. The different literacy practices that occur in professional settings create another focus for literacy studies—that of workplace literacy practices, which examines how professionals communicate with each other in the workplace. Because this study examines the impact of literacy practices at a particular workplace within an examination of the influence that workplace’s practices had on a community, this section describes and reviews the historical development of the workplace literature from the mid-1980s to 2009.
Early studies of workplace literate practices used survey methods to understand how professionals practiced communications. The research into workplace literacy practices of the 1980s focused on the nature of writing in the workplace, emphasizing formal documents (letters, memos, forms, and reports) and what skills are most important to create these documents. For example, Anderson (1985) reviews results and implications of extensive survey research studies, especially related to 5 particular areas—accounting, banking/finance, production/plant management, marketing, office/general mgmt. First, Anderson reports on a survey he conducted of graduates of Miami University (Ohio) who all took a technical writing course but graduated from seven different programs. The questionnaire included twenty-eight (28) questions pertaining to the writing the respondents do on the job. Of the 2,335 alumni who received the questionnaire, 841 were usable for the study. Sixty-nine percent (69%) reported spending at least 10% of their time at work writing. Thirty-eight percent (38%) reported spending at least 20% of their time writing, and fifteen percent (15%) reported spending more than 40% of their time writing at work (p. 17). He also reports that, though these graduates came from seven different departments, there was “no significant difference among the seven departments” in the amount of writing (p. 18). In terms of what attributes of writing respondents felt was important, ninety-three percent (93%) reported that writing well is of at least some importance, and fifty-seven percent (57%) indicated it would be of “great” or “critical importance.” In addition to this survey, Anderson also reports on a review of fifty (50) other surveys of workplace writing that asked similar questions to his survey. His review finds that: 1) there is a lot of writing at work; 2)
readers are generally organizational insiders; and 3) much of the writing involves particular forms including memos, letters, instructions, and preprinted, template forms that writers fill out.

Using another meta-analysis of published research, Debs (1988) reports summaries of research on documentation, including research related to document design, style/comprehension, usability, organization/structure, typography and graphics. Using content analyses, she reviews twenty (20) different texts offering advice on documentation in technical writing settings. She finds that most workplace writing uses active voice, avoids noun strings, and limits the use of multi-syllabic words and difficult words. Additionally, workplace writing integrates signposting/sequencing that is explicit through use of headings and subheadings. An interesting observation she makes is the relationship of graphics to text; she indicates that writers tend to supplement text with graphics, acknowledging that “pictures serve additive function” (p. 19).

Northey (1990) surveys attitudes of accountants about needed writing skills that are needed. In her study, nine hundred (900) accountants at three different organizational levels from five different public accounting firms in Canada received a questionnaire, and 689 (75.5%) participated in the study. All respondents indicated that writing skills are needed, but the emphasis is on correcting errors: mechanics, voice, lack of transitions. She finds that most writing involved reporting information, with little emphasis on persuasion or rapport building. She also finds a focus on writer-perspective, especially in audit reports; and she calls attention to potential problems associated with using this approach rather than using a reader-perspective approach (pp.486-87). Further, Northey
finds that partners and upper managers do more specialized-writing such as memos, letters to clients, and reports or notes to financial statements than lower level accountants do. Finally, she concludes that writers learn how to write as they need to write, not through formal instruction.

Carroll, Smith, Kerker, Ford and Mazur (1988) use two experimental studies to measure efficient learning with different manuals. The first study uses a between-subjects design in which nineteen (19) participants used either a minimalist manual or a commercially-prepared self-instructional manual to perform eight (8) different word processing tasks. Minimalist manuals remove much textual information that explains why certain steps are included in favor of focusing on performance steps. Performance was measured relative to length of time to learn a task and the success participants had doing the tasks. Participants using the minimalist manual were better able to complete the tasks more quickly and with more success than those using the self-instruction manual. In a second experiment using similar design to measure performance relative to the thirty-two (32) participants’ use of either a self-instruction manual or minimalist manual and learning while doing or learning by reading the book. Participants were separated into four groups: two using the minimalist manual, one of which also learned the task by reading the book and the other that learned by doing the tasks; and two that used the self-instructional manual, one of which learned by reading the book and the other learning by doing. The ‘learn-by-doing’ group was given five (5) hours to complete a series of six (6) tasks while the ‘learn-by-reading the book’ group was given three (3) hours to use the manual to learn about the tasks and two (2) hours to perform the six (6) tasks. Generally,
the results showed that the group using the minimalist manual was able to perform better than the groups using the self-instructional manual in both cases.

Charney, Reder and Wells (1988) use experimental designs in three studies. The first study reports forty (40) inexperienced computer users grouped into one of two groups; one group was told which tasks they would be asked to perform using a PC-DOS system, and the other group was not informed of particular tasks they would be asked to perform. Half of each group was given one of two different manuals explaining basic commands for a PC-DOS system; one manual integrated more descriptive language, definitions, examples, overviews and analogies than the other, which was about one-third as long as the more elaborate version. After allowing the participants forty-five (45) minutes to read their manual, the participants were asked to perform various basic tasks explained in the manuals. The researchers measured how well participants performed the tasks relative to the number of tasks they could complete and how long it took to complete those tasks. They found that the group that was given advanced information about the tasks they would perform did better using the abbreviated manual than those who used the longer manual, and that those who had no prior information about the tasks did better using the longer manual than those who used the shorter manual. Charney, Reder and Wells’ second experiment reported on how well users responded to four different sets of manuals. They find that relative to degree and type of elaboration there is no benefit from elaborations of general concepts, no benefit from elaborations offering advice of when to apply specific procedures, but significant benefit on situation contexts for applying procedures. The third experiment reports thirty (30) participants studying
VisiCalc commands by reading a particular manual at their own pace and then were asked to solve problems presented in the manual. Each participant was given three different problem sets: a tutorial acknowledging specific steps to use to perform a task, an exercise identifying a specific goal but no information on how to perform it, and a combination of tutorial and exercises. Performance was measured relative to percent of task completed correctly and the amount of time needed to complete the task. Results showed that participants tended to perform better on tasks when there was an exercise related to the activity. With this study they found that, relative to users and goals; if one has a specific task in mind, there is no need for elaboration; whereas, readers with no specific task in mind benefit from some elaboration. Generally, these studies, like others I review, find that the “minimalist manual” facilitates more efficient learning progress than a self-instruction manual.

Bouldin and Odell (1993) introduce a systems theory approach for studying workplace literacy practices, consistent with the ecology metaphor that I identified earlier. They review several studies of writing and focus attention on invention strategies writers used in each study. From this content analysis, they identify three particular contextual variables that affect invention strategies: rhetorical context, interpersonal context and organizational/cultural context (pp. 273-274). They assert that a systems theory approach to analysis of workplace practices can integrate analyses of these variables. They acknowledge that systems theory assumes that: any phenomenon can be viewed as a system, and there is a set of components interrelated in such a way that a change in any one component is likely to result in changes to other components. One’s
understanding of a phenomenon must be holistic rather than atomistic (p. 270). This observation broadens the scope of what may be considered within the context of a given writing situation.

With the observation that variables beyond the immediate task influence workplace literacy practices, researchers began looking more closely at case studies research that showed how various elements within a workplace ecology influenced writing practices. Zimmerman and Marsh (1989), for example, studied how a storyboarding experience facilitated proposal development within a particular company. Using case study design, they observed a small group as it experienced the writing process associated with a proposal. They also interviewed the participants to understand their reflections of the process. They found certain salient aspects of writing in workplace settings, including: 1) collaboration; 2) diversity of formats; 3) various processes; 4) task-orientation; 5) writing as a social activity; 6) organizational context; and 7) contextual practice.

Murray (1988) studied the use of e-mail systems at IBM in the early days of e-mail technology and how the availability of electronic modes of communication affect medium, mode and code choices for a given message. She uses a case study methodology that includes field notes from ethnographic observations and interviews and logs of e-mail messages as well as “hard copies of memos, documents, overhead transparencies, computer manuals, and so forth” (p. 353). She found that e-mail complicates the orality-literacy continuum debate in which oral approaches to communication seem to differ dramatically from purely written forms of communication. Rather, there are various
styles ranging from informal to formal that exist within each kind of medium. While context affects medium, mode and code choices, certain features of the context, such as the topic of the message, the speaker’s relationship with the audience relative to position or role relations and the setting (distance between speaker/audience, whether communication is synchronous or asynchronous, and “institutional conventions”) affect those choices (pp. 368-369).

Jolliffe (1997) argues that readers need to feel as if they are part of the text they are using in the workplace. Jolliffe conducts a readability test of a particular document that new workers in a metalworking factory have difficulty comprehending. He performs a particular readability test on two passages of this text, which results in a grade-level finding of the 11th grade. While this is within the comprehension of high school graduates employed at the factory, Jolliffe suggests that the source of the difficulty reading the text is not in the grade level but in how the text relates to the reader. He notes that the text uses many passive sentences and intransitivity. The readers cannot locate themselves in the text, creating some distance between the text and the reader. He concludes that workers need to feel an affinity with the text in order to understand it better.

It is clear that workplace literacy research has undergone a shift in methodological approaches from survey/experiment to ethnographic case studies that include interviews and content analyses that consider a systems theory approach to analysis. This new methodological focus centers on what literacy practices occur in specific, contextualized workplace settings and what factors influence those practices. Further, these studies move from surveying practitioners’ general attitudes and perceptions of their practice to
analyzing specific documents and observing and talking with the practitioners about specific practices.

Linking Professional Practice and Pedagogy

As scholarship into workplace literacy practices identified particular practices and related skills required of employees, researchers began encouraging writing teachers to consider differences between academic writing and workplace writing practices in order to integrate some elements of writing observed in the workplace to help students understand these differences and to prepare students for the kinds of writing that would be expected of them at work (e.g.; Spilka, 1993). Because of potential implications of these differences and their relationship to this study’s implications, I review some of this literature.

Using multiple subject case study design, Anson and Forsberg (1990) study the transition that writers make when moving from academic to professional work. Six students involved in a 12-week internship participated in the study. Researchers used drafts and final copies of documents the subjects produced, along with a log of group discussions with the participants, written journals and transcriptions of interviews with the interns and written reflections from each intern. They find three different stages that writers experience in moving from academic environments to the workplace: 1) expectation—idealized social construction of writer’s vision of self in professional setting, 2) disorientation/frustration—battle between idealized vision and reality, 3) transition/resolution—role is established and writer understands position; redefining of position with real understanding of setting and situation (p.208).
Haas (1994) tracks a biology student’s academic progress from a week after she enrolled in college until a few weeks before she graduated. Haas interviews the subject several times each year, and examines written texts that the subject read or composed for classes. She also reviews reading and writing logs maintained by the subject and observes her in class and reading sessions. Finally, Haas also uses read- and-think-aloud protocols. She found that the students’ coursework acts as an apprenticeship into the language of the professional community. Initially, the student engages in reading activities that introduce her to the discourse of her field. As a sophomore, her coursework asks her to respond to the texts within a research setting. In her junior year, the subject became more involved in the discourse of her field as she participated in a work-study program related to biology. As a senior, she becomes more sensitive to contextual issues that affect writing as a scientist and reads texts more critically. Generally, Haas finds that the coursework the subject experiences in each year builds upon skills acquired in the coursework from the previous year. As such, the student is apprenticed into the field’s discourse slowly and through concrete steps.

In the mid-1990s, a debate emerged in the literature regarding how to prepare students for the workplace. The debate entails whether to prepare workers with specific disciplinary sets of skills and discourses as represented in the literature of the 1980s and early 1990s versus the need for broader, creative and adaptive skills with reduced organizational hierarchies and greater global competition observed by Gee, Hull and Lankshear (1996). Because this study considers discourse practices within a workplace, I review some of that literature.
Olsen (1993) conducts meta-analysis of studies pertaining to discourse communities to identify certain trends in research into workplace practices. She describes particular ways of looking at discourse communities and ways of thinking and communicating that distinguish one discourse community from another. She reviews several studies focusing on discourse practices of lawyers and practices among doctors to ascertain what topics associated with professional discourses are researched most and their general findings. She finds that studies associated with legal discourse tend to examine ways that “the setting, situation, the participants, and their language use affect the form of the legal discourse” (p. 186). Relative to medical-discourse studies, she finds that research has tended to study how doctors distinguish observations of fact from subjective observations of opinion or hypothesis and the style in conveying certain kinds of information such as the “use of passive voice to minimize the presence of a killing agent” (p. 187). From this review, she finds that 1) authors consider the discourse audience, trying to appeal to that audience’s “needs, values, assumptions, conventions and expectations”; 2) discourses used in different fields are unique from each other; 3) individuals in a discourse community review and mandate changes in an author’s text as a means of regulating conventions within the discourse community; and 4) contextual factors affect what is considered appropriate and effective in a given text within a discourse community (p. 188). She concludes that studies into discourse communities must identify the special attributes of particular communities that develop and use a given discourse.
Gee, Hull and Lankshear (1996), however, are among scholars who argue in favor of preparing future workers with broader, creative and adaptive skills for what they term “the new work order.” The argument they use is that the marketplace has changed significantly in the past twenty years such that competition is global and customers are more savvy (Applebaum and Batt, 1994; and Gee, Hull and Lankshear, 1996). These attributes require workers to find creative ways to reduce costs, increase operating efficiencies, and to be able to customize products for customers, requiring workers to adapt quickly. Gee, Hull and Lankshear perform a content analysis of several business and industry-oriented texts regarding language used to characterize valued skills. Using interviews and observations they report how a team in a high performance company work together. Specifically, Gee, Hull and Lankshear identify meta-cognition as the primary need associated with the new worker. Consequently, they advocate helping students understand how to do things within a given system and be creative problem-solvers, and they call for academic disciplines to encourage interdisciplinary programs that help students develop related skills.

Hull (1997) reviews several articles from popular newspapers and magazines to ascertain popular views of literacy’s implications for workplaces and the economy. Through this meta-analysis, she finds that the popular media characterize literacy as basic skills and more, “illiteracy costs businesses and taxpayers.” She observes a link within these articles between literacy levels of workers and quality of production; and a favoring of contextualized training (pp. 5-9).
While the studies reported above examine the link between higher education and preparing graduates for work, another set of studies discuss training for workers once they are in the workplace. For example, Merrifield (1997) studies the effectiveness that a particular training program had on workers who faced unemployment as their workplace closed. Merrifield interviews one hundred (100) women who were displaced from their work due to a plant closing. Some of these women participated in the Job Training Partnership Act (JTPA) training program offered by a plant that was about to close. The program was designed to help workers gain new skills to facilitate the transition from one job to another. The interviews occurred about twenty (20) months after the plant closed and ascertained how effective the program was in helping the workers find new jobs.

Seventy-six women had a new job. There was no significant difference in the employment status of women who participated in the program and those who did not (p. 281). Eighty-six percent (86%) of those who had participated in the program for more than three months were employed full time, compared to 54% employment among those who trained less than three months (p. 282). Also, “more of the women who participated were able to move into another economic sector: 41% were in service jobs, 15% in retail trade, and only 37% were in manufacturing” (p. 282). She finds that, to facilitate job changes, literacy training associated with transitions from one kind of work to another must be oriented toward real jobs that exist in a particular area, not general skills, and support systems must be in place.

Multimodality
As I mentioned in Chapter 1, literacy studies have examined the relationship between modes of representation and their rhetorical effects. This study considers intersections of modes of representation used at the workplace for training and other forms of communication, so I review relevant literature here.

Many recent studies of literate practices have discussed multimodality (Gee, 2003; Mayer, 2005; Mayer and Moreno, 2000; and the New London Group, 1996). In a seminal theoretical piece the New London Group, which is comprised of several literacy scholars, observed that new media forms affected ways by which people could make meaning and various practices that come into play in various contexts. They identify five different, unique modes of representation: print-linguistic, visual, audio, gestural, spatial; and they acknowledge that any two or more of these can be combined to form a multimodal representation. They acknowledge that,

we argue that literacy pedagogy now must account for the burgeoning variety of text forms associated with information and multimedia technologies. This includes understanding and competent control of representational forms that are becoming increasingly significant in the overall communications environment, such as visual images and their relationship to the written word - for instance, visual design in desktop publishing or the interface of visual and linguistic meaning in multimedia. Indeed, …; the proliferation of communications channels and media supports and extends cultural and subcultural diversity. p. 60.

With this observation, literacy researchers began considering various combinations of modes of representation that can contribute to communication. Further, literacy scholars
realize that pedagogy needs to integrate instruction in composing in these different modes of representation. The importance of graphic images in these literate practices is noteworthy because of the different kind of literacy at work relative to each—print-linguistic text and image, though both represent communication systems (Murray, 2009). In the past fifteen years, another focus of study within literacy studies has emerged that focuses on the use of multiple modes to communicate and related practices. Studies pertaining to this analysis seek to understand rhetorical attributes of mixed modes and when and under what conditions certain combinations are most productive.

Murray indicates that because of connections between language and consciousness a given combination may be meaningful for some people while the same combination will not be as productive for others because of differing backgrounds that include not just literacy training but literacy experiences and understanding of the universe (p. 16). Indeed, several theories of multimodality and this relationship between print-linguistic text and image have been presented, but each seems to have its own difficulties meeting the challenges of theory development.

Kress and Van Leeuwen (2001) attempt to develop a theory of semiotics that integrates terminology that can describe the various rhetorical dynamics at work in multimodal forms of communication. They recognize the relationship between composer and ‘reader’ as an interactive one; the reader acts upon a message as much as a composer initiates it. Furthermore, they articulate that the message is not just the content but its form relative to how it is presented and the interlocutors’ relationship to each other and their experiences. They introduce new terminology to the discourse of multimodality:
discourse, design, production, and distribution (pp. 4-5). Discourse pertains to socially constructed knowledge. Design pertains to the resources that one uses to create meaning. Design frames how meaning is made. Production describes the materiality of the expression, the media used to make the message visible/material. Distribution, similar to the fifth rhetorical canon of delivery, refers to the means by which readers access the material message (pp. 20-21). They also apply certain terms to explain the social interaction involved in making meaning. “Mode” pertains to the different “genres” of composition identified by the New London Group, of which Kress is a member. The term “medium” pertains to the material resources used to produce a message. “Experiential meaning potential” is also a new term that pertains to the roles that interlocutors’ past experiences play in contributing to making meaning out of a given message. Finally, “provenance” pertains to the importing of certain signs into different contexts to help interlocutors understand each other’s ideas and values (pp. 21-23). Through analyses of the content of several multimodal texts, ranging from artistic works to magazine covers and advertisements and bedroom displays, they illustrate application of these terms to discussion of multimodal forms of semiotic practices.

Mayer and Moreno (2000) report findings associated with several experiments they conducted toward developing a cognitive theory of multimodal learning. These experimental designs involved participants viewing multimodal texts and responding to particular questions about information in those texts to ascertain how much the participants learned. In one study, they report that seventy-eight college students viewed animation associated with the process of lightning generation combined with either
narration describing major steps in lightning formation (“AN group”) or with text on screen that involved the same words and timing (“AT group”). The groups were then tested on transferred knowledge, and the AN group developed more correct solutions than the AT group on the transfer of knowledge test. In another experiment, they report that one hundred and thirty-seven college students observed animation “in one of the following six conditions: one group of students viewed concurrently on-screen text while viewing the animation (TT), a second group of students listened concurrently to a narration while viewing the animation (NN), a third group of students listened to a narration preceding the corresponding portion of the animation (NA), a fourth group listened to the narration following the animation (AN), a fifth group read the on-screen text preceding the animation (TA), and the sixth group read the on-screen text following the animation (AT)” (parag. 9). The narration-related groups performed better than the text-related groups in problem-solving knowledge transfer (parag. 10). In a third experiment, Mayer and Moreno report that sixty-nine college students participated in a two-way analysis of variance “with the between subjects factors being redundant or non-redundant verbal information (A-NT and ANT versus A-N and AN, respectively) and simultaneous or “sequential presentation” order (AN and ANT versus A-N and A-NT, respectively)” (parag. 13). Mayer and Moreno conclude that students who received “sequential presentations” performed better (more creative solutions) on the knowledge-transfer test (parag. 13).

Generally, Mayer and Moreno found that certain combinations of visuals and text information affect learning, suggesting a relationship between modes used to
communicate and their rhetorical impact. In an instructional context, combining visual and verbal/aural modes of representation is more powerful or accomplishing the instructional purpose than using only narration or visuals alone. From these experiments they formulated several principles associated with multimedia instruction. Mayer (2001) summarizes their multimodal principle with the statement that people learn better when pictures and words are integrated into an instructional message than when only words are used (p. 63). When only words are used people may attempt to “build a visual model,” but they may not attempt to do so. If a picture is provided, people can make the visual connection more readily. Mayer also asserts that it is vital to eliminate extraneous material—words, images and sounds—from any multimedia message. Such irrelevant information “competes for cognitive resources in working memory,” disrupting the learner’s ability to organize and retain relevant information (p. 113).

Schnotz (2005) reviews several studies pertaining to the influence working memory has on learning with multimedia, and develops a model of text/picture comprehension that considers working memory. Visual images that integrate text are easier to process because fewer processes of working memory are involved. According to Baddeley’s (1986) model of working memory there is a phonological (auditory) channel and a ‘visuo-spatial’ (visual) channel associated with short term memory. Based on his meta-analysis of empirical studies on students’ learning ability with multimodal instructional texts, Schnotz finds positive effects and negative effects of text/picture combinations. Among the positive effects are: coherence between text and pictures reinforce messages, when auditory and visual channels are used, the reader is able to
process information better because attention is not split within a single channel, sequencing that places pictures before text are easier to process (p. 60-61). Included among negative effects are: redundancy, mapping may be complicated, information processing may be superficial--not deep, and some readers may use only certain representations and not others provided (pp 62-64). Schnotz suggests that when a visual image is presented to a reader, the reader can create a visual model as he/she listens to a narrative about the picture. If only text is used, the reader is forced to process the words while also trying to develop a mental model of the concept or activity. This creates an overload in working memory and compromises ability to learn (pp. 54-55). By facilitating use of both channels, people can better process information than they can when too much of one system is used.

In a meta-analysis of meta-analyses of empirical studies, Clark and Feldon (2005) challenge a number of commonly held beliefs about the effectiveness of multimedia learning by reviewing research studies and using meta-analysis to identify potential challenges to learning with multimedia tools. They find in these meta-analyses that multimedia approaches may not work on all people because of individual differences in learning styles and the nature of information being presented (p. 98). Also, multimedia instruction may not be as motivating a learning tool as proposed. An important consideration in Mayer’s theory is that he accounts for individual differences based on learners’ experiences and knowledge prior to receiving instruction. These individual differences limit the ability of scholarship to generalize the benefits of multimedia approaches to learning.
Kalyuga’s (2005) conducts another meta-analysis of research concerning the “prior knowledge principle” and its impact on multimedia learning. She examines eight particular studies, all of which used experimental designs to measure learning with multimedia learning tools. She finds that, across the studies she reviews, learners who had some prior experience with a similar task were able to learn a new task more quickly than those who had no prior experience with that task (p. 325). This suggests that a trainer or teacher should come to understand a learner’s prior experiences with and knowledge about a given task so as to customize the mode of instruction accordingly (p. 334). Such customization may improve learning.

Gee (2003) asserts that how people read and think about a particular thing is determined by their experiences with certain social groups. Through social practices such groups “encourage people to read and think in certain ways, and not others, about certain sorts of texts and things” (p. 2). Learning is a social practice; it occurs in some kind of social setting generally. Gee identifies a marriage between the semiotic domain and situated practice (p. 26). Reading and writing print text is an example of a semiotic domain. Combining notions of socially-constructed learning and semiotic domains, this also brings to mind the importance of understanding a user’s existing literacies when using certain approaches or modes in training. How much time one needs in order to learn the new mode will affect how quickly he or she will learn the task being presented. It is important to understand modes in which trainees have learned previously.

Further, as Mayer does, Gee connects prior experience and knowledge to learning. People learn by making connections between past experiences and new experiences (pp.
75-76). Games also, however, teach critical thinking by encouraging users to evaluate their experiences and apply that learning to new encounters (p. 92). Because the training at the workplace associated with this study integrated multiple modes of representation, these studies can inform an analysis of data pertaining that training.

**Literacy Sponsorship**

Brandt (2001) interviews eighty (80) participants from a particular county in Wisconsin who represent different birth cohorts or generations about their historical literacy practices. Her interviews focus on identifying not only literacy practices but what “people, institutions, materials and motivations that contributed to literacy learning” (p. 9). Based on these interviews, she conducts content analysis to compare experiences and phenomena that emerge. Among these phenomena is that certain institutions seem to encourage, facilitate, or restrict literacy for their own purposes. Brandt calls this “sponsorship.” Brandt describes sponsors as “any agents, local or distant, concrete or abstract, who enable, support, teach, and model, as well as recruit, regulate, suppress, or withhold, literacy—and gain advantage by it in some way” (p. 19). Because of their connection with economies and policy development, she explains that “sponsors are delivery systems for the economies of literacy” (p.19). Literacy, in this respect, is a form of capital that sponsors use to compete and gain economic and/or political advantage. As one develops particular literacy skills associated with a given form of literacy, he or she becomes useful to the agent that facilitated that learning. Because of this benefit that both the agent and the individual receive, she also observes a reciprocal relationship between sponsor and sponsored (p. 19). Whether through church functions, home practices, school
or the workplace, people tended to engage in certain literacy practices as part of their participation in these institutions. She notes that these institutions benefitted from certain practices and, consequently, encouraged and facilitated learning of those practices while discouraging or restricting other practices. There can be multiple sponsors of literacy in a single institution as well. As a particular workplace assumes a major role in a given community’s economy it cannot help but become a sponsor of literacy. However, the particular ways it sponsors literacy are affected by those political and economic dynamics that affect it. Just as a company must respond to the economic pressures around it, these responses may affect what literacies it uses and how it uses and sponsors them. Brandt finds that as technology changes literacy dynamics, pressure from industries to keep up with that technology affects what literacies they esteem. These changes seem to effect “literacy crises.” With new communication technologies comes the need for new literacy skills, but literacy instruction does not change as quickly as technology changes.

Conclusion

This review shows that, while the field of literacy studies recognizes the different forms of literacy and modes of representation that occur in different settings, certain institutions associated with the dominant culture advance particular ideologies that value certain forms of literacy practices over others within a given ecology. Because of their position, the federal government, businesses and industrial companies—policy-makers and workplaces—exert considerable influence in this valuing of certain practices. They act to sponsor certain forms of literacy toward particular economic goals. Empirical study
of a range of particular practices unique to those different settings can contribute to an understanding how those practices affect and are affected by a particular ecology.

Recent scholarship has focused on researcher-observer or researcher-participant ethnographic studies that attempt to account for a variety of variables within a given ecology. However, literacy scholars are calling for historical research that considers the implications of broader contextual factors that affect literacy sponsorship. The adage, “Hindsight is twenty-twenty” seems appropriate to characterizing these calls; with the broad lens of historical perspective applied to a local case study of literate ecology, studies such as this one can facilitate this analysis toward informing literacy planning and policy.
Chapter 3

Methodology

“…the raison d’etre of content analysis is the lack of direct observational evidence”


As I described in Chapter 1, literacy practices are part of a particular, dynamic ecology in which people’s uses of literacy are affected by environmental variables and may affect those environmental variables. Fleckenstein, Spinuzzi, Rickly and Papper (2008) assert that, “An ecological orientation to research emphasizes the need for research diversity: multiple sites of immersion, multiple perspectives, and multiple methodologies within a particular discipline and research project” (p. 401). Such research considers a variety of contexts within a given study including workplaces, churches, neighborhoods and historical dynamics (p. 401). Examination of multiple sources of information can triangulate data to ensure reliable findings and conclusions.

Krippendorff’s words preface the chapter because the principle analytical method of this study is content analysis within case study design. Much of the theoretical grounding for my research methods comes from content analysis theorists Krippendorff, Silverman (2006), Crano and Brewer (2002), Weber (1990), and Holsi (1969) because they consider general dynamics of such analyses. However, I also call upon multimodal content analysis theorists Bateman, Delin and Henschel (2007), Mathiessen (2007), Rowley-Joliet (2004), Royce (2007), and Unsworth (2007) relative to document analyses.
involving multimodal attributes. Yin (1989) acknowledges six “sources of evidence” within case study design, and three of them—documentation, archival records and interviews—are a part of this study. I apply content analyses to the data collected from these sources. This approach is necessitated largely because of the constraints of an historical study of literacy practices: In an historical study, one cannot observe practices in use as many ethnographic studies do; one must analyze content from sources available to facilitate study of those practices.

The principle research question associated with this study is: As the primary employer in Fieldview Ohio, how did the government and operators of the Boomtown Arsenal sponsor literacy for its employees and for the community of Fieldview, Ohio from 1940-1960 and what ecological factors influenced this sponsorship? Responses to this question can inform broader scholarship in the intersection of workplace, community, school and home literacy practices. Thus, this study also addresses a broader question about the relationship between sponsorship and the ecology of literacy metaphor: How can workplace literacy sponsorship affect literacy practices within the community in which an employer operates, and how can a community’s literacy practices affect an employer’s literacy sponsorship?

Because research questions drive methodological considerations, I have broken this question further into related questions, which I identify as I discuss the different methods associated with the study. These questions include:

What literacy practices were required in the workplace?

What relationship between print-linguistic literacies and visual literacies existed
What literacy practices occurred in school?

What literacy practices occurred at home?

What literacy practices occurred in the community?

What literacy-related institutions or programs did the government or operators fund?

What intersections between these practices exist?

Inferences from answers to these questions can address the following questions:

What groups may have benefited from this sponsorship?

What groups may have been negatively affected by this sponsorship?

In this chapter, I discuss methods used in the study, acknowledging how the method facilitates analyses which address the research questions. I describe my use of interviews; then, I discuss content analyses of archived documents and the use of statistical tests to facilitate qualitative analyses.

**Foundation of the Study**

Having read scholarship in community literacy practices and intersections between workplaces and school practices and school and community/home practices, I was interested in studying potential intersections between workplace and community practices. Though the Arsenal’s munitions operations have been closed and the space is used primarily as a training site for ROTC programs, its presence still maintains a considerable place in the history of the area. Periodic news stories recall its activities during WWII and the Korean War, and news about decontamination efforts appear in the
news as well. Because of the size and significance of this unique site, I began to look into its relationship with the literacy practices of people who lived near it.

In October of 2006, I approached a colleague whom I knew was associated with the county historical society about my interest in studying the literacy practices associated with the Arsenal and the surrounding communities. She immediately gave me the name of the president of the Fieldview Historical Society, whom I contacted via e-mail and met with at her home. As president of the community’s historical society, she was in a unique position to provide general information about Arsenal-related migration into the area as well as the community’s general relationship with the Arsenal. She gave me access to some print materials that described general historical information about the community, the school district, and the Arsenal.

At this time, I also contacted the Arsenal about my interest in studying literacy dynamics there, and I eventually was referred to its archivist. I came to learn that she had been there for two years organizing the various documents at the Arsenal as part of an effort to develop a database of archival records. She gave me access to historical summaries, which were produced at irregular intervals during the Arsenal’s operations. I reviewed these for information about the Arsenal’s history and literacy practices during the periods summarized. I did not review all of the historical summaries; rather, I focused on those that were produced during the WWII years, the Korean War years, and the Vietnam War years; because the Arsenal ended manufacturing operations permanently after the Vietnam War, and its storage operations were dramatically reduced then. The Arsenal operated primarily as a Reserve Officers training ground after the Vietnam War.
In this review of documents I focused on literacy-related themes identified by Brandt (2001), such as identifying what kinds of materials workers read or wrote, how training occurred, and the kinds of backgrounds workers came from as well as historical information to help me understand certain contextual factors that influenced these practices. This review helped to frame the research questions for the empirical study as well help me to think about some coding attributes to consider as, perhaps, a first round of coding. I elaborate on the development of my coding scheme later in the chapter.

In addition to this data, I also reviewed several scholarly works describing historical patterns in migration of workers, educational background and industry in the state and nationally (Hobbs, 2001; Johnson, 2006; Nelson, 1995; Rodabaugh, 1975; Walsh, 1995). The remainder of this chapter describes the methods used for the empirical study of literacy practices within the particular ecology.

**Mixed Methods Design**

This study uses mixed methods within a qualitative case study design. It includes content analyses of interviews and archived documents. Yin (1989) characterizes case study research as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, wherein the boundaries between phenomena and context are unclear and in which multiple sources of evidence are used (p. 23). MacNealy (1999) acknowledges that “case studies tend to rely heavily on interviews” (p. 203). Yin, further, acknowledges that, “[o]ne of the most important sources of case study information is the interview” (p. 88). Generally interviews allow researchers to conduct open discussions about phenomena under study with participants. Yin also states that, “documentary
evidence is likely to be relevant to every case study topic” (p. 85). In particular, he explains the usefulness of reviewing documents to triangulate information from other sources as well as to enhance that information (p. 86). Yin cautions that researchers who use documents and archival records must try to understand the contexts in which the materials were developed and for what audiences (p. 88). Silverman (2006) points out that analysis of documents also facilitates an understanding of choices writers made regarding how to represent information for particular audiences (p. 152).

As an historical case study, I rely on analyses of documents that have been archived at the Arsenal as well as on data collected from interviews with members of the Fieldview community, some of whom worked at the Arsenal.

Interview Methods

Data Sources

In her study concerning what historical changes have occurred in literacy expectations and how people have been experienced these changes in their lives, Brandt (2001) uses interviews in which people tell literacy narratives and share stories about their experiences with literate activities (p. 4). Her study focuses on “economic and other material influences in literacy learning and practices” (p. 7). She reviews no documents but relies entirely on content analyses of the literacy narratives of her participants. She explains that life-story research integrates “historical, sociological, psychological and phenomenological inquiry...[and includes] structured and less structured interviews” (p. 10).
In this historical case study, I use a similar approach to Brandt’s, interviewing those who lived the historical literate experience. Some of the interview participants worked at the Arsenal during the period of study, while other participants who did not work at the Arsenal lived in the community, attending the school district and participating in community organizations. I rely on the interviews to help me understand practices inside the workplace beyond what the documents can provide as well as those literacy practices that occurred in the participants’ home, at school and in the community. These interviews reflect the participants’ recollections of their practices. A concern about these interviews is the sampling/population associated with it.

Many of the participants are over eighty (80) years old, and their memory may be fading. Much of the literature on concerns about memory related to interviews with elderly participants identifies issues associated with disorientation and dementia (e.g.: Eeles and Rockwood, 2008 and Taub, 1980). These studies recommend tests of cognition and recall prior to beginning formal interviewing. None of my participants had indications of disorientation or dementia, and people with whom I spoke about the participants acknowledged belief that the participants had a ‘sharp’ memory. Kirkevold and Bergland (2007) and Decker and Adamek (2006) acknowledge memory-deficits as a concern in qualitative interviews with elderly participants. Both recommend interviewers take additional time to establish rapport with their participants and to use less-structured interview, which Decker and Adamek acknowledge can yield “richer” and “more comprehensive” data than that gathered from structured interviews (p. 61). This could affect the accuracy of the data. I attempt to address this concern by triangulating data
sources; if a number of participants identified the same dynamics or experiences and practices, then I could conclude that the information is reliable.

Also, because of the Arsenal’s position in national defense and security policies associated with it, people who worked there may not feel free to share literacy narratives about the workplace practices. There was a security policy that forbade workers from talking about their work there. Also, their own literacy experiences are likely limited to those they practiced in the position(s) in which they were employed.

Consequently, not only can review of workplace documents triangulate interview data, it can also provide information that interview participants may not share. Interview data sheds light on recollections of general practices of each person, helping to build an understanding of home, community school as well as workplace practices; review of actual workplace documents helps to understand specific practices and expectations of writers and readers there and to triangulate interview data pertaining to the workplace practices. While I acknowledge any discrepancies that emerged as I present findings in Chapter 4, a very large proportion of the data is supported by this triangulation.

**Data Collection**

Content analysis of interviews can address the question: As a major employer in Fieldview Ohio, how did the government and operators of the Boomtown Arsenal sponsor literacy for its employees and for the community of Fieldview, Ohio from 1940-1960 (that is, what kinds of literacy practices did they enable, support, teach, model, regulate, suppress or withhold) and what ecological factors affected this sponsorship?
Further, information gathered in interviews can answer many of the related questions identified above, specifically:

What literacy practices occurred in the workplace?
What literacy practices occurred in school?
What literacy practices occurred at home?
What literacy practices occurred in the community?
To what degree did Arsenal employees talk about workplace literacy practices outside of the workplace?

Sampling

The total population of possible participants is limited to people who lived in the particular community during that time frame and those who may or may not have worked at the Arsenal, too. Consequently, my sample includes some who worked at the Arsenal and some who did not work there but lived in the community at some point during the period of study. However, because this is an historical study, and one must consider that people move to other places and people may pass away, my sampling population is limited to those who stayed in the area and are still living. Further, in attempting to facilitate a sampling that provided a cross-section of the population of the area during the time period, I used two sources to recruit participants:

1) I made announcements about my research project, inviting people to participate, at two of the local historical society meetings—one at a November meeting attended by approximately one hundred (100) people, and the second at the February meeting, attended by approximately thirty (30) people. At each meeting a speaker was scheduled to present information about local history. Prior to the presentation society leaders permitted me to announce my project and facilitate volunteers. Generally, I introduced myself as a graduate
student at Kent State University who was studying the relationship the Arsenal had with the community and I was focusing on reading and writing practices of people who worked at the Arsenal and/or lived in the community between 1940 and 1960.

2) Several members of the historical society gave me names and contact information of people who did not attend the meetings at which I made the announcements but whom they thought would be willing to participate, and I followed up with these referrals via phone or e-mail or both. This list of total referrals included twenty-three (23) names.

I called anyone who wrote their name and contact information in response to these announcements or were referred to me. In each of these conversations I acknowledged the nature of my study, what their participation would entail (an interview lasting approximately 30 minutes) and asked if they would be willing to participate. If they had any questions, I tried to respond to them as best I could. Most (18) of these people were willing to participate, and I made an appointment to interview them at their home, with IRB approval of the research protocol.

Because the sample is derived from announcements at a social gathering and referrals, this is a convenience sampling. Also, all of the volunteers from this initial set of announcements and calls are Caucasian. According to Rodabaugh (1975), African-Americans comprised approximately 2.5% of total war-related employment in 1940 and 8.2% of total employment in war-related industries in 1945. African-Americans also
worked at the Arsenal and lived in the community; however, while records documenting the total number of employees and their gender and ethnicity breakdowns were maintained, almost all of these records are lost or destroyed. The only record of this data that I could find was within the historical summary of July to December of 1943. According to this summary, African-Americans (termed “negroes” in the archived documents) comprised at most about 11% of the workforce there during that period (see Figure 3.1).

Figure 3.1: Gender and Ethnic Breakdown of Employment

<table>
<thead>
<tr>
<th>Month</th>
<th>Male</th>
<th>Female</th>
<th>White</th>
<th>“negro”</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>July, 1943</td>
<td>3947</td>
<td>2622</td>
<td>6289</td>
<td>280</td>
<td>6569</td>
</tr>
<tr>
<td>Aug</td>
<td>5026</td>
<td>2855</td>
<td>7366</td>
<td>515</td>
<td>7881</td>
</tr>
<tr>
<td>Sept</td>
<td>4799</td>
<td>2775</td>
<td>7065</td>
<td>509</td>
<td>7574</td>
</tr>
<tr>
<td>Oct</td>
<td>4643</td>
<td>2803</td>
<td>6854</td>
<td>592</td>
<td>7446</td>
</tr>
<tr>
<td>Nov</td>
<td>4503</td>
<td>3105</td>
<td>6731</td>
<td>877</td>
<td>7608</td>
</tr>
<tr>
<td>Dec</td>
<td>4359</td>
<td>2941</td>
<td>6473</td>
<td>827</td>
<td>7300</td>
</tr>
</tbody>
</table>

from History of BOP, Vol II, p. 8

In an effort to include the experiences of African-Americans in the interview sampling, I asked the president of the historical society if she knew of any African-Americans from the community who may be willing to participate. She gave me a list of a dozen African-Americans whom she knew as a student in the school district, not knowing where they now lived. I searched for their contact information in the phone book and Online, and I contacted those six (6) for whom I could ascertain contact information. Three of these were via phone, and three were via e-mail. In spite of these efforts to recruit African-Americans, none volunteered. As I did when I contacted those in the initial set of referrals and volunteers, when they declined my request, I did not pressure them into participating nor did I inquire as to why they would not participate. Consequently, my sample includes only Caucasians.
The sampling also includes more than twice as many females as males (13 females - 5 males). Women tend to outlive men by approximately five (5) years: the average life expectancy is 80.5 years for white females and 75.3 years for white males (Shrestha, 2006). According to the 1943 historical summary of operations, until September/October of 1942, males made up a large majority of the workforce at the Arsenal. However, in Sept/Oct 1942 “experiments” were conducted to ascertain which production operations could be performed by women. “These tests demonstrated the fact that many operations heretofore thought too strenuous for female labor could be performed efficiently by them” (p. 313). So, gender-related employment shifts, especially on load lines, where most of the assembling of munitions occurred. Figures 3.2 and 3.3 below provide an illustration of gender-related employment patterns on two load lines, showing this shift.

<table>
<thead>
<tr>
<th>Date</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/25/41</td>
<td>34</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>9/30/41</td>
<td>174</td>
<td>11</td>
<td>185</td>
</tr>
<tr>
<td>10/25/41</td>
<td>398</td>
<td>6</td>
<td>404</td>
</tr>
<tr>
<td>11/30/41</td>
<td>684</td>
<td>15</td>
<td>699</td>
</tr>
<tr>
<td>12/30/41</td>
<td>630</td>
<td>69</td>
<td>699</td>
</tr>
<tr>
<td>1/31/42</td>
<td>975</td>
<td>60</td>
<td>1035</td>
</tr>
<tr>
<td>2/28/42</td>
<td>1420</td>
<td>60</td>
<td>1480</td>
</tr>
<tr>
<td>3/30/42</td>
<td>1916</td>
<td>60</td>
<td>1976</td>
</tr>
<tr>
<td>4/30/42</td>
<td>1826</td>
<td>60</td>
<td>1886</td>
</tr>
<tr>
<td>5/30/42</td>
<td>1767</td>
<td>60</td>
<td>1827</td>
</tr>
<tr>
<td>6/30/42</td>
<td>1834</td>
<td>60</td>
<td>1894</td>
</tr>
<tr>
<td>7/30/42</td>
<td>1664</td>
<td>60</td>
<td>1724</td>
</tr>
<tr>
<td>8/30/42</td>
<td>1489</td>
<td>60</td>
<td>1549</td>
</tr>
<tr>
<td>9/30/42</td>
<td>1346</td>
<td>60</td>
<td>1406</td>
</tr>
<tr>
<td>10/31/42</td>
<td>1268</td>
<td>125</td>
<td>1393</td>
</tr>
<tr>
<td>11/30/42</td>
<td>1111</td>
<td>578</td>
<td>1689</td>
</tr>
<tr>
<td>12/31/42</td>
<td>868</td>
<td>726</td>
<td>1594</td>
</tr>
<tr>
<td>1/30/43</td>
<td>670</td>
<td>707</td>
<td>1377</td>
</tr>
<tr>
<td>2/27/43</td>
<td>624</td>
<td>617</td>
<td>1241</td>
</tr>
<tr>
<td>3/27/43</td>
<td>446</td>
<td>422</td>
<td>868</td>
</tr>
<tr>
<td>4/30/43</td>
<td>537</td>
<td>614</td>
<td>1151</td>
</tr>
<tr>
<td>5/31/43</td>
<td>524</td>
<td>867</td>
<td>1391</td>
</tr>
<tr>
<td>6/30/43</td>
<td>408</td>
<td>643</td>
<td>1051</td>
</tr>
</tbody>
</table>

From History of BOP Vol I, p. 314.

<table>
<thead>
<tr>
<th>Month</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 1941</td>
<td>61</td>
<td>0</td>
<td>61</td>
</tr>
<tr>
<td>Dec 41</td>
<td>200</td>
<td>0</td>
<td>200</td>
</tr>
<tr>
<td>Jan. 1942</td>
<td>291</td>
<td>0</td>
<td>291</td>
</tr>
<tr>
<td>Feb</td>
<td>370</td>
<td>0</td>
<td>370</td>
</tr>
<tr>
<td>March</td>
<td>530</td>
<td>0</td>
<td>530</td>
</tr>
<tr>
<td>April</td>
<td>257</td>
<td>0</td>
<td>257</td>
</tr>
<tr>
<td>May</td>
<td>459</td>
<td>0</td>
<td>459</td>
</tr>
<tr>
<td>June</td>
<td>508</td>
<td>0</td>
<td>508</td>
</tr>
<tr>
<td>July</td>
<td>599</td>
<td>0</td>
<td>599</td>
</tr>
<tr>
<td>Aug</td>
<td>422</td>
<td>0</td>
<td>422</td>
</tr>
<tr>
<td>Sept</td>
<td>426</td>
<td>0</td>
<td>426</td>
</tr>
<tr>
<td>Oct</td>
<td>367</td>
<td>0</td>
<td>367</td>
</tr>
<tr>
<td>Nov</td>
<td>551</td>
<td>0</td>
<td>551</td>
</tr>
<tr>
<td>Dec</td>
<td>671</td>
<td>179</td>
<td>850</td>
</tr>
<tr>
<td>Jan. 1943</td>
<td>646</td>
<td>283</td>
<td>929</td>
</tr>
<tr>
<td>Feb</td>
<td>612</td>
<td>349</td>
<td>961</td>
</tr>
<tr>
<td>March</td>
<td>536</td>
<td>470</td>
<td>1006</td>
</tr>
<tr>
<td>April</td>
<td>382</td>
<td>192</td>
<td>574</td>
</tr>
<tr>
<td>May</td>
<td>233</td>
<td>112</td>
<td>345</td>
</tr>
<tr>
<td>June</td>
<td>305</td>
<td>246</td>
<td>551</td>
</tr>
</tbody>
</table>

pp. 321-322.
While female employment eventually exceeds male employment on Load Line I, this was not the trend at the other three Load Lines reported. This data is important because it shows the gender-related inconsistencies in employment across different time-periods included in the study, which can affect the degree to which the interview sampling represents the population of employees who worked at the Arsenal. The interview sampling includes two females who worked at the Arsenal. Also, the interview questions invite participants to share information about practices that any of their relatives who worked at the arsenal shared with them in an effort to include more of the experiences of those who worked at the arsenal. One of the interviewees who did not work at the Arsenal spoke of an aunt who worked there. Consequently, the interview data includes perspectives from female workers.

Finally, because many who worked at the Arsenal during World War II were migrants who relocated elsewhere after employment there ended, the sampling represents people who lived in the area prior to construction of the Arsenal and those who migrated and stayed in the community. I was not able to ascertain the number who migrated into the area for work at the Arsenal during the period of study and then who migrated after work there ended. I was, also, not able to ascertain specific figures regarding migration into the area for work at the Arsenal. While the interview sampling includes some whose families migrated into the area for work, I do not know the degree to which the sample represents the population.

Figure 3.4 shows a breakdown of the interview participants.
Eleven (11) of the eighteen interviewed were students in the Fieldview school district at different points during the period studied. Five (5) worked at the Arsenal during the period studied and two worked in the community; one of these was a teacher in the Fieldview school district. Thirteen (13) were female (approximately 72%), while five (5) were male (approximately 28%). Six (33.3%) of the participants were native to Fieldview prior to 1940, and five (27.8%) migrated to the area between 1940 and 1950. Six migrated to the area between 1950 and 1955, and one migrated to the area after 1955. Of the twelve (12) who migrated, five migrated from within Ohio, while four (4) migrated from more than one state away. Nine (9) of the twelve (12) who migrated to the area did so for work-related reasons. Four (4) migrated for work specifically at the Arsenal. Eleven (11) participants reported that they, their parent(s) or a relative worked at the Arsenal. One participant was unable to recall what kind of work their relative did.

Figure 3.5 shows the breakdown of the ten (10) Arsenal-work positions reported.

<table>
<thead>
<tr>
<th>Position</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction/carpentry</td>
<td>3</td>
</tr>
<tr>
<td>Secretarial</td>
<td>2</td>
</tr>
<tr>
<td>Line/labor</td>
<td>3</td>
</tr>
<tr>
<td>Supervisor</td>
<td>2</td>
</tr>
</tbody>
</table>
Generally, then, the interview sample includes representation of people who were native to the area prior to the Arsenal’s construction as well as those who migrated into the area for work at the Arsenal, those who worked at the Arsenal—male and female—and who held different positions there, and those who did not work at the arsenal but experienced community, home and school-related literacy practices.

Interview Questions

The interviews are semi-structured to open-ended (Silverman, 2006). The script that I used for the interviews is in Appendix A. Most of the questions follow those Brandt used in her study (2001). While she asked her participants about various reading and writing practices, Brandt’s questions were open-ended to allow participants to provide responses that included narratives of particular practices. I use similar questions because of the open-ended nature of the questions and because they allow participants to speak freely of their experiences. Generally, the script acted to guide the questioning; however, after ascertaining demographic information, the interviews tended to occur as conversations with the participants responding at length to several questions. These responses often integrated information that could answer other questions in the set because of relationships between questions. For example, question 17 asks, “How much reading was required of the training program?” and question 19 asks “How much reading was required in the job(s)? What kind?” Some participants included job-related reading requirements as they responded to question 17. Consequently, most of the interviews do not follow the script as it appears. Sometimes, a response facilitated a question not in the script as a follow-up to clarify or explain some information.
While a set of questions existed, participants were not limited to a unique set of potential responses and could convey whatever information they felt was relevant to a question. Silverman also acknowledges that interview questions can generate data about various kinds of knowledge ranging from facts to beliefs about facts and present and past behaviors as well as feelings and motives (p. 120). For the most part, the questions I ask pertain to the participants’ recollection of past behaviors based on facts or their perception of facts. The questions do not ask about motivations for those behaviors. As I indicated earlier, participants’ memories may have faded; however, if several people articulated similar experiences, I would consider that to be source triangulation of data.

Heath (1993) acknowledges a concern about how the way she spoke to interview participants may have affected their responses (pp.264-265). Considering this concern, I tried to be careful with my speech and even dress so as to make the participant feel comfortable. I wore casual, sporty clothes—generally a dress shirt or pull-over shirt along with pants. I wanted to make the participants feel at ease while also appearing as a professional researcher. I tended to sit between 3 and 8 feet from the participant, depending on the floor plan of the room in which the interview occurred. Usually we sat at a kitchen, dining room table, while a few interviews occurred in the participant’s living room with the participant sitting at one chair and me at another chair and an end table or coffee table between us.

With the consent of the participants, I recorded the interviews with an Olympus DS-2 digital voice recorder. Because the voice recorder is able to record meetings without an external microphone, I placed the recorder in a location approximately
equidistant between the participant and me. Prior to beginning the recording, I gave the participant a minute or two to look over the script to help them think about some responses ahead of time. Then, I asked the participant if he or she was ready to begin and began recording upon ascertaining their readiness. After the response to the last question, I thanked the person for participating and then stopped recording. In some cases our conversation about the interview resulted in their sharing some more information, which I wrote in a notebook that I had and in which I noted certain experiences or practices that seemed to stand out.

Transcription

After recording the interview, I transcribed each using the voice recognition software Dragon NaturallySpeaking 12.0. As I played back the recording, I spoke the words into the software, which then generated a transcript. As I did this, I often stopped the recording and went back to ascertain the accuracy of the transcription, typing in corrections where necessary. Also, after generating a complete transcription, I reviewed the transcription with the recording, making any corrections as needed.

Because transcription should document phenomena relevant to the research questions (Geisler, 2004; MacNealy, 1999), I did not transcribe pauses or inflections or other oral language phenomena. My focus is on the themes of literacy practices articulated in the response, not how the response was said. While phonological attributes may affect meaning, the participants all spoke the same dialect of English as the researcher. Furthermore, pauses document a break in language flow; they do not document reasons for that break. The researcher could only speculate as to the reason for
a pause: was the person thinking about a response, was the person trying to clarify facts in their mind as they recalled them prior to articulation, was the person distracted by someone or something in the room at the time of the pause? On more than one occasion, for example, a pet entered the room where the interview occurred, distracting both the respondent and interviewer momentarily.

Further, a couple of interviewees digressed from the focus of a given question, offering information that went beyond the scope of the study. Near the end of two interviews, specifically, the participant of each began to describe practices that occurred after the period of study-- some of which involved Arsenal-related practices, most of which involved work or other activities elsewhere. In such cases, I weighed the information offered and its relevance to the study. If the information contributed to the study by describing a temporal trend pertaining to the Arsenal’s sponsorship, I transcribed it. If it did not seem to contribute to the study, I did not transcribe it; though, I noted in the transcription the nature of the discussion.

Because I did not videotape the interviews, I also cannot integrate non-verbal cues or gestures that participants used into transcription. Consequently, I do not document places where such gestures may have affected an oral response from me. An example of this is the following exchange, during which Roger responds to my question about training he received:

R: You pick up a shell, put it in a vice

Me: And they showed this to you or you didn't have anything to read but they showed you how to do this?

R: No, no. It was very…
Roger explains the process of drilling a shell casing. As he did this during the interview, I recall that he used his hands to gesture the motions involved. He had said nothing about reading a manual or receiving classroom instruction for the procedure; so, I asked him how he came to learn that process. He begins a response and pauses to think of a term that describes how he learned the process. During that pause, he gestured with his hands. The exchange prior to this pause and his gesturing prompt my offering of the term “hands-on.”

These items can be considered limitations of the methodology. Had I videotaped the interviews, I could document more precisely a number of gestures and expressions not articulated. Also, by not documenting pauses or inflection attributes, I limit the data documented to oral language. However, in both cases, the limitation does not dramatically affect the data collected relative to the scope of the study.

Unit of analysis

Holsti (1969) identifies six generally used units of analysis for content analysis:

Word or symbol, theme, character, sentence or paragraph or item (pp. 116-117).

Generally, he acknowledges that “word” or “symbol” is the smallest unit used, while “item” is “too gross for most research and may present problems when items fall between two categories” (p. 117). For this study, I use “theme” as my unit of analysis, which Holstl labels as the most useful unit for content analysis (p. 116). Holstl characterizes the
“theme” unit as an assertion made about some subject. In using “Theme,” the researcher must break down a particular statement into a single theme or themes to facilitate tabulation into categories. I identify categories later, however, understanding theme as my primary unit for content analysis helps explain transcription and document selection approaches. Generally, my categories reflect themes of literate practices across spheres of work, home, school and community, similar to those identified by Brandt in her study. That is, in Brandt’s study, home literate practices generally involved writing letters to friends or relatives and in diaries or journals and reading newspapers or books. School-related literate practices involved reading textbooks or literature and writing essays or creative works. Community-related practices included reading and writing organizational newsletters and religious texts. Workplace literate practices included reports, manuals, newsletters and correspondence.

Categories and Coding:

As acknowledged above, content analysis of interviews can identify the presence of literacy practices across spheres of work, home, school and community. Because I am trying to ascertain the presence of certain literacy practices at home, school, in the community and at the workplace, as well as any interactions thereof, the categories I use emphasize those particular practices.

Again, the questions are provided in Appendix A. In this section I explain coding of responses to these questions. Most questions are coded relative to the presence of certain practices relative to those themes identified above; for example, “home writing” is coded relative to the presence of “journals and diaries,” “correspondence;” and “work
reading” is coded relative to “correspondence,” “reports,” and “manuals.” These are coded as nominal data (categorical data), rather than as interval data (indicating some quantitative value), to avoid suggesting any value of literacy level or skill associated with any particular practice. Nominal variables do not suggest any particular ordering, ranking or value associated with them. If, for example, I were to format “home writing” as an interval or ratio variable and give “correspondence” a higher value than “diaries,” it would suggest that skills associated with correspondence are valued more or are more rigorous than skills used for writing diaries. I list all categories and related codes in Appendix B.

In coding passages from transcripts, I considered the information a particular question sought and then looked for certain codes represented in the response. I did not count how many times a given code was acknowledged; only whether it was acknowledged. An example is from the exchange below:

Dirk: Did you do any reading or writing outside of school? You mentioned the Methodist Church writing that you did. Anything at home or leisure reading newspapers?

Steve: I did letters—did a lot of letter writing and those types of things… to grandparents and I did some reading but not a lot of reading. I was a worker—had a paper route and paper routes and did a lot of work through school. We didn't have a whole lot of money. We just did those types of things.

This exchange would result in my coding this participant’s home writing activity as limited to “letter-writing.” I also coded for non-print-linguistic literate practices any participants identified, because I consider the New London Group’s (1996) conception of multi-literacies and multiple modes of representation within the scope of the study. A few of the participants who worked at the Arsenal acknowledged the hands-on training
associated with their work there, which I coded as visual, aural and experiential (combining spatial and gestural modes identified by the New London Group).

Two participants acknowledged literate practices other than print-linguistic outside of the Arsenal. Lucy spoke of writing in Braille (a tactile literate practice) at home so that she could correspond with her brother who was blind and attending classes in another city. This is an exceptional practice because it is used in the limited context of a home that included a disabled family member. Also, Claire spoke of drawing a map as part of a school assignment, suggesting that some visual literate practices occurred in school. I discuss this item in Chapter 4 because of the link to a school-related practice, but it represents the only occurrence of a visual mode of literate practice associated with practices outside of the workplace.

An example of coding a relative’s workplace literacy experience, from the same interview, is below:

Dirk: okay, you mentioned that your father worked at the arsenal and that he participated in the construction of it. what did he do at the arsenal when he started there?
Steve: he was in supervision and supervision in various titles for number of years and he retired in 1982 after 42 years at Boomtown arsenal.

For this exchange I would code the work experience represented as the person’s “parent,” the position as “supervisor” and employment years as “over 40.” If the participant shared information about the relative’s experiences at the Arsenal, I included that information in the data set, which would then provide a more comprehensive picture of literate practices at the Arsenal.
I avoided asking many follow-up questions, beyond clarifying the information a question sought, based on responses in order to avoid heavily customizing the interview to particular individuals. By asking the same questions of all participants and letting them articulate a response based on their understanding of a question, the questions maintain some consistency across interviews.

Inter-rater Reliability

To test for reliability of coding for interview analyses, I called upon a colleague who had a master's degree in English and was a PhD candidate at the time of the coding activity. She reviewed transcripts of 6 of the 18 (33%) interviews. Training included review of my categories and coding schemes as well as illustrations of my coding of some materials included in the sample of materials that they reviewed.

I used simple agreement as the index for inter-rater reliability. In spite of its weakness as somewhat misleading, simple percent agreement is identified in literature as the most popular form of inter-rater reliability measure for content analyses (Lombard, Snyder-Duch, and Bracken, 2002). This scholarship identifies .8 (80% agreement) as an acceptable level. Inter-rater reliability of the interview coding was .95 (95%).

Analysis

Because of the largely categorical nature of the codes for the interview study, I consider patterns within the data to understand which practices were emphasized. That is, I examine patterns of the occurrence of each code associated with the categories. As certain codes are identified from the interview data more often than others, such
differences suggests emergence of a particular attribute or theme associated with that category. For example, if participants acknowledge more print-linguistic forms of literate practice at home (such as reading newspapers and writing letters) than other practices it suggests a theme that print-linguistic practices were emphasized at home. In addition to analyzing data for each category, I also review data regarding general trends across categories, such as the kind of reading and writing activities that occurred at school and at home to see if any thematic patterns arise. For example, if participants acknowledge more print-linguistic forms of reading and writing (such as reading newspapers at home and writing essays for school) than they acknowledge of visual practices (like the map-drawing acknowledgement related to school), it suggests an emphasis on print-linguistic skills over other literacy skills across spheres as a theme.

**Document Analysis Methods**

**Data Sources**

I also review documents from the particular workplace involved to better understand what practices it actually sponsored—encouraged, facilitated, limited, restricted for its own purposes. As I mentioned above relative to triangulating with interview data, reviewing as many different types of documents from the workplace provides another necessary data source to build a comprehensive picture of literacy practices there. I include in this corpus: historical reports/summaries that operators of the arsenal prepared at irregular intervals, depending on how active the site was; standard operating manuals, newsletters, incident reports and building specifications. The total corpus included in this study numbers over forty documents. In the next section I detail
data sources within the context of data collection. Review of the variety of documents sheds light on specific literacy practices across different levels of the organization.

Review of several documents at the worksite in order to address the research question: What literacy practices occurred at the Arsenal? Krippendorff (2004) observes that researchers can determine an effective sampling size by reviewing a large corpus of the entire population and selecting a smaller corpus of texts that represent patterns across the larger corpus (p. 123). I explain my process later in this section.

I contacted the Arsenal’s archivist, who had been working there for three years, documenting all print materials. She gave me access to an electronic database listing archived documents. However, she also acknowledged that this list was incomplete; many documents had not yet been included in the system. Documents not yet in the system were still disorganized, and part of her job was to bring some organization to the Arsenal’s materials. I studied forty-three (43) archival documents from the Arsenal to:

1) ascertain relationships between different modes used for representation and literacy expectations associated with them to address the research question regarding “What relationship between print-linguistic literacies and visual literacies existed at the workplace?”

2) ascertain literacy expectations through readability testing to address the research question “What literacy practices were required in the workplace?”

I drew randomly from the listing of available documents based on the number of documents archived relative to different types of documents. That is, first I ascertained some parameters of the number of documents of a given type and differences in those
numbers (e.g.: manual/SOP versus routine reports), and I did not use any systematic means of drawing texts for the sample other than skimming the catalog and picking from those published during the period of study. Figure 3.6 shows a breakdown of the types of documents and the number of each included in the sampling.

Figure 3.6: Documents Sampled

<table>
<thead>
<tr>
<th>Type of Document</th>
<th>Number Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual/Standard Operating Procedure</td>
<td>6</td>
</tr>
<tr>
<td>Newsletters</td>
<td>16</td>
</tr>
<tr>
<td>Routine Reports</td>
<td>11</td>
</tr>
<tr>
<td>Special Reports</td>
<td>5</td>
</tr>
<tr>
<td>Building Specifications</td>
<td>5</td>
</tr>
</tbody>
</table>

This distribution represents to some degree the distribution of available documents relative to each type. That is, there are more newsletters than any other kind of document; so, newsletters make up the largest proportion of documents in the sample, and the format of these ranges considerably across time (this is explained more in Chapter 4). There also seemed to be several routine reports, including historical summaries, but the format and style of these tends to be consistent. Specifically, these tend to be 8 1/2” x 11,” standard print format, integrating headings and subheadings and 1 inch margins, and using 12 point font size throughout. Also, the same kinds of sections are included and ordered similarly across documents. There are also several manuals/SOPs (standard operating procedures), but the format and style of them varies over time. In particular, a 1945 bomb SOP uses landscape format for graphics and text, and it integrates photographs associated with each step with the textual instructions for each step. Several SOPs from the 1950s use portrait format for text and photographs, and the photographs are appendixed relative
to the textual instructions. There are fewer special reports, such as incident reports; however, all of these are formatted alike. Also, there are several building specification documents, and these tend to follow the same format and style.

Content analysis of Arsenal archived texts addresses the following related questions:

What literacy practices occurred in the Arsenal’s operations?

What relationships between print-linguistic literacy practices and visual literacy practices exist?

The particular kinds of documents used at the Arsenal during the time period as well as information contained within historical summaries can inform the first of these questions. To answer the second of these questions, I reviewed the archives to identify particular modes of representation used in operations, responding to the following questions:

What modes of representation are used or described in documents (manuals, reports, summaries, correspondence and newsletters)?

To what degree are visuals and print-linguistic text modes used in certain kinds of documents?

What kinds of visuals are used relative to particular kinds of documents and their purpose?

What other modes of representation are identified in descriptions of operations?
What assumptions about readers’ literacy skills are implied within documents and literacy events that would involve different readers?

Sampling

Holsti (1969) acknowledges that sampling documents for content analyses generally occurs in a two or three stage process: identifying a list of sources, drawing a sampling of entire documents and sampling a limited number of pages from within documents (p. 130). This study uses all three of these stages for the analysis of archived documents:

1) The first round of coding, as described above, helped me to identify potential sources and characteristics of those sources. I reviewed those in the database to ascertain the number of documents and particular types of documents available. From this review I was also able to ascertain that I would need to use a stratified sampling. Crano and Brewer (1986) and Krippendorf (2004) acknowledge that stratified sampling involves recognizing unique subgroups within a given population. In the Arsenal’s population of documents, there were different types of documents available—newsletters, routine reports, special reports and manuals. These different kinds of documents represent different subgroups of documents; each is written for a unique subgroup of the worker population. Subgroups are identified in Figure 3.7.
Figure 3.7: Employee literacy-related subgroups

<table>
<thead>
<tr>
<th>Document</th>
<th>Subgroup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newsletters</td>
<td>General worker audience</td>
</tr>
<tr>
<td>Routine reports</td>
<td>Upper management/administration</td>
</tr>
<tr>
<td>Special reports</td>
<td>Upper management/middle management</td>
</tr>
<tr>
<td>Manuals</td>
<td>Line workers and supervisors</td>
</tr>
</tbody>
</table>

Because different readers and writers are associated with each subgroup and my research questions seek to ascertain reading practices across different kinds of employees within the Arsenal, I needed to distinguish between these subgroups.

2) I then sampled approximately twenty-five to thirty-three percent (25%-33%) of each type of document available and listed in the database. While scholarship generally does not identify a specific percentage of a given population as ideal for sampling, I use this figure because it would offer a reasonable amount of the population of each type of document from which general observations about the documents could be made. Generally, scholarship calls attention to challenges in sampling for content analysis, but the researcher’s responsibility is to try to ascertain a way to generate a representative sampling of the population. The population size is unknown, however finite, and drawing on a relatively large percentage of the known items would
provide a reasonable sampling for the entire population. I recorded aggregate information including the number of print-linguistic text pages and the number of pages that included graphics and the type of each kind of graphic to facilitate analyses of proportions of each. My research questions include analysis of relationships between different modes of representation and related literacy demands; so, recording this information would help to address those questions. There is quite a bit of variability in formats and lengths of the various documents. This sample size would give me a good idea of the range of modes used within each type of document while representing a relatively large sampling of the population. The first round of coding helped me to identify particular categories and coding for this analysis, as indicated above.

3) Finally, I sampled a limited number of pages to facilitate readability testing. Generally, I randomly opened the document, first, by placing my first finger at a random location, not counted or pre-determined- on the side of the closed document and flipped to that page. I then transcribed a few articles (newsletters) or complete page of text (other documents), and pasted that transcription into the testing tool, which is described later in this chapter. I did the same thing to flip to another page. I repeated this to collect several samplings from a given document.
Further, I tried to sample documents representing the time period’s range; that is, I sampled documents of each type (except for building specifications, all of which were from 1940 or 1941) from the 1940s, 1950s and 1960. Just as including interview participants with experiences just beyond the time period range allows for analysis of any changes in policy, such coverage with documents would allow for analysis of policy trends in the workplace. As I acknowledge above, some documents vary in format and style across time periods, so it is important to sample a range of documents within a given time period as well as across time periods associated with the study.

In analyzing documents I tabulated data relative to aggregate information. Aggregate information considers phenomena associated with an entire document, and these variables are provided below. This information would help in answering questions pertaining to certain literacy practices for particular kinds of documents and their readership, and in the next section I describe development of specific categories I used for the aggregate analysis.

Rhetorical Purpose of Document and Related Readerships

Generally, there appears to be several differences in the use of graphics across different kinds of documents relative to their general readership and literacy skills associated with those readers. However, these differences can also be attributed to the purpose of the document. Much scholarship finds that certain kinds of graphics are more useful than others for particular rhetorical purposes: generally, for example, photographs assimilate closely physical objects they represent, making them useful in instructions, while tables represent numeric data effectively for reports in which such information is
presented (Gurak and Lannon, 2007; Kolin, 2009; Helmers, 2006, Murray, 2009). Also, graphics placed within text of a document are considered primary graphics (immediately relevant to the purpose of the document), while those placed in appendixes are generally considered secondary in nature, supplementing the text information (Markel, p.141; Oliu, Brusaw and Alred, p. 69).

Further, as acknowledged in Chapter 2, Mayer (2001) and others (see, for example, the collection edited by Mayer, 2005) support the use of multiple modes in education and training materials because the different modalities can reinforce each other or certain modes may appeal more to certain readers than to others, and including both will facilitate learning for different kinds of learners. Murray also finds the value of redundancy in providing print-linguistic text alongside of related images in multimodal compositions (p.32).

Unit of Analysis

As with the interview analysis, the unit of analysis for the documents is that of themes. Certain themes pertaining to patterns in the use of the various modes of representation used in various documents and related literate expectations/demands emerge from the review of documents. The categories I identify below attempt to facilitate empirical analysis of those themes.

Categories: approaches

Development of categories to facilitate analysis is debated in the literature, especially regarding use of grounded theory approach, as indicated above (Crano and
Brewer, 2002; Holsti, 1969; and Krippendorf, 2004). Generally, one can use an “a priori” approach identifying categories prior to the actual collection of data; or one can use a grounded theory approach, letting categories that facilitate analysis emerge as one collects data. Strauss (1987) acknowledges that such analytical categories can be identified by the researcher at any of several phases in the research. Krippendorff acknowledges five (5) different ways to define the unit(s) of study for content analysis: physical distinctions, syntactical distinctions, categorical distinctions, propositional distinctions and thematic distinctions (pp.103-109). Two that work for the study of texts that include print-linguistic and visual modes of representation, multimodal representation, are physical distinctions and categorical distinctions. Because this study examines such relationships, I use similar categories. Categories related to physical attributes of a message that the literature typically identifies, though, include: amount of space on a page devoted to the object(s) of study, size of the object being studied on a given page and frequency of occurrences of a given attribute (Crano/Brewer, Krippendorff, Royce, Matthiessen). Krippendorff also acknowledges that frequency of occurrences can characterize categorical distinctions—the frequency that a given category of a variable occurs suggests something about its value. While different documents may use different relationships relative to their purpose, examination of a single kind of document or modes of representation across different readerships relative to a single purpose may find particular trends.

While little debate about “a priori” categories exists; Holsti and Krippendorf encourage grounded theory approach, while Crano and Brewer discourage it. Crano and
Brewer acknowledge that content analysis is a form of observational research, which necessitates identification of units prior to making observations (p. 247). Consequently, as acknowledged previously, I use mostly “a priori” categories. However, Holsti encourages grounded theory approach, acknowledging that the categories must reflect the research questions and that the standardization of a set of categories assumes a large corpus of research on a given phenomenon (pp. 101-102). Further, Krippendorf suggests that grounded theory approach is appropriate when he states that units, “emerge in processes of reading and thus implicate the experiences of the analyst as a competent reader” (p. 98). As noted above, Strauss (1987) explains that attributes of grounded theory approach can occur at each step in the research process (pp. 25-32). I used it principally within the concept-indicator phase, which Strauss acknowledges directs coding of certain empirical indicators (p. 25). Indicators are data that are indicators of a given “concept the analyst derives from them” (p.25). Strauss goes on to explain that through comparing similarities and differences across indicators/data a category emerges and related codes can be refined accordingly (p.25). While most of the categories I use have been identified to some degree in literature previously acknowledged, I observed two important attributes of the documents and used a grounded theory approach toward accounting for those items; consequently, my coding reflects certain issues within historical studies not presented in the literature. Specifically, placement of certain graphics and the presence of any missing pages became important to document. I explain these particular categories in the next section.

Categories Used
In this section I identify specific categories and coding procedures for the document analyses. I also show examples of that coding. Certain kinds of categories tend to be identified across content analysis theorists. Because of their relevance to this study, I have used the following categories to code data relative to aggregate materials (entire documents):

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale of measure: Nominal, ordinal, interval, or scale</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of document</td>
<td>Nominal</td>
<td>Manual/SOP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Routine Report</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Special Report</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Newsletter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Building Specification</td>
</tr>
<tr>
<td>Total number of pages</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Pages with only text</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Pages with only graphics</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Combination pages (pages with both text and graphics)</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Co-location</td>
<td>Nominal</td>
<td>In-text</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appendixed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Some in-text, some appendixed</td>
</tr>
</tbody>
</table>

Figure 3.8 shows an example of a page that would be coded as ‘text-only’; note that it includes a list presented in alpha-numeric print-linguistic text. I included such listings as text.
While lists are generally included as a form of graphic representation, I did not code lists largely because I include SOPs and manuals in this study, and these documents revolve around lists that may be broken down into further lists. For example, an SOP for
making a bomb includes a step-by-step listing of tasks, which are then broken down into a listing of steps to perform that task.

An example of an image-only page is in Figure 3.9.

Figure 3.9: Example of Graphic-only page


I coded such organizational charts and other graphics that integrated print-linguistic text with visually formatted representations as graphics instead of as hybrid text/image because, while the text is part of the graphic representation, the visual representation in which the text appears is emphasized on the page and graphic.

However, I coded templated forms, which one would complete by filling in blanks placed alongside prescribed print-linguistic text, as print-linguistic text.

While the entire page in Figure 3.9 is occupied by a graphic, the feature that would include it as image-only is that it is the only representation on the page.
An example of a combination page is in Figure 3.10:

Figure 3.10: Example of Combination page

The page includes standard print-linguistic text as well as photographs, which are discrete from each other. To code the page provided in Figure 3.10, I first identified it as a combination page, then acknowledged the number of graphics on the page (2), what percentage of the total page is occupied by both graphics (approximately 33%), indicated the size of each graphic (the graphic to the left would be coded as “20%-33%” of the total
page, while the graphic on the right is coded as less than 20% of the total page). Finally, I listed the kind of graphic each was (photograph).

Because page formats differed across types of documents (standard single column 8 ½” by 11” portrait page design in most documents to 8 ½” by 11” landscape page design in at least one manual to 3-5 column design in newsletters across different decades), I then broke these figures into percentage information relative to the total number of pages. For example, I coded for the percentage of text-only pages and graphic-only pages. This contributes to standardizing numeric information related to number of pages for each category.

Additional scale categories include:

- Number of tables
- Number of charts
- Number of maps
- Number of diagrams
- Number of photographs
- Number of drawings
- Number of graphics 1/5 page in size or smaller
- Number of graphics 1/5 page to 1/3 page
- Number of graphics 1/3-1/2 page
- Number of graphics ½ page-3/4 page
- Number graphics ¾ page to 90% of the page
- Number graphics full page or larger than one full page (foldovers)

In Figure 3.9 above, a single chart takes up 100% of the page; while in Figure 3.10 two photographs occupy approximately one-third of the page, with the one on the right occupying less than 20% of the page and the one on the left occupying 20%-33% of the page.
While the above-mentioned scale categories are identified in content analysis literature, I observed other phenomena for which I had to develop categories and codes. Strauss (1987) explains that categories should reflect the phenomena being analyzed; consequently, categories may emerge from the data within a particular study. In addition to several commonly used categories, two additional categories that emerged pertinent to aggregate data is that of location of visuals relative to the text that describes them: the aforementioned “Co-location” (or Relative Location) and “missing items.”

It became clear that visuals in manuals and SOPs produced after 1950 were positioned after the text information, while they were placed within the related textual information frequently in such documents produced before 1950. I include the relative location code because of the various placements that I observed. Bateman, Delin and Henschel (2007) consider such positioning of information within their category of “rhetorical structure”: “how the content is divided into… main material, supporting material” (p. 155). Generally, appendiced information is considered supplemental material, while graphics placed within the text are considered primary to the purpose of the document (Markel, 2010 and Oliu, Brusaw and Alred, 2010). Because of this temporal difference in locating graphics and the potential association with perceptions of the relationship between the text and graphics, I coded for these different locations.

Also, some pages are missing from some documents, having been destroyed or lost; and some of these pages contain graphics, according to references in pages that exist. Some of these are textual pages, while others are appendiced pages. For example, some documents include textual references to graphics found in appendixes, and the
appendixes are missing. Rather than omit these documents entirely from analysis, I attempt to include the fact that some pages are missing in the analysis while including the materials that do exist. Excluding the entire document from the analysis and including only documents that are complete omits a portion of the population of documents. The aggregate analysis attempts to identify frequency of certain phenomena, such as the number of text-only and graphics-only and combination pages as well as types of graphics used. A given document that is missing pages may have more of certain types of pages than I could observe, but I can only analyze the material I observe. So coding for missing pages lets the reader understand that there may have been more graphics or text-only pages or more of a certain type of graphic present, but that I could not document it. I have coded that which I could code; however, I need to record that a given document was missing pages that I could not code. In any case, I have tried to minimize the number of missing pages included in the data so as to minimize the effect those missing pages has on the analysis.

These categories differ somewhat from those generally identified in the literature, because the literature on multimodal pages tends to deal with content analyses of newspapers/magazines, which tend to use column space as a measure of use. Fewer studies have analyzed report or manual documents. The more recent work in multimodal analysis seems to examine relationships between text and moving images/animation on a computer screen (e.g.: Wysocki, 2001) or comparing text-based representations to animated representations of the same content (e.g.: Unsworth, 2007). Further, Unsworth acknowledges that certain kinds of visual representations may articulate explicit semiotic
relations between the visual and the viewer or the writer and reader (p. 332). For example, a photograph showing actual people who represent the viewer will be more meaningful to that viewer than a diagram showing some representation of the viewer (p. 348). So, I code for photographs as well as drawings or diagrams, because a photograph may carry more rhetorical meaning for a reader in a certain context—a manual, for example. Use of a lot of photographs compared to any other kind of graphic may suggest a rhetorical decision by the writer associated with the reader’s literate background.

I also code these graphic and textual distinctions because Matthiessen (2007) acknowledges that combinations of graphics and text have been “a feature of literate cultures,” but that the division of labor between images and text has undergone “significant” changes over time (p. 29). An emphasis on diagrams and images and photographs suggests an emphasis on visual literacy skills as a theme, while an emphasis on print-linguistic text suggests an emphasis on print-linguistic literacies as a theme. Through content analyses, I am able to ascertain the “division of labor” of these different modes in multimodal pages.

Bazerman (2008) asserts that “site-specific questions must attend to the particular character, opportunities, and difficulties of gathering data at the site as well as to the kind of analysis the data will allow” (p. 306). Consequently, my data collection methods attempt to address specific site-related issues, like missing pages in documents, lack of color photography, and age-memory related issues associated with interview participants. Brandt (2001) lets the data emerge from the interviews and codes relative to the institution acting as sponsor and the ways it sponsors literacy. I use this approach, though
the focus is on how the Arsenal and its operators acted as sponsors. Workplace-related questions emphasize practices at the Arsenal and analyses attempt to ascertain any correlations between workplace practices and other practices.

While Brandt does not examine any textual materials, Heath (1983), Street (1984) and Scribner and Cole (1981) consider texts within their design to understand relationships between literate practices in different settings. Generally, for example, Heath codes such documents relative to the kind of verbal and visual representations associated with them; though, she does so very generally, and she uses narrative analysis. For example, she observes that “reading material in the mill, beyond section names and signs marking restrooms, lunchroom, trash cans, soft drink machines, etc., is limited to information on the bulletin boards” (p. 234). She does not report an empirical textual analysis showing frequencies of certain relationships or types of text or graphics. However, I attempt to code these variables for empirical study here to facilitate mixed-methods analyses because of potential relationships they may reveal between literacy expectations of readers and the material presented in the documents. This analysis is consistent with the consideration of multiple modes of representation that is associated with this study. Extensive use of visual representations of information in documents suggest an emphasis on visual literacy skills, while extensive use of print-linguistic text in documents suggests an emphasis on print-linguistic literacy skills.

Inter-rater Reliability

To test for reliability of coding for document analyses, I called upon a colleague who had a master's degree in English and was a PhD candidate at the time of the coding
activity, and he had experience coding multimodal texts. I asked him to code aggregate
text analysis of the workplace documents, reviewing 10 of the 43 (23.26%) documents
used in the sample. Training included review of my categories and coding schemes as
well as illustrations of my coding of some materials included in the sample of materials
that they reviewed.

As with the interview analysis, I used simple agreement as the index for inter-
rater reliability. Again, in spite of its weakness as somewhat misleading, simple percent
agreement is identified in literature as the most popular form of inter-rater reliability
measure for content analyses (Lombard, Snyder-Duch, and Bracken, 2002). While most
scholarship identifies .8 (80% agreement) as an acceptable level, Marquez and McCall
that a level of .67 (67%) is acceptable for content analysis depending on the situation.
Krippendorff (2008) acknowledges that, “where tentative conclusions are deemed
acceptable may an α ≥ .667 suffice” (p. 354). Further, Marquez and McCall acknowledge
that .67 may be difficult to attain when there are several categories under consideration
(p. 451). The aggregate text analysis involves over twenty (20) categories; so, I use the
.67 level for comparison purposes for that analysis.

There was a 70% agreement in inter-rater reliability of the aggregate text coding,
which is above the 67% standard. There are twenty-four (24) categories involved in this
particular part of the study, and a disagreement on certain individual categories would
effect disagreement on possibly four other categories. For example, I ascertained that
several disagreements in that set were related to the other coder’s inclusion of tables of
contents and an occasional overlooked page. Because that rater included the tables of contents in the “total pages” category, it also had to be included in the “image-only” category as well as “Tables” and “location.” Also, the “location” category would complicate its treatment in the set, because in many documents the table of contents is positioned as an appendix rather than as a preliminary page. Also, these disagreements tended to result in counts that were less than three (3) items off from each other for a given variable. Because I report percentage breakdowns relative to this analysis, the effect of the disagreements is minimal on the overall analysis.

Readability Tests

Finally, readability tests are part of content analyses (Holsti, p. 89; Krippendorff, p. 58; Crano and Brewer, p. 262) because they are a measure of reading skill expected of a given audience. Because one of the related research questions in this study is to understand literacy requirements of employees who worked at the Arsenal relative to how their background may have affected literate practices, I include analysis of literacy levels expected of and practiced by employees as evidenced in readability tests of various documents. To facilitate this analysis, I sampled three to four passages from a selection of each type of document—manuals/SOP, routine report, special report, newsletter—randomly. That is, I turned groups of pages in no systematic fashion, coming to a page that may have had graphics on it or not, and selecting a passage from that page. I drew this sampling in this way to establish a set that represented readability attributes for the entire document.
I retyped two or three entire articles (Newsletter) or passages (manuals, reports, building specifications) of an average of over 200 words per passage, with a range of 70 words to 422 words. I, then, applied five different readability tests, all of which measure grade level necessary to understand the content using different algorithms to each sampled passage. To run the test, I used the Website http://www.online-utility.org/english/readability_test_and_improve.jsp. This Website allows the user to copy and paste text passages into a box and it will calculate results for several different readability tests. The interface of this Website is provided in Figure 3.11.

The site facilitates several tests including Gunning-Fog, Coleman-Liau, Flesch-Kincaid, ARI and SMOG. All of these are associated with measures of readability relative to a particular grade-level. That is, the resulting output number associated with any of these tests reflects the grade level needed for a reader to be able to understand the passage. However, each uses a different set of variables to arrive at the grade-output.
Figure 3.11: Readability test Website Interface

Tests Document Readability And Improve It

This free online software tool calculate various readability measurements like Coleman Liau index, Flesh Kincaid Grade Level, ARI (Automated Readability Index), SMOG. Document readability is the indication of number of years of education that a person needs to be able to understand the text easily on the first reading. Comprehension tests and skills training.

Tool is made primary for English texts but might work also for some other languages. It displays also complicated sentences (with many words and syllables) as suggestion what you might do to improve its readability.

Enter text (copy and paste is fine) here:

or read it from a website (only plain text .TXT):

Both Krippendorff (2004) and Crano and Brewer (2002) acknowledge that the Flesch-Kincaid test is the most used test, acknowledging that even the U.S. Department of Defense uses it to measure readability of its documents; consequently, I report only data related to the Flesch-Kincaid test in this study. This test, which is derived from a test Flesch developed in 1943, considers the average number of words used per sentence and
the average number of syllables per word. Examination of the mean grade-level readability score associated with the various documents in the workplace helps to identify patterns of reading expectations of targeted audiences of those documents. If the mean of a particular kind of document is lower than for another document, this suggests that the audience of the first kind of document is expected to have a lower grade-level reading skill than readers of the second document. This difference and its degree of difference—how many grade-levels apart the scores are—suggests a theme of different expected reading skills for each audience.

Qualitative Analyses

I used qualitative analytical methods in this study. Yin (1989) encourages analysts to identify a particular theme or unit on which to facilitate analysis of case study data. He generally discourages use of statistical analyses within case study design—single case study and multiple case study—largely because variables studied are unlikely to have any “variance” (p. 113) and selection of particular cases is “not based on any sampling logic” (p. 124). However, he encourages using a “pattern-matching” approach to analysis to facilitate internal validity in a single case study and replication of a given study to other cases, thereby enhancing external validity. Data from different observations within a case study may show a certain pattern from which findings and conclusions are drawn.

Traditionally, analyses of content tend to focus on the presence of given phenomena being studied and patterns that emerge. Within this study I analyze patterns and trends of certain phenomena. I analyze the patterns of different literacy practices
within interview data and certain kinds of practices reflected in documents. I consider the frequency of occurrence of certain practices identified across interviews and across documents to understand patterns and trends. Literature on content analysis helps identify potential categories and coding for interviews and documents. Further, literature that describes analyses of visual information tends to call attention to certain categories of attributes of graphic data relative to salience. These include use of color, relative size, richness, and sharpness (Tufte, 2006; Kress and Van Leeuwen, 2006; Rowley-Joliet, 2004; and Van Leeuwen, 2003). Consequently, my coding includes relative size and the type of graphic (e.g.: photograph versus diagram). Color photography and printing were not available for part of the period under study, so I do not include them as a characteristic of study. Bateman, Delin and Henschel (2007) consider this dynamic in their category “production constraints,” which may be attributed to availability of color photography and/or macro-economic concerns about costs of using such (155). Further, because I examine documents published over a period of twenty years, I also observe changes that occurred in their content and format over this period. Several documents published in a given 2 or 3 year time frame exhibit similar attributes; and the attributes differ with documents published more than 5 years apart. I discuss these progressive changes over time as shifts in attributes and general trends.

I observed that manuals that targeted line workers, for example, tended to use more graphics than tended to be used in routine reports, which were more print-linguistic-heavy, read by upper management. That is, I ascertain what the mean percentage of a given type of document is text-only pages, graphic-only pages, and combinations. I also
study the frequency of graphics in different types of documents relative to their type and relative size. To do this, I counted the number of each of the aforementioned categories and codes relative to each document, entering these counts into the statistical package SPSS 12.0. As a qualitative study, I perform frequency and percentage analyses on all of the data.

The principal theory that I apply in the analysis is that of literacy sponsorship. Embedded in this analysis is the assumption that sponsors of literacy exist, as Brandt (2001) describes them. I define the operators of the Arsenal as those sponsors, and I analyze themes associated with that sponsorship. The government, through the Army, was among the operators of the Arsenal. The government also invested in the community’s infrastructure, including its literate infrastructure. It helped to construct a school and libraries in the community. Considering Brandt’s conception of literacy sponsorship, I consider ways that the sponsors “enable, support, teach, and model, as well as recruit, regulate, suppress, or withhold, literacy—and gain advantage by it in some way” (p. 19). I look for particular practices in each sphere and across spheres to understand which practices are emphasized over others. Brandt’s conception is informed also by Brian Street’s (1984) ideological theory of literacy. As stated in Chapter 1, Street’s theory posits that the meaning of literacy is embedded within the institutions in which it is practiced, including home, school, community and workplace. Additionally, Street applies the following characteristics of literacy to this model:

6) The meaning of literacy depends on the social institution in which it is embedded;
7) Literacy can be known to us in forms that already have political and ideological significance and cannot be separated from that significance;
8) The particular practices of reading and writing that are taught in any context depend upon such aspects of social structure as stratification and the role of educational institutions;
9) The processes whereby people learn reading and writing construct the meaning of it within particular practices;
10) Referring to “literacies” is more appropriate than to a single “literacy”

Brandt acknowledges that sponsors are agents, which includes institutions; and these agents shape literacy practices by favoring certain literacies that help them accomplish their political and economic goals. She states, “in whatever form, sponsors deliver the ideological freight that must be borne for access to what they have” (p. 20). This suggests that sponsors invoke a particular ideology of literacy on others.

Further, it is evident that an appropriate term to characterize the various practices associated with meaning-making is “literacies.” Literacy practices carry various requirements associated with the ability to make meaning. As the New London Group (1996) observes, different modes of representation facilitate meaning making in different ways. These modes include: print-linguistic, visual, aural, gestural (experiential), spatial and combinations of these that create multimodal representations. As stated in Chapter 2, they argue that literacy includes, “understanding and competent control of
representational forms that are becoming increasingly significant in the overall communications environment, such as visual images and their relationship to the written word.” (p. 60). So, I also apply the New London Group’s theory of multiliteracies and related modes of representation in my definition of “literacies.”

**Conclusion**

In this chapter, I have identified the details associated with my research methods for this study. This study uses interviews and document analyses within case study research design. This design facilitates study of the primary research question: As the primary employer in Fieldview Ohio, how did the government and operators of the Boomtown Arsenal sponsor literacy for its employees and for the community of Fieldview, Ohio from 1940-1960 and what ecological factors influenced this sponsorship? Related questions include:

- What literacy practices were required in the workplace?
- What relationship between print-linguistic literacies and visual literacies existed at the workplace?
- What literacy-related institutions or programs did the government or operators fund?
- What literacy practices occurred in school?
- What literacy practices occurred at home?
- What literacy practices occurred in the community?
- What intersections between these practices exist?

Inferences from answers to these questions can address the following questions:
What groups may have benefited from this sponsorship?

What groups may have been negatively affected by this sponsorship?

While it does not include participation from African-Americans, the sample associated with the interview study is a good representation of the Caucasian population of the community and those who worked at the arsenal. Counting frequency of occurrence of the various codes for each of the interview-related categories facilitated identifying particular themes associated with literacy practices of those interviewed, allowing for an understanding of the literacy experiences of those who lived in the area and/or worked at the arsenal during the period of study. It also helps to understand how certain documents, like manuals, were used at the Arsenal.

The sample for the document analyses is a good representation of the range of literacy practices at the Arsenal during the period of the study. Counting frequency of occurrence, testing readability and measuring means of the categories involved allows for an understanding of literacy practices and expectations at the Arsenal. Also, interviews with several members of the community, including former employees of the arsenal, helps to triangulate data associated with the interviews as well as data from archived documents.

I have also identified several concerns and limitations associated with the study’s methodology such as age-related memory issues of the interview participants and the number of documents to which I had access. I also acknowledge how I attempted to account for these by gaining assurances from acquaintances of those elderly participants that their mind is still “sharp“ and by using multiple sources of data and by triangulating
data with other sources and other methods. I report findings of this study in the next Chapter.
Chapter 4

Literacy Practices and Sponsorship Implications

“That’s one thing Mr. Smith, who was my boss, was very adamant about. Would walk around and lift his arms; if there’s anyone who cannot spell ‘personnel’ they best not be in this office.” Interview participant

In Chapter 3 I detailed the research questions and methodologies used to collect and analyze data related to those research questions, which I restate below. In this chapter I identify key findings among themes that emerge from the research as I present results of those analyses. The quotation above foreshadows some of this study’s findings and implications. One’s literate skills could affect what work employees at the Arsenal could do in spite of certain accommodations for low literacy levels. It was also clear that certain literate skills were esteemed while others were withheld. Most importantly, there is evidence that a failure at the workplace to balance effectively those literacy practices that were esteemed with those associated with the accommodations made for employees with low literacy levels contributed to an accident resulting in the death of eleven employees. Consequently, literacy sponsorship carries with it implications related not only to political and socio-economics, but life and death.

Again, the primary research question associated with this study is: As the primary employer in Fieldview Ohio, how did the government and operators of the Boomtown
Arsenal sponsor literacy for its employees and for the community of Fieldview, Ohio from 1940-1960 and what environmental factors influenced this sponsorship? As I have acknowledged previously, Brandt (2001) defines sponsors of literacy as, “any agents, local or distant, concrete or abstract, who enable, support, teach, and model, as well as recruit, regulate, suppress, or withhold, literacy—and gain advantage by it in some way” (p.19). The research question itself identifies multiple sponsors/agents; so, I begin this chapter by specifying those agents and their relationship to each other and the community within the analytical framework. To assist in responding to the question with the data collected, I have broken this question further into the following related questions:

What literacy practices were required in the workplace?

What relationship between print-linguistic literacies and visual literacies existed at the workplace?

What literacy-related institutions or programs did the government or operators fund?

What literacy practices occurred in school?

What literacy practices occurred at home?

What literacy practices occurred in the community?

What intersections between these practices exist?

Inferences from answers to these questions can address the following questions:

What groups may have benefited from this sponsorship?

What groups may have been negatively affected by this sponsorship?

I begin the reporting of findings by identifying the particular agents who acted as sponsors of literacy—operators of the Arsenal. I address findings related to each discrete
sphere: workplace, home, school and community, emphasizing findings related to the workplace since its sponsorship is the focus of this study. Then I identify practices common across these spheres that suggest overlaps in sponsorship between the workplace, home, school and community. Such overlaps can suggest attributes of sponsorship affecting the entire literate ecology. This analysis integrates data from both the interview study as well as the document analyses. As mentioned in Chapter 1, a catastrophic event occurred, and it has some literacy-related implications associated with it. This event and its literacy dynamics serve as a focal point for the chapter. I link much of the data to analyzing how these practices may have contributed to the accident.

Identifying the Major Sponsors of Literacy

Three agents act as principle sponsors during the period of study: the government, Atlas Powder Company (APCO) and Vulcan Tires. As were all of the arsenals built for WWII, the site is operated as a “Government-Owned, Contractor-Operated (GOCO) site. APCO is the contractor during WWII; and, shortly after the war ended in 1945 the government, through the War Department, took it over entirely to store munitions not used in the war. Vulcan Tires was hired by the government in 1952 as the operating contractor as U.S. involvement in the Korean War increased, and Vulcan Tires took over operations from the government shortly after that war ended. The government still owned the site, but the War Department no longer operated it.

Because the Arsenal was established through a government-funded effort to create arsenals throughout the country to produce weapons for the Allies, the government is the primary sponsor during WWII and until Vulcan Tires assumed control in 1952. APCO is
a co-sponsor during WWII, but the government, especially the Army, is very much involved in operations and seems to have a greater role in decision-making processes.

Because the focus of this study is on how the operators of the Arsenal acted as literacy sponsors, it is important to consider the various literacy practices that occurred there and implications thereof. Generally, a variety of literacy practices were used at the Arsenal, covering the range identified by the New London Group (1996): print-linguistic texts, aural, visual, spatial, gestural and multimodal. Also, different forms of documents required different kinds of literacy skills, and there appears to be a literacy-related hierarchy in which more print-linguistic skills are required of employees at higher levels. A study of the investigation report related to the accident offers insight into these practices as well as implications related to the separation of print-linguistic practices and oral/visual/experiential practices. A connection between literacy practices, training and actual practice associated with this accident will be discussed throughout the chapter.

In the next section I provide a general description of the accident and introduce literacy-related attributes that will be discussed more fully in this chapter.

Description of Event

On March 24, 1943 an explosion in the Depot area of the Arsenal killed eleven people and injured another three. The explosion destroyed an entire storage igloo as workers were unloading and moving boxes of small, twenty-pound fragmentation bombs (see Figure 4.1). The investigation concludes that the combination of a defect in the fuze used to detonate the bombs and the rough handling by workers, in spite of expressed precautions that pertained to the defect, caused the explosion to occur (p.13).
Report of Investigation into Accident

In the investigation report, Stratton (1943) acknowledges various attributes of practices that depot workers used when unloading and moving bombs into position within storage igloos. This information suggests that employees received specific training but moved away from some attributes of that training in actual practice.
Based on interviews with workers, Stratton acknowledges the routine procedure for unloading the bombs, and he acknowledges a change in procedure as more boxes are unloaded or as workers perceive the need to unload quickly:

f. The routine procedure noted above follows. The railroad car is opened. The door bracing and bulkhead bracing are removed. The semi trailer is backed to the door-opening, and beginning with the outside box of the upper tier the boxes are handed down and placed in the truck. This first unloading operation requires the boxes to be handled by two men but as more boxes are removed from the car it was common practice for one man to pull a box from the tier: (the box and contents weigh 168 pounds), permit it to slide down through his arms on to the floor and then to walk the box on its corners to the truck, where it would be taken by two stackers and placed in position. This procedure was continued until a trailer load was completed.

This passage suggests that workers were trained to unload the boxes as a two-man operation. However, the workers modified it so that only one worker would do the job of two, resulting in dangerous handling of the boxes. Stratton acknowledges that,

The handling of the boxes at both the railroad cars and the igloo was carried out according to usual procedure. Helper No. 3070 working in the railroad car substantiated the previous testimony but indicated the boxes containing the bomb clusters were difficult to handle inasmuch as they were not provided with handles. He stated they were instructed to give special care to this shipment as it was the first shipment of this type of munition that had been received at the Depot. He detailed the procedure of unloading the cars as described in paragraph 5 above, making the statement that the boxes were permitted to slide down between the arms of the workers, landing on the end, and then were walked to the truck.

In spite of being “instructed to give special care to this shipment,” the workers use a procedure other than the one associated with their training that compromises safety.

As I discuss throughout this chapter, data show that much of the training at the Arsenal came in the form of visual, aural and experiential training. Workers were shown
how to do a given task through demonstrations and, then, they practiced doing the task. In some cases, very little time passed between the start of training and the worker assuming work on the task.

Stratton also acknowledges that the fuze assembly of the bombs involved was new and defective in its tolerances:

f. During the discussion, Captain Dorsey of the Kingsbury Ordnance Plant showed data which indicated fuze M-110 had had an extremely bad loading history...over one million of these fuzes have had to be re-worked before they could be made sufficiently reliable to be placed on the bombs. The chief weakness in the fuze is in the pinion column which when coming out of adjustment generally permitted the safety blocks to fall out and the fuze to become armed. This data report in the form of a memorandum to O. E. Ralston dated January 6, 1943, indicating the defects in these fuzes, will be requested from Kingsbury Ordnance Plant.

This passage indicates not only that a defect that could endanger the lives of others was known prior to the accident, but that a memo—a print-linguistic document—was written by an officer who was aware of defects in the fuze of the particular bomb.

As I discuss later in this chapter, the data show that, while workers received their training mostly through visual, aural and experiential practices, administrators often communicated through print-linguistic forms of literacy. Workers also read print-linguistic materials, though literacy expectations across these materials and positions varied considerably. Training practices affect how employees perform certain tasks, and these practices include the various ways they are taught about performing those tasks. There are clear differences in literacy practices relative to one’s position and relative to the accident’s timing. So, I discuss findings related to training practices as well as other
literate practices that are involved in the accident, such as writing and reading practices among administrators.

The information in the investigation report show that workers were not told adequately how to be careful handling the boxes despite officers’ knowledge about the need for such care. A memo that specifies problems with the fuze and related hazards exists before the accident, and testimony shows that workers were told to be careful. However, their use of the dangerous one-man protocol suggests that they did not know exactly why they needed to be careful or how to be careful. A breakdown in communication occurred somewhere between the original memo and the instruction to the workers to be careful, which could be related to the separation of modes and related literacies practiced by each audience. This breakdown suggests that certain information ought to be conveyed in multiple modes of representation—orally and in writing—to reinforce each other. Indeed, Stratton concludes the report with the acknowledgement that:

b. Upon verbal report of the undersigned to his commanding officer, action was initiated to locate all other shipments of twenty pound fragmentation bombs M-41 in transit or storage and to caution all authorities that extreme care must be taken in the handling of these bomb clusters in shipping boxes. p. 14

This cautioning of “all authorities,” evidently includes supervisors; because the Ammunition, General (1945), used by supervisors in their training, includes explicit references to precautions associated with rough handling or dropping of boxes, which are highlighted with italics to call attention to them (Figure 4.2).
No such references occur in manuals that pre-date the accident. This suggests a relationship that exists between visual, aural, experiential and print-linguistic literacies. I discuss this relationship in this chapter as well. As suggested with these passages, sponsorship-related dynamics shift throughout the period. Consequently, I break the discussion of workplace practices into sections related to these shifts: pre-accident practices, short term post-accident practices and longer term post-accident practices.

The next two sections consider training and other literate practices that occurred at the Arsenal to understand the sponsorship dynamics associated with them and how they may have contributed to this accident. After presenting findings associated with these practices at the Arsenal, I present information about practices at school, home and in the community that may have been affected by those at the Arsenal. This information suggests a sponsorship influence within the ecology of the workplace and community.

What literacy practices were required in the workplace?

In this section I present findings associated with workplace literacy practices, describing the training employees experienced as well as other literate practices across different levels of the organization.
Training Practices

As articulated by interview participants who worked at the Arsenal and in Arsenal documents, virtually all employees experienced some part of the training program, no matter the level at which they worked; consequently, it is important to consider various attributes of the literacy sponsorship associated with that training.

Pre-accident Training—Line Workers

“Roger,” the interviewee who began work at the arsenal the earliest (1942) reported that training was heavily visual and hands-on:

Me: Do you remember the training that you received when you begin, first began work at the arsenal

R: Very little

Me: Very little. Do you remember. Very little recollection of it or very little training?

R: You pick up a shell, put it in a vice

Me: And they showed this to you, or you didn't have anything to read but they showed you how to do this?

R: No, no. It was very…

Me: Hands-on?

R: Hands-on. Very hands-on

Training of line workers emphasized visual, oral and experiential literacies. I asked Roger specifically if there was any reading of print materials in this training, and he acknowledges that there was not. This is confirmed with review of archived documents, which also shed light on the training of supervisors.
According to its 1942-1943 Summary of Operations, the training programs offered at the Arsenal used multiple modes of presentation. Principally, the training programs relied on visual modes, although manuals were distributed to employees. Mayer (2001) observes that multimodal presentation is most effective when low-knowledge learners (those with little previous experience with or knowledge about the task) and/or high-spatial learners (those who have the ability to process spatial information quickly, also visual learners) are involved (p. 161). The Arsenal’s History of Operations (1944) acknowledges that,

“training was concentrated upon two principal centers of activity:

1) employe training, which included an induction talk to all employes and pre-employment or vestibule training, lasting two or three days, for fuze and detonator line operators,

The induction talk was given by the employment interviewer. “Induction talks were given to over 19,000 employes from December, 1941 until April 1942” (p. 110). As seen in the excerpted description below (taken from page 110) vestibule training included the showing of silent movies that were accompanied by narration (Figure 4.3 below). Mayer (2001) acknowledges that it is important to present both pictures and words simultaneously rather than in succession. Presenting them simultaneously enables the learner “to hold mental representations of both in working memory” (p. 96).
Roger’s comment and this passage indicate that training of line workers emphasized visual, aural and experiential literacies. Training for those who worked in the Depot area also emphasize visual, aural and experiential literacies. The same document acknowledges that:

Demonstrations as to the proper method of storing ammunition in magazines and of loading and blocking it in railroad cars were given by the instructors. In order to carry out these demonstrations miniature models of igloos, railroad cars, and several types of ammunition were designed and constructed to scale, thus making it possible to follow the specifications as given on the loading and storage charts. After the demonstrations had been completed, students were given ample opportunity to inspect and, later, to practice with the miniatures.  p. 270
This form of training was developed by the government in conjunction with industry. Recognizing that many workers had little industrial training, particularly related to the war industry, the government and industry leaders developed the Training Within Industry (TWI) program. This program’s learning model was based on the adage that one learns through experience (Dooley, 1945). According to the TWI Report (1945), “People have to learn to do jobs…Learning by doing is good, planned training” (p. 17).

TWI developed a program to quickly train workers by breaking down jobs into simple processes (21). Generally, the program presented the following four points about training to plants:

1) The training program should be one of utter simplicity.

2) It must be prepared for presentation by intensive and carefully ‘blue-printed’ procedure, utilizing a minimum of time.

3) It must be built on the principle of demonstration and practice of ‘learning by doing,’ rather than on theory.

4) The program should provide for ‘multipliers’ to spread the training by coaching selected men as trainers who, after being qualified in an institute…pass the program on to supervisors and their assistance who would use it in training men and women workers

Once operations were broken down into simpler tasks, training on each task included the following instruction:

1) Show him how to do it

2) Explain key points
3) Let him watch you do it again
4) Let him do the simplest parts of the job
5) Help him do the whole job
6) Let him do the whole job—but watch him
7) Put him on his own

Visual, aural and experiential modes of presentation are evident in the description of the instruction. Moreover, the worker is learning how to do a specific task in the context that he or she will be doing it. While not mentioned explicitly in the *TWI Report*, this is a form of experiential education, which encourages learners to apply skills they are trying to learn through situated practice under a teacher’s supervision (Dewey, 1938).

This program is described more in the next section. The TWI program helped to develop supervisors by giving them a variety of skills, including the ability to train workers as described above. The next section describes more of the training program as it was provided to supervisors.

Pre-accident Training—Supervisors

Because of the depleted labor market, the government developed the TWI program. It identified five particular needs of supervisors: knowledge of work; knowledge of responsibilities; skill in instructing; skill in improving methods; and skill in leading (War Manpower Commission, p.48).

While line worker training lasted only a few days, supervisor training lasted eight weeks, considering the time needed to train in the five needs areas identified above. Also, while most of the instruction portion included explanation of visual diagrams and
demonstrations of production procedures, half of it (144 hours) involved field work. Relative to the time spent in field work, the Historical Report of Operations from 1942 explains that “it was felt that this was a minimum in which they could absorb, through actual handling, sufficient knowledge of the methods and procedures involved in handling the enlarged variety of ammunition now is use” (p. 267). Also, storage charts were made available to and studied by trainees prior their going on to field work (p. 273). Such charts emphasize visual literacies.

Training—Manuals/SOPs

Visual and experiential modes of presentation were emphasized in training the line-workers, and they were important to training of supervisors. However, there are manuals and standard operating procedures (SOPs) available for both line workers and supervisors. These require different kinds of literacy skills than the visual, experiential and aural practices. In this section I present findings related to these manuals and SOPs.

Generally, among the pre-accident manuals and SOPs that I observed, many were print-linguistic-heavy, incorporating few graphics. Figures 4.4-4.6 are three consecutive pages from the Ordnance Inspection manual of 1942. This document is 280 pages long, and it would be read by inspectors and supervisors. As the examples show, it is print-linguistic text-heavy.
Figure 4.4: Page from manual used by workers

PROCESSING OF AMMONIUM NITRATE AT RAVENNA ORDNANCE
PLANT

Receiving and Unloading: When shipped, cars are equipped with a half length "dip pipe" installed. On arrival, this pipe is immediately removed and the full length "dip pipe" (which is strapped to the under frame of the car) is substituted.

When the half length dip pipe is removed from the car, a sample of the clear liquor is taken through the man hole for analysis by the inspector. He should promptly test for the presence of solid impurities with litmus paper. If the solution is alkaline, the unloading may proceed and the remainder of the sample is then taken to the laboratory for "heat test." The "heat test" was developed at Ravenna Ordnance Plant as a check on any set of sabotage in transit and is not a part of the specification. The principle is that pure NH₄NO₃, free from organic substance or acids will sublime with a clear fume leaving no residue.

The method of inserting the full length dip pipe is as follows: Remove the short pipe by unlatching the flange connection (b) and insert the long one as far as it will go without forcing, attach a steam hose and turn the steam on in the pipe slowly. This will dissolve the crystals around the pipe and allow it to settle into position for bolting securely to the flange.

The "dip-pipe" is then connected to the liquor unloading line. The air hose is connected to its fixture and with all other valves and the manhole tightly closed, air pressure to the extent of 25 pounds is applied and thus the superheated liquor is blown directly into the storage tank.

The air pressure gauge reading is checked at regular intervals during unloading to see that the air reducing valve is operating properly. The air pressure on the inside of the tank car is not to
Figure 4.5: next page

exceed 25 pounds per square inch, a safety factor established to ensure the safety of the equipment.

The approximate time for this first blow is one hour. At the end of this time, the manhole cover is then turned back on its hinge and the agitator pipes are inserted lengthwise of the tank, reaching about 2/3 of the way to the ends of the tank. These pipes are of stainless steel, with steam holes placed at the top of the tank car to prevent direct steam on the sides and bottom of the tank. Then the agitators are inserted, it is not necessary to disconnect the "tip pipe" and air lines. This prevents loss of steam.

The agitator pipes are connected to a steam line of reduced pressure, and a vigorous flow of steam is maintained until the ammonium nitrate crystals are completely dissolved. Then the bottom ends of the car are hot to the touch, one can safely assume that the contents are entirely in solution and the final blow off is made.

In order to make the final blow off of the hot liquid into storage, the agitator pipes are removed, the manhole cover sealed, and the air pressure applied.

Then the liquor has been removed and the manhole cover is opened and the car checked for the complete removal of solids and liquids. All unloading equipment is then washed down with clear water and all caps and covers are replaced on the base of the tank car.
In addition to the inspection manual, a primary manual used by supervisors and workers also integrates much print-linguistic text. Figure 4.7 illustrates the only page from the Manual of Safe Practices (1942) directed at employees who handled explosives.
This manual was provided to all employees; and different sections of it, acknowledging particular information for workers who worked in certain positions, were color-coded for each position. These manuals use a considerable amount of print-linguistic text, suggesting that employees also needed to have related literate skills.

Post-accident Training—Manuals/SOPs

There does not appear to be a change in the visual, aural and experiential approaches used in training after the accident, largely because the TWI program was still
in place. It was the primary model of training throughout WWII. However, there is a dramatic difference in the print-linguistic materials used with that training after the accident. Figure 4.8 is a page from a manual used by supervisors that was published in 1945.

Figure 4.8: Page from Supervisor Manual (1945)
The page integrates images of two different kind of ammunition, helping the reader visualize the particular item being described by text. Figure 4.9 shows a two-page spread taken from a bomb manufacturing SOP, published in 1945.

The spread provides photographs of the particular step, and these pictures are positioned directly above the print-linguistic text. Mayer (2005) encourages providing images and textual information together so that each re-enforce each other. Mayer’s multimodal principle is that people learn better when pictures and words are integrated into an instructional message than when only words are used (63). When only words are used people may attempt to “build a visual model,” but they may not attempt to do so. If a picture is provided, people can make the visual connection more readily. Note, also, the print-linguistic text regarding safety positioned to the left, among the first items one would read when reading a traditional print-linguistic text from left-to-right.
Figure 4.9: 2-page Spread of bomb SOP guide.

Finally, even the print-linguistic text in the supervisors’ manual calls attention to safety, including the handling of fuzes and issues with dropping packages (see Figure 4.10). Not only is the information provided explicitly, but it is italicized. The visual feature of using italics to highlight the text calls the reader’s attention to it.

These examples suggest that in addition to using print-linguistic literacies in training after the accident, more effort was made to integrate visual attributes into print materials to appeal to the visual literacies of workers and to re-enforce the visual aspects of the experiential and aural training. The highlighting of certain text related to safety and positioning of it in certain places on a page, contribute visual attributes to the print-linguistic text, too, re-enforcing the message.
the round from a hot tube within 45 seconds after the original misfire, water should be played on the barrel until it is cool. The safest time to remove a misfired round of fixed ammunition is between 30 and 45 seconds after its occurrence.

(2) SEPARATE-LOADING AMMUNITION.

(a) Two attempts will be made to fire the primer before it may be removed. If the primer is heard to fire, a minimum of 60 seconds will be allowed before the breech may be opened and the faulty charge removed. The faulty charge must be stored separately from other charges.

(b) If the primer is not heard to fire, two more attempts to fire will be made. Then proceed as follows:
1. If the primer can be removed by a person standing clear of the path of recoil, after 2 minutes have elapsed, the primer may be removed and a new one inserted. If the second primer fails, 10 minutes should be allowed to pass and then the breech may be opened.
2. If the primer cannot be removed safely as described above, no attempt will be made to open the breech or replace the primer for 10 minutes.

(c) Misfire primers should be handled carefully and disposed of quickly, owing to the chance of a primer hangfire. Further information will be found in AR 750-10 and the Technical Manuals and Field Manuals pertaining to the piece.

g. Fuses.

(1) Extreme care must be taken in handling and assembling fuses to shell or bombs. All fuses must be treated as delicate mechanisms. The forces which arm a fuse on firing a weapon can be simulated by rolling or dropping, and a fuse so armed may be functioned by the impact of a blow or by dropping.

(2) In the assembly of fuses and projectiles, the fuze body, threads, adapter, and fuze cavity must be inspected to assure that grit, grease, or other foreign material is not present. This is necessary for proper seating of the fuze without the use of excessive force. Cleaning of the fuze cavity should be accomplished with a piece of cloth and a small stick which can be inserted into the cavity. Fuze-hole lifting plugs should not be removed except for inspection or when the fuze is about to be inserted.

(3) When ammunition or projectiles are issued fused, no attempt will be made to remove the fuses without specific authority and instructions from the Chief of Ordnance.

(4) Fuses will not be altered. Any attempt to alter or disassemble fuses in the field is dangerous and is prohibited except under specific direction of the Chief of Ordnance. The only authorized assembling or disassembly operations are screwing the fuse into the
In addition to integrating more graphics and text information in visually-sensitive ways, readability tests show changes in how print-linguistic attributes of the SOPs and manuals used in training were prepared. I found a noticeable difference in Flesch-Kincaid scores that decrease over time. This can suggest a progressive understanding of the need to modify print-linguistic texts to accommodate low literacy levels. In particular, grade-level readability scores for manuals/SOPs seemed to drop from 1942 to 1953. Table 4.1 shows this comparison, including publication date in parentheses.

Table 4.1: Readability Scores: Manuals

<table>
<thead>
<tr>
<th>Document</th>
<th>Page number sampled</th>
<th>Flesch-Kincaid Score (Grade-level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordnance Inspection Manual (1942)</td>
<td>18</td>
<td>11.49</td>
</tr>
<tr>
<td>Ordnance Inspection Manual (1942)</td>
<td>33</td>
<td>11.7</td>
</tr>
<tr>
<td>Ammunition, General (1945)</td>
<td>117</td>
<td>8.99</td>
</tr>
<tr>
<td>Ammunition, General (1945)</td>
<td>210</td>
<td>8.91</td>
</tr>
<tr>
<td>Mobilization Planning Manual for 90mm Complete Rounds (1953)</td>
<td>3</td>
<td>5.87</td>
</tr>
<tr>
<td>Mobilization Planning Manual for 90mm Complete Rounds (1953)</td>
<td>4</td>
<td>6.46</td>
</tr>
</tbody>
</table>

Line workers and supervisors would have been readers of the Inspection Manual and the Planning Manual. While only supervisors would be the primary audience for the Ammunition, General. The 1942 manual has the highest grade-level requirement, and the 1953 manual has the lowest. This could represent a change over time in understanding of the print-linguistic literacy skills of the employees. It also represents an effort to sponsor print-linguistic skills through adjusting the text for a lower print-linguistic literacy level. The grade level skill required to read and understand the information goes from almost a
12th grade level in 1942 down to less than a 7th grade level by 1953. As the grade-level reading skill was adjusted downward, employees may have been able to better understand instructions and information provided in print-linguistic form. Authors of these texts may have received feedback reflecting this understanding and adjusted their writing accordingly.

Several items illustrate a shift in the way information is presented in print training materials. These shifts indicate a change in sponsorship dynamics, recognizing that more visual information in them may encourage workers to review them and understand them better than using only print-linguistic text. Also, the readability test results on the manuals suggests writers adjusted over time to facilitate easier reading of the materials for workers.

While these print materials exist, however, it is also important to ascertain how people used these documents. As Purcell-Gates (1996) notes, the presence of books in a home does not mean that they are read. Further, Hutchins (1995) notes that print-linguistic instructions tend to act as a guide more than as a standard for all settings in which a given task may occur. What can be inferred from the documents available and interviews is that employees did not, for example, take the manuals home and read them carefully.

None of the interviewees indicated that they brought workplace documents home or were even permitted to do so. In response to my question about what employees may have brought home from the Arsenal or talked about of work at home, Steve
acknowledges that there were limitations on what employees could bring home or talk about:

Steve: No, no. pretty much. Pretty much in those days we had security clearances and the protocol in those days was to sort of leave work at work. Don't come home and talk about shipments or what you were doing.

Neither can one assume that line workers read much to prepare for a job at work. Few recalled having to read much material, and they emphasized the on-the-job training experience, which involves visual and aural literacies. Indeed, interview participants and the archived documents acknowledge that much training was “on-the-job,” or through actually watching someone perform the job and then practicing it oneself. While some interviewees acknowledged that manuals were available, they also stated that these were used more as reference materials than as primary instructional documents.

These practices emphasize literacies other than print-linguistic; they draw the focus of practice to visual, experiential and aural literacies. The TWI program was used at arsenals throughout the country during WWII, and documents associated with that program show that it purposefully emphasized these literacies because of employees’ backgrounds.

Literacies Related to Training: Implications for Sponsorship

Training of workers and supervisors—pre-accident and post-accident—emphasized visual, aural and experiential literate practices in order to help people who were not experienced with war industrial work to learn appropriate skills in an efficient manner, in accordance with the TWI Program. Considering the protocol articulated in the
accident report, workers were trained to unload bombs as a two-man operation that was a safe way to handle the boxes. However, in practice, this was modified to make the operation go more quickly. While not indicated either as acceptable or unacceptable practice in the written procedures for unloading bombs, the routine procedure of dropping boxes and walking them, evidently, had become an accepted practice to accelerate unloading of bombs. Stratton (1943) acknowledges in the investigation report that such modification “was common practice” (p. 7). It may have become accepted practice because of workers’ prior experiences with fuze tolerances that prevented safety-related consequences. The modification to a one-man unloading operation from the safer two-man operation may have been encouraged in practice, not related to training.

Hutchins (1995), who reports about operations in a nuclear submarine, documents field practices that do not follow training or documented instructions and how such practice becomes accepted behavior. He calls this practice “situated cognition.” Hutchins explains that a set of documented procedures acts as a “meditational device” between the task and the reader; however, he also observes that learning can “be mediated by so many different kinds of structures” (p. 291). These structures include visual/experiential modes. Hutchins characterizes written instructions as guidelines, and Amerine and Bilmes (1990) point out that written instructions serve as a set of guidelines and authors of instructions often omit information that they feel the reader may be able to infer. Hutchins, further, observes that reading instructions and performing the steps represent different mediating structures for the learner; the act of reading a single written step in a procedure involves understanding “what the step says, what the step means, and the actions in the task world
that carry out the step” (p. 301). Hutchins explains that written instructions act as a guideline around which actual performance in doing the task may be negotiated because of the potential to infer actions from written instructions that may include limited information.

Again, Arsenal workers were not familiar, generally, with munitions prior to their work at the Arsenal; however, Hutchins’ subjects are trained nuclear submarine specialists. As specialists they would have specialized knowledge of particular operations and would not need highly prescribed instructions in training materials. Potential hazards of allowing readers to infer actions in the absence of explicit information is greater for unskilled personnel like those who worked at the Arsenal than it is for those who have the degree of training like those operating a nuclear submarine. So, Arsenal workers should have been given more explicit information, as they were in texts published after the explosion.

Long Range Changes in Manuals

An interesting observation among the manuals designed with line workers and inspectors as primary readers is a trend over a period of time in the use of graphics. While graphics in the 1945 bomb SOP are positioned to be immediately available to readers as they view print-linguistic text, manuals published in the 1950s position graphics, mostly photographs, as appendices. Such separation and placement of graphics suggests primacy of print-linguistic text over visual representations.

Such differences among the various print materials signal a shift from visual/multimodal compositions to more print-linguistic compositions. This suggests a
shift in the literacy sponsorship toward esteeming and facilitating more print-linguistic literacies than the visual literacies facilitated in the 1940s.

As mentioned above, the government and APCO were the operators of the Arsenal during WWII, when there is a shift from print-linguistic-heavy manuals to manuals with more balance between print-linguistic text and graphics. This pattern of balancing print-linguistic text with images suggests a shift in the way the agents sponsored literacy within the ecology of the workplace, the Arsenal. As they recognize the need to facilitate communication with low-literate workers, they integrate more balance to encourage workers to look at the materials and to read the print-linguistic text accompanying the images. Further, the adjusting of grade-level readability of print-linguistic text in the manuals suggests that the agents were trying to encourage workers to read the manuals by making the information more understandable. However, this balance and use of graphics shifts in materials published in the 1950s.

Vulcan Tires was the contractor and primary sponsoring agent in the 1950s, when photographs are not used in the newsletter and when photographs and graphics are placed in appendixes in manuals and SOPs. The changes could be related to the changing workforce. As stated above, those who worked at the Arsenal during WWII came from various literate backgrounds and had no experience with war-industry production. They would benefit from having images to refer to as they learned to manufacture munitions. As skilled veterans returned from war, they could take on those jobs without needing much training and as many images to help them understand their tasks. Also, most people who worked at the Arsenal after WWII had been employed there during the war. These
workers would not need the kind of training associated with the TWI Program. None of
the historical summaries of operations at the Arsenal from the 1950s indicate anything
about the training that occurred there.

Other Literate Practices at Work

While training tended to emphasize visual and experiential literate practices, in
addition to manuals, employees also had access to newsletters and forms, while managers
and administrators composed and read various reports. Newsletters combined print-
linguistic and visual texts while reports tended to integrate more print-linguistic text
while integrating some visuals.

The arsenal published a monthly newsletter for employees, and this tended to
focus on social elements; though, some articles discussed safety issues as well. Figure
4.11 shows a page from the May 1942 Newsletter.
Those who worked at the arsenal reported very few writing practices at work. Generally, only those who were employed as secretaries did any kind of writing on a regular basis, and that was transcribing what was dictated to them. Table 4.2 shows a breakdown of literate practices among interview participants who worked at the Arsenal.
Table 4.2: Literate Practices at the Arsenal

<table>
<thead>
<tr>
<th>Participant</th>
<th>Position</th>
<th>Reading Practices Reported</th>
<th>Writing Practices Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>David (self)</td>
<td>Supervisor</td>
<td>newsletter, manual, correspondence, reports</td>
<td>None</td>
</tr>
<tr>
<td>Sarah (self)</td>
<td>Secretarial</td>
<td>Correspondence, reports, manuals</td>
<td>Correspondence, reports, manuals; transcribing</td>
</tr>
<tr>
<td>Sandy (self)</td>
<td>Secretarial</td>
<td>None</td>
<td>Correspondence, reports, manuals; transcribing</td>
</tr>
<tr>
<td>Roger (self)</td>
<td>Line/labor and supervisor</td>
<td>Reports, correspondence, manuals, newsletter</td>
<td>None</td>
</tr>
<tr>
<td>Susan (relative)</td>
<td>Line/labor</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Steve (self and parent)</td>
<td>Supervisor (both)</td>
<td>Reports/ manuals</td>
<td>Reports</td>
</tr>
<tr>
<td>Claire (2 relatives: husband; brother)</td>
<td>Line/labor</td>
<td>Manual</td>
<td>None</td>
</tr>
<tr>
<td>Carol (2 relatives: parents)</td>
<td>Construction; secretarial</td>
<td>Reports, manuals, correspondence</td>
<td>None</td>
</tr>
<tr>
<td>Jane (relative)</td>
<td>Line/labor</td>
<td>Manual</td>
<td>None</td>
</tr>
<tr>
<td>Don (self)</td>
<td>Construction</td>
<td>Manual</td>
<td>None</td>
</tr>
</tbody>
</table>

This transcription practice is evidenced with the following interview dialogue:

Me: What kind of reading are you doing.. reports or is it manuals, what?

Sarah: It’s actually reports. And the person I work for was the head of the employment services division. And it was mostly letters in and doing letters for him and things like that.

Me: So, it was taking dictation and then writing the letters for him?

S: Yes

Those who supervised also wrote periodic reports. A practice acknowledged in the following interview:

Me: Okay, you mentioned that your father worked at the Arsenal and that he participated in the construction of it. What did he do at the Arsenal when he started there?

Steve: He was in supervision and supervision in various titles for a number of
years, and he retired in 1982 after 42 years at Boomtown Arsenal.

Me: Did he ever talk about the kind of work he did there? Any kind of reading or writing associated with that work?

Steve: He did. He talked about reports. Of course, when you’re with the government; he was in the government for 11 years and then he worked for the contractor. The Boomtown Arsenal became a contractor operated facility in 1952 and those who stayed on with the contractor, they had that opportunity to do that.

As acknowledged above, literate materials used by different audiences may reflect a certain understanding of the primary audience’s literacy skills. Low-literate people or those learning a new skill tend to favor using visual and oral materials and experience rather than print-linguistic materials (Mayer, 2001). However, the relationship between alpha-numeric, print-linguistic literacies and visual literacies also depends on the rhetorical nature of the material involved and the audience. As indicated in Chapter 2, instructions tend to require extensive use of visuals, while reports tend to require fewer visuals and different kinds of graphics than those typical of instructions (Markel, 2010; Oliu, Bursaw and Alred, 2010).

As I illustrate in the next section, reports read principally by administrators and supervisors had more print-linguistic content than other forms of representation. As indicated above, manuals and SOPs, which were read more by line workers than anyone else, included many more graphics than reports did. Also, the training line workers and supervisors received emphasized visual and experiential literate practices.

What is the Relationship Between Print-Linguistic Text and Graphics?

In this section I present data related to the relationships between visual and print-linguistic text in documents to show literate differences across documents and related
readerships. As I acknowledged in Chapter 3, generally, a large amount of graphics used in a given document suggests an appeal to readers with visual literacies, while a limited use of graphics with an emphasis on print-linguistic text would appeal to readers with print-linguistic literacy. Line workers and inspectors came from varied literate backgrounds. Many were unskilled in industrial work and more familiar with farm-work. They were the primary readers of the manuals and SOPs. Therefore, authors of these texts applied a greater use of graphics to the materials for those employees than print-linguistic text to facilitate meaning-making. Such visuals include samples of templated forms inspectors would complete, including the one displayed in Figure 4.12.

Such a form, which requires reading and writing, minimizes print-linguistic literacy demands by providing labels for most of the textual material needed and organizing it visually. This suggests lower literacy requirements for workers who complete it since most of the information requested is prescribed, reducing the amount of work they must do for the writing task.
As acknowledged above, material read by line workers—newsletters and manuals—tends to integrate a lot of photographs, while supervisors’ material includes more diagrams and executives’ materials integrate more tables. As mentioned in Chapter 3, readers tend to assimilate more closely with photographs than other graphics, and assimilation is important when training or instruction is involved. Line workers are reading manuals, SOPs and newsletters, which integrate many photographs. Supervisors
are reading other kinds of manuals and administrators are reading reports, which tend to integrate fewer photographs and more tables and charts. Again, certain documents are being read by certain categories of employees; consequently, there is considerable correlation between the findings associated with types of documents and findings associated with readership. Line workers are reading manuals and SOPs, which integrate many large visuals; while supervisors and administrators read reports integrating smaller visuals. Larger graphics may help readers understand visual relationships represented in them, such as would be the case with a diagram or photograph in a manual showing a reader how to perform a given task.

Manuels and newsletters tend to have a considerably large number of photographs and diagrams, while specifications tend to use tables and charts more often. Drawings and photographs were common in newsletters. Also, manuals tend to use larger images: photographs, template forms and diagrams; than routine reports and building specifications. Newsletters most-often integrated graphics with text generally; while other documents tended to locate graphics both within text and as appendixes. Building specifications tended not to have many graphics. This suggests that print materials that were used by workers generally integrated more graphics than those used by supervisors and administrators. Also, print-linguistic texts used by workers for instructional purposes (manuals) used larger and more graphics than those used for informational purposes (newsletters).

As I mentioned above, there is, also, an historical trend toward moving graphics in manuals from within text to appendixes, leaving related text as text-only pages.
Placement of photographs within text in the manuals/SOPs published in the mid-1940s suggests a consideration of photographs as complimentary to print-linguistic text associated with them, while placement of photographs in an appendix in manuals/SOPs published in the 1950s suggests a consideration of those photographs as supplemental or secondary material. Further, though they are used in newsletters often in the 1940s and 1950s, photographs disappear from newsletters by 1960. Compare Figure 4.11, reproduced below, with Figure 4.13, which shows an example of a page from the June 1960 issue of the newsletter.

Figure 4.11: 1940 Newsletter

Figure 4.13 1960 Newsletter

The format of the newsletter changed from decade to decade such that there was more use of images, especially photographs, in the 1940s and 1950s than in the 1960 issues.
Sponsorship Implications

Clearly, the various modes of presentation used in training worked to reinforce the information conveyed in each, while also facilitating practice with the equipment before actually handling explosive materials. However, a separation in literacy skills, and consequently, in modes of representation used in communication, evidently occurred as one rose to higher levels at the Arsenal and the Army generally. More alpha-numeric, text-based writing and reading were emphasized because of the nature of the paperwork and reporting that occurred at those levels. This suggests an interesting correlation between literacy training, modes of presentation emphasized and level of employment attainment in the workplace.

As evidenced above, as one attains to higher levels of employment in the organization, the more alpha-numeric, text-based forms of representation are emphasized. As a literacy sponsor, while facilitating training of workers to perform specific tasks to produce and store munitions, the Arsenal’s operators restrict access to upper management positions by establishing a literacy hierarchy that limits the access one with low literacy has to upper management positions.

Administrators are reading more print-linguistic material while line workers are exposed to fewer print-linguistic materials; this separation seems to have contributed to the accidental explosion in that workers were “instructed” to be careful, while specific details of hazards associated with the fuze were articulated to officials in a memo. That workers continued to use the usual routine of dropping the boxes and walking them in the igloo suggests that workers may have simply been told to be careful without having
specific details necessary to understand how to be careful. Further consideration of literacy requirements relative to readability of the documents suggests that employees needed to have not only basic print-linguistic skills in order to advance but also literate skills associated with a certain grade level. In the next section I report on findings related to this separation of literate practices and expectations thereof.

Print-Linguistic Literacy Requirements across Levels: Readability Tests

Another way to examine literate differences that are embedded in the documents is to conduct readability tests on the print-linguistic text relative to the readership of particular documents. This can articulate a difference in expectations of readers and accommodations in language used, especially when examining comparable documents across different readerships. Manuals were provided, for example, to line workers and supervisors. If significant differences exist between the readability of these documents, there may be a finding pertaining to differences in literacies across readers. This carries literacy implications associated with transferring information articulated between administrators and then to workers.

As indicated in Chapter 3 I used readability tests to ascertain whether there were any differences in the language used in different documents. The Flesch-Kincaid test results found that there are differences in the mean grade-level required to understand text across different types of documents and across different readerships.

If the memo referred to in the explosion investigation report was written for a reader with certain grade-level literacy skills, the message would need to be modified
before it was articulated to workers who may have lower grade-level reading skills. I report these findings here because they suggest a literacy grade-level requirement.

Tables 4.3 and 4.4 show the breakdown of means across different types of readerships and documents relative to the Flesch-Kincaid scores. Administrators and managers need to have completed at least half a year of college education in order to be able to read documents, such as reports, that they typically read. Line workers and supervisors need less than a 10th grade education in order to read the materials they typically read, such as the newsletter or manuals. This suggests that any information shared between administrators would be difficult for workers to understand if the message is not first modified.

Table 4.3: Flesch-Kincaid means according to readerships

<table>
<thead>
<tr>
<th>Reader</th>
<th>Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>line worker/labor/inspector</td>
<td>9.5033</td>
<td>9</td>
</tr>
<tr>
<td>supervisor/manager</td>
<td>8.9340</td>
<td>10</td>
</tr>
<tr>
<td>administration/manager</td>
<td>12.6343</td>
<td>14</td>
</tr>
<tr>
<td>All</td>
<td>9.8064</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>10.4459</td>
<td>44</td>
</tr>
</tbody>
</table>

Table 4.4: Flesch-Kincaid Means according to document type

<table>
<thead>
<tr>
<th>Document type</th>
<th>Mean</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>report: routine</td>
<td>12.9145</td>
<td>11</td>
</tr>
<tr>
<td>report: special</td>
<td>9.7690</td>
<td>10</td>
</tr>
<tr>
<td>manual/SOP</td>
<td>9.3333</td>
<td>12</td>
</tr>
<tr>
<td>Newsletter</td>
<td>9.8064</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>10.4459</td>
<td>44</td>
</tr>
</tbody>
</table>
Differences in the Flesch-Kincaid scores across different documents signal that the authors of these texts understood that readers would have different backgrounds. While it is important to understand what literacy expectations there are as evidenced in the documents themselves, it is also vital to ascertain how people used these documents.

*Sponsorship Implications*

While TWI emphasized visual and experiential literacy practices to mitigate low literacy levels and facilitate efficient training and production, Dinero (2005) acknowledges that the TWI program fell out of favor in the United States after WWII largely because of three factors: there was no longer a central entity to supervise its implementation, the expansion of production facilities and equipment, and the lack of the necessity of war-related efficiencies due to the absence of serious international competition to motivate continued use (p. 14). He acknowledges the shortsightedness of this attitude, observing that companies were quickly trying to shift production from war goods to consumer goods without considering how TWI could benefit them.

As stated above, Vulcan Tires took over operations from the government by 1952, suggesting the potential for two different literacy sponsoring agents. Also, the Arsenal was still under government control in the early 1950s, as use of photographs and color in newsletters lessened. So placement of photographs in manual appendixes in 1950 and using fewer photographs in newsletters at that time may be more a government-driven decision than a contractor-driven decision. The decision to place photographs in appendixes of manuals may have been affected by the fact that many employees who worked at the Arsenal during the Korean War had stayed on after WWII. These
employees needed little additional training or refresher reading. So, sponsorship dynamics may have changed because of the workers’ previous experiences with and knowledge of the operations and procedures. Alternatively, the use of fewer photographs in newsletters then may be an economic decision, and the lack of photographs at all in 1960’s newsletters may be a contractor-driven decision to reduce production expenses. Nevertheless, it reflects sponsorship toward favoring print-linguistic literacies.

Generally, visual and print-linguistic literacies seem to be equally valued in the 1940s. While practices in the early part of the war seem to esteem print-linguistic literacies, the materials published in 1945 seem to value print-linguistic and visual literacies equally. This could be due to the bomb accident and the need to integrate more graphics and more explicit information into training materials. Indeed, the text pertaining to safety in handling fuzes identified above (Figure 4.2), published in the 1945 supervisors’ manual, is likely a direct result of the accident.

The separation of practices across levels of the organization serves to compromise safety in the scope of the bomb accident. Print-linguistic modes are favored at higher levels of the organization while workers’ low literacy levels are accommodated with visual, aural and experiential practices. At some point in the process of moving the message from the administrative level (favoring print-linguistic literacies) to the workers (who favored visual, aural and experiential literacies) the message specifying the defects and how they could be more careful in handling the boxes was lost.

Recall the passage of the report acknowledging that one of the fuze assemblies of the bombs involved was new and defective in its tolerances:
f. The chief weakness in the fuze is in the pinion column which when coming out of adjustment generally permitted the safety blocks to fall out and the fuze to become armed. This data report in the form of a memorandum to O. E. Ralston dated January 6, 1943, indicating the defects in these fuzes, will be requested from Kingsbury Ordnance Plant.

The defect in the fuze’s tolerance and that “over one million of these fuzes have to be re-worked before they could be made reliable” indicates a problem in their manufacture that could have been promulgated through practices that included erroneous procedures. Also, the evidence of a memo (print-linguistic document) that pre-dates the accident indicates that upper management would be aware of the defects and would need to articulate cautions to supervisors and workers in writing and/or orally. Evidence suggests this exchange of information was done orally, at least for the workers:

h. Helper No. 3070 working in the railroad car substantiated the previous testimony but indicated the boxes containing the bomb clusters were difficult to handle inasmuch as they were not provided with handles. He stated they were instructed to give special care to this shipment as it was the first shipment of this type of ammunition that had been received at the Depot. He detailed the procedure of unloading the cars as described in paragraph 5 above, making the statement that the boxes were permitted to slide down between the arms of the workers, landing on the end, and then were walked to the truck.

This passage indicates that workers were told to be careful, but they were not informed of specific precautions needed related to the fuze’s tolerance sensitivity; they continued to use the routine procedure of rough handling associated with the munitions with which they were more familiar.

In the 1940 safety manual mentioned above, no information about precautions related to dropping or rough handling of boxes is provided in the section addressing workers employed in the explosives areas. Further, a 1941 Ordnance School Manual (the
predecessor to the Ammunition, General) refers generally to the condition of projectile fuzes as they are stored (p. 55 and p. 59). Figure 4.14 shows the specific text pertaining to safety of the fuzes from that 1941 manual (item C. 4). That text only indicates that there is some tolerance when the fuze is in the ‘safe’ setting position.

Figure 4.14: Fuze Safety Information Published in 1941 Supervisors’ Manual

Though no print-linguistic text explicitly indicates particular precautions, the information above suggests that there was safety protocol provided orally to workers in the Depot area and that the protocol included moving boxes as a two-man procedure.
Also suggested with the memo is that, while a print-linguistic memo articulating specific concerns was provided, the particular nature of those concerns may or may not have included issues associated with dropping the boxes or handling them roughly, beyond safe practices conveyed in the two-man operation’s protocol. Also, if such precautions were provided in the memo, as the word of necessary precautions made its way to the workers specific information about the nature of care was omitted. Workers knew to be cautious. However, as suggested by the continued ‘routine’ procedure of workers dropping boxes, they did not know specifically of what to be cautious or how to exercise caution. Had specific information about the fuze’s defect and precautions contained in the pre-accident dated memo been circulated to all Depot workers, either in document form or orally, the explosion may have been avoided.

Again, no accidents of the like occurred after this event. As indicated earlier, the author of the report emphasized acknowledgement of the need for caution with the fuzes, and that acknowledgement is evident in subsequent manuals. Additionally, a few interview participants who worked at the Arsenal also recalled an emphasis on safety: Indeed, no other accidents involving such explosions occurred subsequent to this accident, suggesting that these safety precautions were clearly articulated in writing and re-enforced several ways. Also, a number of interview participants who had worked at the Arsenal acknowledged an emphasis on safety.

David, who worked there after the explosion, acknowledges an emphasis on safety protocol among line workers:

me: what kind of training was there associated with that line work that you remember:
David: I had some… there wasn’t any training outside of safety. They had like a change house and on the actual line as far as pouring the melt. I didn’t do this, but, on the line where they melt the TNT; that is not the name of it, but that’s what it is; okay… and the ..as for safety we were not allowed to have any matches or, if you.. like… there had been a change house a short distance away probably about…. probably about 300 feet, 400 feet something like that; and that's where they allowed the people to smoke. no lighters and no matches were allowed in there at all. but they had a small lighter that was connected to electrical. And if you tilted it a little bit, it would light for the people who wished to smoke there.

Don, who also worked there after the accident, also articulates the existence of a manual that emphasized safety:

Don: I was almost guaranteed a job before I ever got out there. It was in safety and security, which was a field I knew nothing about. But nonetheless there was a field manual that you carried with you and that manual had been written in blood; and, so, you didn't vary too much from what was in the field manual.

David points out that training emphasized safety information, and Don acknowledges the existence of a safety manual that was treated as very important. While Don’s position is directly related to safety, the acknowledgement of the manual and its importance suggests that workers were encouraged to use the manuals. This data show that the separation of modes contributed to the accident and that combining modes of representation in a way that re-enforces each other, the information conveyed is better remembered and practiced.

The next sections report findings related to the other related questions with implications pertaining to the sponsorship of the Arsenal operators that extends into the community. The various practices at the Arsenal seemed to esteem print-linguistic literacies; the practices in the community also reflect the esteeming of print-linguistic literacies, suggesting the influence the government and operators of the Arsenal had as sponsors within the local literate ecology.
What literacy-related institutions or programs did the government or operators fund?

The data show that the government constructed and supported the Arsenal as well as a library within the Arsenal’s grounds, the community’s library and an elementary school in the housing development built for workers at the Arsenal. The government’s funding of these institutions suggests a form of sponsorship since these institutions are traditionally associated with developing and encouraging certain literate activities. The roles of these institutions in the community are evidenced in the interviews pertaining to home, school and community-related practices. Because of the connection they have to the government’s sponsorship within the literate ecology of the community outside of the Arsenal, I provide some basic information about the construction of these institutions in this section.

Libraries

The Arsenal had a library on its grounds, which made a variety of books available to workers as well as children of those who lived on the Arsenal grounds. The library was “operated in conjunction with the Harfield Public Library and Bookmobile, it is, to our knowledge, the only library provided by any ordnance plant in the United States” (Establishment of Arsenal, 1943, p. 9). In addition to the rotating collection of books, the Arsenal also subscribed to several magazines and newspapers (p. 9). In the first year of operation the library loaned 7,692 items to over 8,000 people (p. 9). The library
represents a literacy institution made available by the government to workers and families that were housed inside the Arsenal’s grounds.

The federal government provided funding to build or expand libraries in Fieldview and neighboring Harfield. Within Fieldview, the government built a library inside the Community Building. Two (2) of the participants worked there at some point during the period of study, and seven (or 23%) spoke of frequenting the community library on a regular basis for school or leisure. I discuss more information that participants shared about the library later in this chapter as I discuss intersections across spheres of school and community.

School

Fieldview’s school district was also provided with funding to expand to accommodate the influx of workers. As the Army designed the community in which it would operate and house workers (Elm), it included in the design an elementary school (K.T. Elementary School). The elementary school is located within the federal housing project, as is the community building, which housed the library. Several of the interview participants attended classes in this school building.

As with the library inside the Arsenal’s grounds, the construction of the school and community library also represent making literacy-related institutions available for members of the community to encourage and facilitate literacy practices generally. Describing the government’s investment in literacy infrastructure, Grabill (2001) found that “literacy tends to be constructed in relation to the mandates of funding and policy interests (largely from government and industry) and to the goals articulated in large part
by those interests” (p. 626). As Brandt, (2001) also observes, “literacy takes its shape from the interests of its sponsors” (p. 20). The inclusion of libraries and an additional school building articulates the government’s valuing of print-linguistic literacies and the recognition that literacy is important to the Arsenal workers and their families.

**What literacy practices occurred in school?**

Thirteen (72.2%) of the participants were enrolled in the Fieldview school district for their entire elementary and secondary schooling, and fourteen (approximately 78%) earned their diploma from Fieldview. Of the thirteen who attended Fieldview’s school district for their entire experience, all but one reported practicing all of the listed forms of literacy practices: reading stories, books and plays; and writing short papers, book reports and poetry.

The interview question pertaining to reading and writing practices did not specify in what class or classes the activity occurred or was required. However, many interviewees referred to activities generally expected in English classes. Many spoke about a variety of reading practices and related activities. This diversity is represented by this person’s recollection of book reports and poetry memorization:

H: Well, there again, we had textbooks that we read in that was sort of things that students do. We always, in English. In junior high school and high school English was a separate subject, and we did extra reading with written and oral book reports. We memorized poetry.

Some participants talked about how teachers encouraged them to read; two who spoke about their school activities in the 1950s called attention to the competition to earn
reading certificates. Responding to a question about her use of the community library, one states:

Mary: Yea. The library had ...I’d say, probably as many books and a school library, and probably had as many books as any other library and we were very much encouraged, and in the classroom, then, we would have the groupings of books that we were encouraged to read for nothing else but the certificate. But.. We were…we were.. there was nothing more that we liked than the challenge of beating out anyone else in the class . I mean, if they were gonna get a certificate, by golly, you were gonna get one too. So, that was our big encouragement

Me: So, it was highly competitive?

Mary: Our group was highly competitive and… that was it was highly competitive but yet we weren’t mean about it. And the kids that… if you didn't do it he didn't do it and nobody razzed you about it. But there was a lot to keep up with. An internal kind of thing

Another, responding to a general question about what reading or writing he recalled from school responds:

Me: Do you remember any of the reading or writing activities from high school in particular the assignments that stand out?

Steve: The only things that stand out was the spelling. We would reinforce spelling. Spelling bees were reinforced. that there is quite a competition. No one most. I was one of those guys who play to compete. The notion of something in and speak something. Writing really didn't kick in for me personally until probably 7/8 grade in that area.

This indicates that some students used the reading certificate program to motivate them to read more books over a given period of time. Such sponsorship espouses print-linguistic literacies.

Another participant, though, recalled a map of Ohio that she had to draw as part of her school experience. In the following exchange Claire clarifies that not all of her reading involved reading creative works:
Me: These books were much creative pieces, then--poetry or stories.

C: Yes, well, somewhat. But then there would be about a book about Ohio, and we would draw the shape of Ohio and talk about the different products and resources and that kind of thing.

Also, while none acknowledged specific recollections of them, picture books likely were part of elementary education experiences. So, there were some visual literacies associated with education. However, the overwhelming majority of statements in interviews identified print-linguistic forms of literate practices.

**Sponsorship Implications**

In each interview, as participants discussed various school-related activities, it is evident that they recall most clearly the many opportunities they had to practice print-linguistic literacies. This illustrates another area where print-linguistic literacies are sponsored more favorably over other forms of literacies, much as it is at the Arsenal.

**What literacy practices occurred at home?**

The interview data also show that print-linguistic literacy practices were emphasized and encouraged at home. Children and parents read newspapers, books and write letters to friends and relatives on a regular basis.

Fourteen participants (almost 80%) reported some kind of writing practice at home, with most (50%) reporting several different types—diaries, journals, letters. Of those who reported on their parents’ or siblings’ writing at home (11), 9 reported that there was no writing practiced; however, it is possible that others’ writing and reading
were not visible to the interviewees. Ten people reported that they read a variety of materials—magazines, books, newspapers; and four (about 20%) reported that they did not read at all at home. Additionally, fifteen (84%) reported reading to others at home.

Seven people reported on being encouraged in their literate activities at home. Generally, either a teacher or a parent had the most influence on these activities. Such sentiments are reported in the following exchanges:

Me: And you said that was during the 1950s. Any other information that you’ve recalled as we’ve talked about the home; reading or writing activities; or school, or any kinds of reading or writing instruction that you received?

Jane: No. I just remember that we were expected to read a newspaper every day.

Me: Your parents encouraged that?

J: Yes; that was daddy’s big thing; just to keep up on current events.

Me: And would you talk about that; talk about what kinds of stories that were in the newspaper, then?

J: It was…there were…

Me: Any quizzes?

J: Well, no…You knew you were supposed to do and you did it. You respected your parents. You didn’t question your parents back in my day.

And:

Susan: Ok there are. From those I can remember from elementary school reading the Dick and Jane stories. I can't remember literature or anything like that through junior high. I remember, for some reason, Ohio history and I can kinda visualize it, the book. And all the things that we learned about Ohio, and it was very interesting to me. I learned about early governmental things that… how the Ohio began in the government way. My mother always read to us a lot at home. I think that's where we, my brothers and I, developed a love for reading; because she read a lot at home and I don't remember… mostly I think it was Bible stories. I can’t remember a lot more than that.
Sponsorship Implications

Parents and teachers encourage children to read and write toward developing print-linguistic skills. Parents and teachers recognize that such skills are important, and they try to encourage their children to develop such skills through rewards and discussions. Consequently, parents and teachers, as Brandt (2001) notes, act as sponsors of literacy, also favoring print-linguistic forms of literacy. These practices re-enforce esteemed practices at the Arsenal as well.

What literacy practices occurred in the community?

Based on the interviews, a variety of practices occurred in the community ranging from reading and writing newsletters for civic organizations to writing instructional manuals within 4-H activities. Though, none recalled community-sponsored adult literacy programs. However, there were some community activities in which volunteers practiced reading and writing.

Three participants reported participating in community programs—one was library-sponsored and two were sponsored by civic organizations. Generally, these involved reading or composing newsletters. One example of this is from Steve, who participated in church-related newsletter editing. When asked if he recalled any writing assignments from school, he acknowledged that he could not recall any, but referred to writing activities that were part of his church service:

…those were those years I was doing things for the Methodist Church. Attended the Methodist Church in Fieldview; and some of us… we considered ourselves, the kids, trespassers and the congregation were debtors. So we went back and forth there doing the little newspaper there with the Methodist fellowship that I
edited for a couple of years; and, of course, we brought those skills to bear to the Methodist Church.

While there was no organized community literacy program outside of school, the civic and religious institutions supported literacy development. Further, as Helen suggests, the school sponsored some of the literacy practices shared with the church in that the children who produced the church newspaper brought their school-obtained literacies to the newspaper.

Another participant spoke of her experience in 4-H and the writing activities there:

Helen: I don't remember other than the 4-H activities. I was in 4-H all this time
Me: And did that involve any reading or writing?
H: Oh yes. Oh yes. We had our project booklets that we had to write in and read extra things about.
Me: And then you read about how to do certain kinds of things?
H: Oh, absolutely. Reading was just a part of my life.

Half of the participants (9) reported on experiences they had at the community library; though two of these were specifically school-related experiences. Five people reported leisure-reading activities pertaining to the library. These experiences are represented in the response one participant gave when asked about reading activities outside of school:

Mary: On a personal level we had no TV growing up, and it was an economic issue more than stand that my parents took on .more than anything. I think I was 12 when we got our first TV. Well, I can remember complaining terribly because the kids would talk about watching this show or that, but for me it probably made a huge difference because I read... all I had to do was to read. You know. We
were friends with Mrs. Alexander who was the librarian, and the library was in the exact same place it is now only much smaller. In the community building. And umm, my mother didn't drive and my father worked afternoon shift, but Mrs. Alexander. I would walk across the field, probably first and second grade it started, and one day a week and I would spend from whatever time school was out-- three o'clock 3:30 whatever, until the library closed at five o'clock and just read by my choice and then Mrs. Alexander would take me home. And that was something that was an arrangement made between herself and my parents, but the thing that sealed the deal for her, I think, was that she stayed for dinner. My mother was a great cook, and she would have dinner there and my mother always fussed and have dessert, and I think that Mrs. Alexander liked that. So, it worked out very well. I’d bring home a huge pile of books when I’d leave the library; and those books would be done by the next week. So I personally read a lot because I had… in the winter. in the summer you’re playing and outdoor things but in the winter there was nothing to do but, but to read.

While this experience seems one affected by economic dynamics for the family, it indicates a personal interest in reading for pleasure. It also recognizes a degree of sponsorship from the librarian and family friend, Mrs. Alexander. While the library acts as a literacy institution, the librarian appears to act as one who encourages attendance at the library and shows a personal interest in the student’s literacy development.

The findings of library access are important to note because, while I reported experiences of those who lived in the Fieldview community here, I also noted earlier the presence of a library within the Arsenal grounds for employees and those officers and their family who lived on the grounds as well as the Harfield library in a nearby community.

Sponsorship Implications

As with experiences at school and home, participants recall many opportunities to practice print-linguistic forms of literacy in their community-related activities. People are
even bringing school-related literacy experiences to bear on civic-related practices. As people are exposed to experiences that value print-linguistic forms of literacy in the various spheres of work, home, school and community, they cannot help but perceive that such skills are valued generally and necessary to advance in society.

**What intersections between these practices exist?**

It is important to consider intersections between the workplace and the spheres of home, school and community, especially when studying any influence or sponsorship exerted by the Arsenal on practices in those other spheres. The data show that print-linguistic literacies were esteemed both in the workplace as well as in the school, home and community. While visual, aural and experiential literacies are facilitated at the Arsenal and visual practices are part of the school experience, an overwhelming amount of data show an emphasis on print-linguistic skills. This suggests that the government, especially, and Arsenal operators tried to sponsor print-linguistic practices over others within the local literate ecology.

**What groups may have benefited from this sponsorship?**

While the nation benefitted from the multiliteracy practices at the Arsenal in terms of ammunition supplies available for the war effort, clearly, people with low print-linguistic literacy were able to acquire a job at the Arsenal; this provided them a livelihood. Further, just as Brandt (2001) observes that print-linguistic literacies were required to advance economically throughout the 20th Century, the Arsenal encourages print-linguistic literacies by using them to facilitate professional advancement there as
well as helping children in the community to acquire such skills to position them to be able to succeed economically as well.

**What groups may have been negatively affected by this sponsorship?**

While it appears that most groups benefitted from the government’s and contractor’s sponsorship, the literate hierarchy I observe limits movement across levels of the organization. Those with low-literacy levels cannot advance to higher positions in the Arsenal’s management structure. Also, as described above, employees who handle explosives are placed in a dangerous position because they have limited information because of the separation of modes of representation and expectations of literacy therein.

**Conclusion**

At the Arsenal, a variety of literate practices occurred, and all were facilitated toward accomplishing a common geo-political goal—national defense and victory in war toward peace and the maintenance of democracy. Print-linguistic, visual, aural and experiential literacies are practiced at the Arsenal. However, the literacy hierarchy there favored print-linguistic skills. Also, at school, children were encouraged to learn print-linguistic literacies. Adults, even those who worked at the Arsenal, explicitly encourage children to develop and practice print-linguistic literacies at home.

Adults in the community—parents and teachers-- seem to understand that print-linguistic literacies are valued over other literacies, even though all are practiced. The interview data show that children were encouraged to develop print-linguistic literacy skills. While all modes are used to accommodate varied literacies in the workplace,
people seem to recognize an ideology that favors print-linguistic literacies, which is
evident in a temporal study of the workplace archived materials and in the instruction
students receive at school. These suggest sponsorship of print-linguistic literacies over
others by the government within the local literate ecology.

As such, adults encourage their children to develop those print-linguistic skills
that they understand will enable the children to advance socio-economically. Parents
engage their children at home in letter writing to relatives and friends. They also expect
children to read books and newspapers to help the children do well in school settings. The
government also supports this education-related literacy sponsorship through construction
of the school and libraries.

There is an evident hierarchy represented in the modes of representation and
related literacies in materials at the Arsenal. A variety of literate practices occurs, yet the
separation of modes emphasized across positions reflects a definite hierarchy that limits
and regulates advancement. One cannot rise to certain levels without having a certain
level of print-linguistic literacy.

Another interesting finding is that the existence of manuals at the Arsenal does
not necessarily mean they were used much in training or for reference. Based on
interview data, many of the line workers did not actually read manuals since they were
provided on-the-job training. If one perceives that he understands a task based on on-the-
job training and practice, then he is less likely to refer to printed materials to gain further
information.
However, as the aforementioned case shows, there are material consequences, including life and death, embedded in decisions to esteem certain literacy practices over others. The literate hierarchy at the Arsenal seems to have contributed to the bomb explosion accident. Specific information that was conveyed in a print-linguistic mode to an administrator and that could have helped workers understand how to be careful never found its way to the workers. At some point the information was lost, and it may be due to the separation in modes of representation encouraged at the different levels of the organization. Presenting information using multiple modes can re-enforce, or provide an alternative means by which to present, that information.

I acknowledged sponsorship-related implications of findings reported throughout this chapter as I responded to the study’s related questions. In Chapter 5 I respond to the primary research question, regarding how the government and operators of the Arsenal acted to sponsor literacy within the framework of Brandt’s description of literacy sponsorship; “to enable, support, teach, and model, as well as recruit, regulate, suppress, or withhold, literacy—and gain advantage by it in some way” (p. 19).
Chapter 5

Implications for Sponsorship

The capture of literacy for economic production and competition introduces great demand and support for writing yet also great instability and turbulence into workplace writing practices. People who write for a living must function under these conditions often as intense mediators of powerful ideological processes, mingling self and system as they transform abstract need into transactional texts.

Brandt, 2005; p.194.

Discussion

Brandt’s quotation above calls attention to the increasingly challenging relationship between ideologically-motivated literacy-learning and personal, economically-motivated practices relative to valuations of literacy and related pedagogies. As workplaces strive to maximize profit in good economic times and survive in poor economic times, they tend to focus on short term objectives. Individuals, however, look to fill short term needs while balancing long term needs that may affect their employment in dynamic economies. As mentioned in Chapter 3, case study methodology must consider contextual factors that affect local practices. I use the findings that I reported in Chapter 4 toward responding to the primary research question of the study.
Graff (1979) asserted that any definition of literacy must be able to account for cultural and temporal differences in literacy dynamics, and Brandt (2001) called attention to changes in literacy standards over a period of time. While the field of literacy studies espouses research that considers ecological dynamics of literacy within social environments, it lacks close examinations of historical implications of certain forms of sponsorship.

As I acknowledge in Chapter 1, Street characterizes the meaning of literacy as embedded in the institutions in which it is practiced; a particular institution may value a certain form of literacy; and, thus, that particular form of literacy is considered more appropriate than any other form. Brandt’s quotation above echoes this attribute of literacy, as those institutions in which literacy is practiced sponsor those literacies that enable it to accomplish its work and economic goals at the risk of sacrificing long term benefits of workers or neglecting individuals’ needs. As Heath found in her study, children from the African-American working-class community (Trackton) were placed at a disadvantage in school compared to children from the white working-class community (Roadville) because of differences in the ways literacy development occurred at home within each setting. African-American children had little experience at home with the school-valued forms of literacy, while the white children had more experience with those literacies at home; and, consequently, the African-American children struggled in school.

This study has attempted to consider various literacy practices within a particular sponsorship dynamic that worked together at times and collided at other times with serious implications. This sponsorship dynamic extends into the homes, school and
community, suggesting the influence that the sponsor of the workplace has within the local ecology. The primary research question associated with this study is: As the primary employer in Fieldview Ohio, how did the government and operators of the Boomtown Arsenal sponsor literacy for its employees and for the community of Fieldview, Ohio from 1940-1960 and what environmental factors influenced this sponsorship? Generally, responses to this question can inform broader scholarship in the intersection of workplace, community, school and home literacy practices. That is, broader questions associated with this study are: How can workplace literacy practices affect literacy practices within the community in which an employer operates, and how can an employer consider a community’s literacy practices within its own literacy practices?

I organize my response to the primary research question according to Brandt’s conception of literacy sponsors; “any agents, local or distant, concrete or abstract, who enable, support, teach, and model, as well as recruit, regulate, suppress, or withhold, literacy—and gain advantage by it in some way” (p.19). In this chapter, first, I identify the agents associated with the sponsorship in this study, then I discuss how these agents facilitated the different attributes of sponsorship and gained advantage by it. I address each attribute based on the findings reported in Chapter 4.

“Any agents, local or distant, concrete or abstract…”

While parents, teachers and librarians clearly act in some capacity as sponsoring agents within the community, in the scope of this study the government and contractors who operated the Arsenal acted as the primary local agents in that they were in close proximity and contact on a daily basis with those who worked at the Arsenal. Also,
because of their proximity and considerable physical presence, the operators are a concrete agent of sponsorship for workers and the community.

The federal government acted as both a local and distant agent in that officials in Washington planned and directed certain operations while federal officials—military officers—held administrative positions at the Arsenal. It also was a concrete agent in that the officers at the site acted as representatives of the abstract federal government.

The two different operators of the Arsenal—APCO and Vulcan Tire—are also local sponsors. However, while APCO’s sponsorship is difficult to separate from the government’s influence, Vulcan Tire’s sponsorship, clearly, differs from that of the government or Atlas’ in that print-linguistic modes of presentation are favored over visual modes. However, this can be due to the number of employees who stayed on to work at the Arsenal and no longer needed the kind of training workers received in the 1940s.

“…who enable, support, teach, and model”

The federal government and APCO embraced and facilitated the practice of multiple literacies, especially during WWII. The government, with help from industry leaders, developed the Training Within Industry program, which emphasized visual, aural and experiential literacies, to accommodate low-literacy levels among workers. This accommodation concerning anticipated literacy backgrounds of employees and the need for efficient retraining enabled increased production of war products needed to support the war effort. A certain amount of education is implied within each level of work at the Arsenal, but the ways training is provided and the ways in which training documents
provide information speak volumes about differences in practices during WWII—before the accidental explosion and after it—and after WWII.

The modes used for training at the Boomtown Arsenal were affected by the following: labor pool and migration patterns, the literate background of employees, the war-time economic environment that shifted labor skills from farming to war industry, and efficiencies needed to quickly prepare workers to do their work. The government espoused, and facilitated with the TWI program, training that minimized potential literate differences among workers and created efficiency in training by emphasizing oral, visual instruction that integrated demonstrations and opportunities to practice the skills shown. Because employees came from varied backgrounds, Arsenal operators understood that there would be a need to accommodate related literate differences.

Mayer (2001) identifies two metaphors of multi-media learning: information acquisition, which facilitates adding information to one’s existing knowledge; and knowledge-construction, which applies to model building to facilitate cognitive guidance (p. 14). Training at the Arsenal focused on specific task-oriented information acquisition, disregarding the knowledge-construction modeling metaphor. The emphasis was on training for a specific task as quickly as possible. Also, fewer people were needed during the Korean War, since operations there were on a much smaller scale. Consequently, the Arsenal operator managed to hire many of the people who worked at the arsenal during WWII and stayed in the area, limiting the need for additional training. Such an approach values oral, visual and experiential literacies over print-linguistic literacies.
Further, the manuals and SOPs used in training and as reference resources show changes in sponsorship attributes across periods. Steps presented in the G.P. bomb SOP (e.g. Fig 4.9 in Chapter 4), which was published in the 1940s, provides visual information with the print-linguistic text information in the spread. Also, the print-linguistic information is formatted to be visually accessible quickly. However, in all of the SOPs published during the 1950s all of the print-linguistic text is placed before any visuals, though each visual can be identified with corresponding print-linguistic text. This difference suggests that the multimodal representations espoused by Mayer were recognized and esteemed during WWII, while they were devalued in the 1950s.

As I reported in Chapter 4, this study has found that the government and operators of the Arsenal esteemed print-linguistic literacies over other literacies. This emphasis is evidenced in the literate hierarchy of the Arsenal wherein practices at higher levels required people to have proficiency with print-linguistic literacies, while practices at lower levels required less print-linguistic proficiency and integrated more visual literacies. Further, the modification of print-linguist materials progressively toward lower grade-level literacy requirements suggests an effort to encourage print-linguistic skills as well as an understanding of the information.

“…as well as recruit, regulate, suppress, or withhold, literacy”

An over-emphasis on the visual and experiential can create a precarious situation. While manuals were distributed, these were rarely used other than as reference guides in case someone forgot a specific task. As evidenced with the bomb-explosion incident, when a safe protocol is forgotten or set aside because of time issues or product-quality
issues, it compromises any efficiencies and places workers at great risk. Workers need to be encouraged to read any written materials that may reinforce safety guidelines associated with operations. Further, such materials could have provided information that was not clearly articulated orally to help workers understand what specific precautions to take. Manuals published after the explosion accident do this.

Supervisors and administrators, those in higher positions, were expected to have print-linguistic literacies that included higher grade-level expectations than workers likely had in addition to visual literacies. One could not advance within the organization without these skills. In this sense, the literacy hierarchy at the arsenal represents the literacy-related ideology which privileged print-linguistic modes over visual modes of representation.

Print-linguistic literate practices were, also, actively encouraged throughout the community. Data associated with the library usage, school instruction and practices at home and in community organizations emphasize print-linguistic skills. People saw the value of these literacies in possibly advancing themselves and their children. These practices favor print-linguistic literacies, even though a program that facilitated multiple literacies was practiced at Arsenals around the country during WWII. Subsequent to WWII, however, the print-linguistic ideology seems to have re-emerged as the favored approach as materials at the Arsenal emphasized those literacies over the multiple literacies practiced during WWII.

“—and gain advantage by it in some way”
Brandt observes that the literate environment of pre-WWII brought about the literacy crisis of WWII. She characterizes the 1930s literate ecology as “regional stratifications” of the literacy economy brought about by the geographic and economic make-up of the United States—largely a farming economy that affected how children were taught and how adults valued literacy practices toward farming applications. Fieldview was a farming community prior to WWII. The training associated with the military-industrial economy of WWII provided instruction in various technologies that would continue beyond the war period and become part of the national, and eventually, global economy. This connection illustrates a link between literacy and the social, political and economic needs of the country at a given time period.

Finally, generally, it appears that the literacy practices of the workplace did not negatively affect literacy practices within the community—at home, at school or in civic organizations or in leisure-reading activities. Children were encouraged to learn print-linguistic literacies even as they practiced visual literacies such as drawing state maps. However, the practices clearly suggest an understanding that print-linguistic literacies are esteemed over visual or other literacies. Brandt (2001) also notes that print-linguistics literacies were valued during much of the 20th Century.

Much as a certain level of education is required to advance within the Arsenal’s literacy-related hierarchy, so, too, does that literacy-professional advancement relationship extend beyond the Arsenal.

Conclusions
This study shows a clear link between literacy sponsorship and the impact sponsorship has on a literate ecology. Sponsorship of a particular literacy suggests an ideology that esteems that particular form of literacy. The government and operators of the Arsenal accommodated the literacies of the workers by providing training that emphasized visual, aural and experiential practices and integrating visuals in instructional materials. However, a clear emphasis on favoring print-linguistic literacy is evident in the hierarchy at the Arsenal, the adjusting of print-linguistic text to lower grade levels to accommodate low literate workers and its presence in the school, at home and in the community literate practices. This emphasis suggests an ideology that esteems print-linguistic forms of literacy over other forms of literacy. Street (1984) asserts that literacy is defined and valued according to the institutions in which it is practiced, and the sponsors in this study valued print-linguistic literacies over others toward certain benefits.

Brandt and Clinton (2002) observed limitations that local studies of literacy like this one, which tend to focus on particular individuals or communities, have on understanding global issues. However, they also acknowledge that local practices tend to extend into more global settings. I identify and discuss several global implications associated with the findings of this study in the remainder of this chapter.

Literacy Sponsorship and Market Demands

Bazerman (2005) and Brandt (2001) note that literacy crises seem to be perceived at particular points in time. Brandt (2001) and Kress (2003) observe changes in what literacies are esteemed over time as different technologies are available and used. Brandt asserts that literacy crises emerge from changes in various geo-political and global
economic forces that shape the market demands for business and industry (p. 75). These, in turn, affect changes in literacy expectations to facilitate meeting market demands. Market demands include not only those literacies required to produce needed materials and products, but also demands associated with sustaining a given social and economic structure and improving it. During WWII the government and plant operators needed to facilitate visual and experiential literacies because of the geo-political and demographic factors associated with a grand scale, global war that took many skilled tradesmen out of industry and replaced them with people with different work-related skills.

As evidenced in the interviews and examples of print materials reported here, line workers practiced predominantly visual and aural/oral literate skills, while supervisors experienced a balance between the visual and the verbal forms of representation. Also, the higher-level administrators, who wrote the annual summaries of operations, emphasized print-linguistic skills. These differences in modes across the levels within the organization represent a form of social stratification. Workers who do not have certain literate skills cannot advance beyond a given level, creating a literacy-oriented barrier to advancement. Literacy, then, is used to stratify the organization such that those who have esteemed print-linguistic skills have authority over those who lack those skills. If literate practices across modes of representation are practiced such that all experience and learn how to practice them with proficiency, that barrier is eliminated.

Workers are able to learn tasks more quickly when training integrates multimodal forms of representation. Understanding factors that may affect worker training and the relationship between the visual and the textual modes of representation relative to a given
context will help employers to develop appropriate training materials in such contexts while encouraging employees to advance their literacy skills. As such, this study contributes to an understanding of how workers’ literate backgrounds affect their ability to learn certain skills and how modes used in training practices can accommodate certain literate backgrounds and experiences of new employees toward a more diversely literate workforce. It also encourages instruction in print-linguistic literacies because of ways various modes can re-enforce each other or serve to clarify information for readers.

Again, as the New London Group asserts, “the visual mode of representation may be much more powerful and closely related to language than ‘mere literacy’ would ever be able to allow” (p. 64). By emphasizing the visual skills of workers the government and employers connected to the Arsenal effectively minimized literate differences among workers, helping people from various backgrounds understand how to perform their specific tasks.

Because of the war-time economic environment, the operators of the Arsenal needed an efficient way to prepare workers for their tasks. Many migrants had skills training for farm work, but they would need retraining for war-related industry. Training that emphasized the visual could accommodate faster transition in skills. This is further reinforced by the transient nature of the migrants. With a high turnover, employees needed to be able to be hired and placed to work quickly.

Also, interestingly, evidence presented in Chapter 4 suggests a correlation between level of employment and literacy skills required. One who has alpha-numeric, print-text based literacy skills is able to attain a higher level of employment because more
documents at those levels emphasize print-linguistic modes of representation. Such skills are emphasized in the forms of representation used by those employees. Those who have visual and experiential literate skills are able to work at lower levels in the organization because training and practices emphasize those skills. However, the study also shows that various modes can act to re-enforce each other. If these modes are not used in conjunction with each other, severe consequences can occur as evidenced with the explosion accident.

Implications of Sponsorship

Knowledge is delivered through literate practices. Kucer and Silva (2006) note that literacy sponsors play a role in constructing knowledge for particular communities: “Literacy is a primary avenue through which knowledge is developed and conveyed...Sponsorship impacts what knowledge is to be privileged or deemed “official” and what is to be ignored” (p. 43). Information needs of workers and others must consider the best literate ways for the information to be presented. As The New London Group (1996) noted, certain modes of representation may serve readers better than other modes for particular information. This is also echoed in Moreno and Mayer’s (2000) findings concerning use of multimedia forms of instruction to help students learn new concepts. The accident involving the bomb explosion illustrates the importance of having multiple forms of literacy practices re-enforce each other to facilitate understanding and retention of information. Subsequent to the explosion, it is evident that employees received training about safety protocol as well as a handbook re-enforcing that information.
Also, Kaplan and Baldauf (1997) identify specific factors that seem to bring about perceived literacy crises: “economic change, political and geopolitical change, demographic change and multiculturalism, and technological and mass cultural change” (p. 89). Brandt (2001) observed these dynamics at work in her characterization of the crisis during WWII. Indeed, as unskilled workers came into the Arsenal, literacy demands needed to change to accommodate their practices to facilitate quick transition to the new economy.

The case discussed throughout Chapter 4 shows how the kind of literacy a sponsoring agent facilitates and encourages while also regulating practices can have drastic material consequences. Precautions that could have prevented the accidental explosion existed in a print-linguistic document available to higher ranking officers of the Arsenal. While evidence that workers were aware that they needed to be careful with the boxes exists (the foreman acknowledging so), evidence also suggests they did not understand why or what precautions they should have taken (the foreman acknowledging that the boxes were still handled roughly). Had the information been available to them in print-linguistic form, or conveyed more precisely orally, the accident may have been avoided.

Changes brought on by war are sudden and require quick shifts in skills. Similarly, as technology changes at an increasingly faster pace and global competition intensifies policy planners need to account for this potentially unanticipated shift and literacy issues therein. Sensitivity to such forces will help people understand why certain literate practices are being valued at a given moment over others while recognizing
potential value in other literacies. Further, in an economic downturn that includes increased unemployment rates in spite of reports of employers seeking qualified workers (Schleis, 2009), such as that experienced recently (2009), an environment that embraces multiple literacies may be able to adjust to changes in needed employee skills quickly. This ability to transition quickly reduces the length of any economic recession, permitting workers to change jobs without losing much of their own economic position.

By examining the literate relationships that exist across the various settings of home, school, community and work in a particular literate ecology, a few observations may be inferred from this study. The first is that literacy-development policies must recognize that some geo-political and geo-economic forces that shape literacy demands cannot be planned for and require immediate shifts in literacy ideologies and practices to effectively negotiate changing political and economic patterns. The second is that multiple forms of literacy can be effectively practiced in a single ecology whether they are formally esteemed by a given entity or not, and these practices should not be ideologically prioritized. By recognizing the value of multiple literacies and multimodal forms of representation, the government and workplaces can open doors to employment and opportunity when they encourage these practices to exist and value them.

Socio-economic and Socio-political Implications

A few responses to these observations, some of which are already being espoused, include:

1) multiple literacies need to be valued, instead of valuing a single form of literacy,
2) ecologies of literacy must account for socio-political, economic and demographic dynamics at play in a given period of time and facilitate adaptation,
3) sponsorship of literacy starts at the highest levels of government, business and industry; and these entities need to value literacy development consistent with evolving global market needs,
4) these entities must support literacy development by making funding for multi-literacy education more accessible, and
5) institutions where literacy development occur—schools, colleges and workplaces—need to integrate new work order-related skill development into their curricula, while facilitating disciplinary discourse learning.

The use of multi-modal representations and various representation systems individually can facilitate communication. However, the quote prefacing this chapter acknowledges that print-linguistic literacies are still valued in the workplace. Brandt’s study pertained to 20th Century skills and changes in print-linguistic literacies that occurred over that period. Whether these skills persist or change within the 21st century needs to be considered further. A growing body of scholarship observes a trend toward demands for visual literacies in the 21st Century (Kress and Van Leeuwen, 2001; Mayer, 2001; Mitchell, 1996; Selfe, 2004; Tufte, 2006). The federal government should fund education programs that support multi-modal literacy development, much as it funded institutions that supported print-linguistic literacies in the period associated with this study.
Higher education seems to support disciplinary specialization as preached by business and industry leaders who influence federal education policy (again, the Spellings’ Commission included a handful of business and industry executives), however, education needs to account for potential changes such that workers can shift from one kind of job to another as market demands change. This affects what institutions should teach to prepare future workers. Studies in workplace literacy support valuing multiple literacies equally (Kalyuga, 2005; Petroski, 1996; and Senge, 2006; Witte, 1992; and Zimmerman and Marsh, 1989). As I mentioned in Chapter 2, there is debate concerning whether to prepare workers with specific disciplinary sets of skills and discourses or with broader, creative and adaptive skills with reduced organizational hierarchies and greater global competition.

While scholars like Olson (1993), Haas (1994), Jolliffe (1997) and Merrifield (1997) encourage discourse-specific training; Applebaum and Batt (1994), Gee et al (1996), Dinero (2006) and Senge (2007) argue that the marketplace has changed significantly in the past twenty years such that competition is global and customers are more savvy (Applebaum and Batt, and Gee et al). These attributes require workers to find creative ways to reduce costs, increase operating efficiencies, and to be able to customize products more for customers, requiring workers to be able to adapt quickly (Gee et al, Dinero, and Senge). Within this “new work order,” Gee et al identify meta-cognition as the primary discipline associated with the new worker; helping students understand how to do things within a given system and be creative problem-solvers. Dinero (2006) and Graupp and Wrona (2006) allude to creative thinking skills to help workplaces find more
efficient methods for doing certain tasks. Further, Senge (2007) identifies five particular sets of skills, encouraging workers to constantly develop themselves so that they can adapt to new environments while also engaging in a systems approach to analysis: trying to understand how things operate within a given system and trying to improve certain attributes within it so that the rest of the system benefits. These skills and disciplines require various literacy practices identified above, including visual, experiential, and print-linguistic.

Further, as Scribner and Cole (1981) and Street (1996) have observed and reported, a single ecology can include different forms of literacy practices, none of which is generally esteemed over any other, and each form is used appropriately within that ecology because there is a lack of ideological interference. Interestingly, these particular studies both pertain to non-American cultures; cultures that American audiences may perceive as ideologically different from their own. Studies that report literacy dynamics in the United States tend to illustrate gaps between actual practices and ideological values (e.g.: Heath, 1983, Purcell-Gates, 1995, Farr, 2003, and Skilton-Sylvester, 2002). This study shows sponsorship that values multiple literacies and the modes of representation associated with them within a single ecology in the United States within a particular geo-political and economic environment that existed during the particular historical period and which exists today. While not a time of war, there is considerable geo-political movement in business and industry that necessitates quick transitions. The current economic environment, also, demands that workers be able to transition from one set of skills to another quickly to minimize unemployment.
Implications for Workplaces and Literacy Education

Though this study examines practices and ecologies associated with a very unique period in this country’s history—a period when the world was at war and most of the government’s, industries’ and civilians’ efforts were aimed at ending that war, this study’s findings carry many implications pertaining to the question of how workplace literacy practices can affect literacy practices within the community in which an employer operates and how a community’s literacy practices can affect an employer’s literacy practices. Specifically, the following implications emerge:

1) Practices that encourage multi-literacies facilitate rapid learning of new concepts, addressing language and literacy-related barriers,

2) There are connections between literate practices and effective rhetoric. Certain literacies are more effective for certain purposes than are others, including instruction in new concepts; and these literacies ought to be taught and applied toward accomplishing those rhetorical purposes. This literacy includes an understanding of how to balance rhetoric associated with various modes of representation.

3) Economic support from the government and others can encourage development of proficiencies in multi-literate practices that facilitate quick transitions from demands associated with one economy to those associated with another.

While certain rhetorical purposes affect literate practices, as they consider how to train new employees, companies should conduct a needs assessment that addresses not
just internal work dynamics but also literacy backgrounds of their employees and employees’ learning styles. Such assessment should also consider socio-political factors that affect the company’s performance. Such assessment can help literacy sponsors such as the government, institutions of higher education, and companies understand how to facilitate efficient operations and transitions to new economic demands.

The current global economy encourages workplaces to relocate jobs to different parts of the world. As workers cross geographic and linguistic boundaries, their literacy skills are challenged. Multimodal forms of training facilitate learning in such environments. Workplaces also want employees to be able to transition quickly into their job without needing much training. As companies understand the training new hires have received prior to being hired, they can use that background to help accommodate certain literacy skills and understand with which modes trainees feel they best learn. Further, facilitating multimodal forms of training will lessen the amount of time needed to train employees. It may also help workers who lack certain skills for other kinds of work learn those skills faster, helping them to move from one job to another faster.

Mitchell called attention to the increasingly global visual culture that includes, flight simulators and computer-aided design tools and virtual environments in the workplace (p. 23). Also, recently, forms of training are being conducted via video gaming environments. A point Gee (2003) makes about games and their ability to help people learn is that they need to be able to be learned. That is, learners need to be able to understand the game itself before they can use it for learning (p. 6). People need to have a certain kind of visual literacy in order to use games for learning (p. 13). Gee
acknowledges that game environments represent a different “semiotic domain” than other, more commonly experienced semiotic domains. Gee espouses using video games for learning activities because of the social dimensions involved in such games, and their increasing popularity suggests that many people may be literate in their use.

Policy-makers need to understand what skills are needed to accommodate shifts in demand as technology changes and demographics change, affecting economic change as well. Such skills are being identified in literature associated with the “new work order” (Gee, Hull and Lankshear, 1996) and “the learning organization” (Senge, 1990). Generally, these skills encourage proficiency with multiple literacies. The government is a major sponsor of literacy in both the local ecology associated with this study as well as in the national and global ecology.

Workers are able to learn tasks more quickly when training integrates multimodal forms of representation. Yet, different kinds of reading material at different levels of the organization require a variety of literacy skills, including visual, aura and print-linguistic. Understanding factors that may affect worker training and the relationship between the visual and the textual modes of representation relative to a given context will help employers to develop appropriate training materials in such contexts. As such, this study will contribute to an understanding of how workers’ literate backgrounds affect their ability to learn certain skills and how modes used in training practices can accommodate certain literate backgrounds and experiences of new employees.

The Training Within Industry (TWI) program that many arsenals used during WWII supported certain literacies and incorporated multiple modes of representation—
aural, visual and behavioral. Within educational settings, the TWI philosophy has been applied in service learning initiatives. Further, the philosophies developed by those who created the TWI program has been espoused recently in business and industry publications as one that can lead to more efficient production methods, and it has been implemented in several companies, including Toyota (Liker & Meier, 2007). This form of training is currently being supported as a form of efficient training in what Kress (2003) calls an increasingly visual culture. In such a culture, certain literacies are required. While it emphasizes visual and experiential literacies, TWI also encourages development of print-linguistic literacies. For example, such skills are integrated in its use of suggestion box practices and in creating narratives that not only may help in training but also in technological or process improvement (Dinero, 2005 and Liker and Meier, 2007). As such, it integrates multiple literacies and engages various modes of representations associated with those literacies. However, with regard to this study, such print-linguistic literacies were not encouraged at lower levels of the organization, hurting employees. The Training within Industry model is still practiced, and an annual conference about the impact that it has had on companies has been held in recent years (TWI Summit). Further, recent publications such as Toyota Talent (2007), TWI Workbook (2006) and Training within Industry: the Foundation of Lean (2005) espouse TWI as a training model. Such attention to modes used in training practices should include critical examination of political, cultural and economic implications in addition to safety and risk concerns. The study I have reported here can inform this revival of TWI and help to
improve connections between forms of workplace and community literacies and how companies can implement it and educational institutions can facilitate learning with it.

Limitations of This Study

This study examines practices in a given ecology with the benefit of more historical perspective than one generally can ascertain in an ethnographic study. While this perspective offers a broader lens to facilitate analysis, several limitations of such historical studies are evident with this study. These limitations generally pertain to the inability to observe practices, having to rely on memories of events and practices that occurred fifty to sixty years ago and the challenges of connecting available documentation with actual practices.

The most significant limitation is associated with the necessity to infer actual practices from interviews and documents, as opposed to observing those practices. As I acknowledged in Chapter 4, while there were several manuals/SOPs available for review in the archived materials, interviewees acknowledged very limited use of manuals in their training, if any use at all. Further, the report of the bomb explosion accident seems to indicate that even procedures presented in training were not followed strictly. They were modified to suit particular temporal concerns at the risk of safety. Actual observation of these practices would ascertain to what degree manuals were used along with any on-the-job training and how workers followed safety-related protocol.

Relative to inferences of home- and school-based practices, many interview participants rarely could recall specific practices, offering general recollections. For a study of general practices, like Brandt’s (2001), such coverage is sufficient if
accompanied by a few specific experiences to illustrate experiences those who could not recall specific events may have had. A few participants did identify specific activities, many of which I report in Chapter 4. This facilitated some inference to the general community’s practices. Recollections of general practices at the Arsenal and the documents helped to infer practices there through triangulation. However, actual observation would enable the researcher to describe specific practices in considerably more detail than I could report here. While observation would be optimal, an historical study that involved a more recent ecology, perhaps less than fifteen years ago, could address some of these issues, too. Interviewees’ memories would be fresher and the participants would be younger, limiting lost recollections or foggy memories. I have attempted to address some of these limitations through triangulation of data sources and research methods, but I recognize that the limitations impact the ability to verify practices.

Furthermore, regarding findings pertaining to home and school practices, as I noted in Chapter 4, the study focuses on a single school district and community. This focus limits potential for inferring findings to a general population. A larger scale study including other school districts and communities in the area may facilitate broader generalizations about practices there.

Another limitation, alluded to in Chapter 3, is that the sampling for the interview study included only Caucasians who grew up in the area or migrated and stayed in the area. It does not include African Americans who also migrated or grew up in the area and/or any people—African-American or Caucasian-- who relocated beyond the county.
Directions for Future Research

This study supports much of the current scholarship in literacy studies pertaining to the advancement of the concept of multiple literacies and pedagogies that include instruction in various modes of representation including multimodality. It calls attention to the separation of sponsored literacies and potential consequences of such separation. Future studies can consider these and other phenomena pertaining to literacy sponsorship within ecologies of literacy including:

1) Other historical studies on the subject of ecologies of literacy. For example, future studies can consider the impact that automotive manufacturing plants have had on certain locales, as the automotive industry changes directions within the current economy.

2) Historical studies, like this one, that also include the experiences of minority populations and those who migrated to other areas after their particular experience. Examination of government and military sponsorship regarding minority groups that served the country in war time and their experiences after war can offer much for policy development that engages minority groups.

3) How the government supports and restricts literacy development when it sponsors a limited set of skills toward advancing what it perceives to be market trends. For example, the U.S. government offered federal grants supporting specific kinds of programs and literacies thereof. Studies can consider the impact this sponsorship has within historical contexts.
4) Considering how companies currently apply the Training Within Industry model and critiquing its successes or failures as a literacy sponsor.

I encourage further historical studies in literacy with the understanding that limitations such as these be recognized but that research into local practices with an historical perspective can benefit literacy research. As such studies are published, readers of these studies can attempt to ascertain ways to address these limitations.
Appendix A

Interview Questions

1) Were you born in the Windham area or at what age did you move to the area?

2) School(s) attended?

3) College? Degrees attained: what; when completed?

4) Age when you began working in area?

General Adult education

5) Did you attend any adult education/training classes/workshops?

6) When?

7) Where?

Adult education—transition-community-sponsored training

8) What training programs do you recall were available to help with your or your family's transition to life in NE Ohio?

9) What community-based training programs were available to develop reading and/or writing skills?

10) What reading skills were developed in this program?

11) What writing skills were developed in this program?

12) How did the skills developed in this program help you or your relative(s) at home, education and/or in any work you or they have done?

Job search
13) Did you or anyone in your family work at the Arsenal? What position(s)?

14) Did anyone help you complete job applications?

15) What questions related to reading/writing skills were asked in any job interviews?

Work-related skills

16) What was the Arsenal's training program like?

17) How much reading was required of the training program?

18) How much writing was required of the training program?

19) How much reading was required in the job(s)? What kind?

20) How much writing was required in the job(s)? What kind?

Home/other work literacy

21) How did the skills you/your relatives learned in this program help at home or in any other job you/they've held?

22) What other reading and writing training did you/they received?

23) How did this training help you/them at home or at any other job you/they've held?
Appendix B

Interview Categories and Codes

<table>
<thead>
<tr>
<th>Category</th>
<th>Scale (nominal, interval, ratio/scale)</th>
<th>Response Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native:</td>
<td>nominal</td>
<td>Yes,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No; Arrived before 1940</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No; arrived between 1940 and 1945,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No; arrived between 1946 and 1950,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No; arrived between 1951 and 1955,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No; arrived between 1956 and 1960</td>
</tr>
<tr>
<td>Migrate from</td>
<td>Nominal</td>
<td>Not applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Within state</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One state away</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More than one state away</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outside U.S.</td>
</tr>
<tr>
<td>Migrate reason</td>
<td>Nominal</td>
<td>Not applicable\</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Affordable housing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work, self; not arsenal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work, self; arsenal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work, parents; not arsenal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work, parents; arsenal</td>
</tr>
<tr>
<td>Grade entered</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Grade completed</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>Graduation year</td>
<td>Scale</td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>Nominal</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes; some college</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes; completed associates degree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes; completed Bachelor degree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes; completed Graduate degree</td>
</tr>
<tr>
<td>Arsenal Work</td>
<td>Nominal</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>yes; reporting my own experience</td>
</tr>
</tbody>
</table>
| Years employed | Scale | Yes; reporting parents’ experience  
| Position | Nominal | Yes; reporting siblings experience  
| School Writing | Nominal | Line worker/laborer/inspector  
| | | Supervisor, manager  
| | | Administrator  
| Work Writing | Nominal | none  
| | | poems  
| | | essays  
| | | plays  
| | | drawing maps  
| | | poems/essays  
| | | poems/plays  
| | | all  
| Work Reading | Nominal | none  
| | | manuals  
| | | correspondence  
| | | reports  
| | | correspondence and manuals  
| | | correspondence and reports  
| | | manuals and reports  
| | | all  
| Other literate practices: Work | Nominal | Training (visual, aural, experiential)  
| Home writing | Nominal | notes/reminders  
| | | diaries/journals  
| | | letters  
| | | diaries/journals and letters  
| | | all  
| Other literate practices: home | Nominal | Map drawing  
| Others home writing | Nominal | Did not write  

<table>
<thead>
<tr>
<th>Activity</th>
<th>Level</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents/aunt/uncle</td>
<td>Nominal</td>
<td>arsenal, wrote letters</td>
</tr>
<tr>
<td>Spouse, sibling</td>
<td></td>
<td>arsenal; wrote letters</td>
</tr>
<tr>
<td>Parents/aunt/uncle</td>
<td></td>
<td>arsenal, wrote letters</td>
</tr>
<tr>
<td>Spouse, sibling</td>
<td></td>
<td>arsenal; wrote diaries/journals</td>
</tr>
<tr>
<td>Spouse, sibling</td>
<td></td>
<td>arsenal; wrote diaries/journals</td>
</tr>
<tr>
<td>Home read self</td>
<td>Nominal</td>
<td>did not read newspapers, magazines, books</td>
</tr>
<tr>
<td></td>
<td></td>
<td>newspapers/magazines, books</td>
</tr>
<tr>
<td>Home read to</td>
<td>Nominal</td>
<td>None, letters to parents, letters to children, stories to children,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Newspapers/magazines to children</td>
</tr>
<tr>
<td>Others read home</td>
<td>Nominal</td>
<td>None, Parent/aunt/uncle worked arsenal; read letters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spouse/sibling worked arsenal; read letters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parent/aunt/uncle worked arsenal; read newspapers/magazines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spouse/sibling worked arsenal; read newspapers/magazines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parent/aunt/uncle worked arsenal; read books</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spouse/sibling worked arsenal; read books</td>
</tr>
<tr>
<td>Work talk at home</td>
<td>Nominal</td>
<td>not applicable, no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Community write</td>
<td>Nominal</td>
<td>newsletter, promotional material, reports</td>
</tr>
<tr>
<td>Community read</td>
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<td>newsletter promotional material reports</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Community programs</td>
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<td>none library-sponsored church-sponsored civic-sponsored</td>
</tr>
<tr>
<td>Influences</td>
<td>Nominal</td>
<td>None identified Parents Teacher Other community members Parents and teacher Parents and other community members Teachers and other community members All</td>
</tr>
<tr>
<td>Library recall</td>
<td>nominal</td>
<td>No experience conveyed School-related only Included leisure Worked there</td>
</tr>
<tr>
<td>Adult literacy program</td>
<td>Nominal</td>
<td>None Yes; basic reading/writing skills Yes; career-related program</td>
</tr>
</tbody>
</table>
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