This thesis reviews literature on cognitive psychology to demonstrate its relevance to the field of composition with a specific focus on technical communication. It specifically addresses how cognitive psychology became important to composition and how it has enhanced the field’s understanding of reading, writing, and teaching processes. In terms of reading, cognitive psychology provides the field with guidelines writers can use to best enhance reader comprehension. In terms of writing, cognitive psychology brings to the field the view of writing as a process. Teaching writing and reading processes involves looking at how the two are intertwined. Building on connections between reading and writing, contemporary studies of cognitive psychology focus on how teaching students metacognitive strategies can help students enhance their reading comprehension and improve their writing ability. MOOs and Knowledge Forums are presented as two examples of online learning environments that incorporate the teaching of metacognitive strategies. Ultimately, this thesis argues for the overt inclusion of cognitive psychological principles in writing classes as a way to help students understand the guidelines writing teachers pass on to them.
UNDERSTANDING THE RELEVANCE
OF COGNITIVE PSYCHOLOGY TO COMPOSITION:
TAKING A CLOSER LOOK AT HOW COGNITIVE PSYCHOLOGY
HAS INFLUENCED IDEAS ABOUT READING, WRITING,
AND THE TEACHING PROCESS

A Thesis

Submitted to the
Faculty of Miami University
in partial fulfillment of
the requirements for the degree of
Master of Technical and Scientific Communication
Department of English
by
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2008

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ACKNOWLEDGEMENTS

This thesis has been a long time coming. When I began this process, I had no idea what a giant undertaking it was going to be. There are many people I have to thank without whose help this thesis would never have been completed. First, I would like to thank the members of my thesis committee, Dr. Gordon Allen and Dr. Katherine Durack, who worked very hard in a short amount of time to make sure I got my degree. Most especially, I would like to thank Dr. Jean Lutz, my committee chair, for her help and encouragement throughout this thesis process. Without her help, I would never have overcome the many obstacles I encountered along the way.

I would also like to thank my family for all their support and encouragement during this process. Specifically, I would like to thank my parents, Morris and Ellen Berkowitz, who have always believed that I could successfully complete this thesis and obtain my degree.

Finally, I would like to thank Scott Shellabarger who has been with me throughout this process and without whose patience and support I could never have made it this far. Thank you for all your advice and encouragement.
Chapter 1: Introduction

Cognitive psychology, simply put, studies how people think. It is the study of how people attend to, perceive, learn, remember, and think about information. As such, the topics studied within cognitive psychology are ones that affect our everyday lives. How we learn, how we remember, and how we think about information are all processes that we do on a daily basis for a number of different subjects, from something as simple as remembering a telephone number or a person’s name to something as complex as learning how to solve a mathematical problem. In this case, however, the subjects of relevance to cognitive psychology are reading, writing, the act of composing, and learning to write.

My thesis will address how cognitive psychology has helped researchers and instructors understand and teach writing and the writing process. Through an historical lens, I will review the role of cognitive psychology to show how it has been used as a theoretical framework for explaining how people learn to read, write, and teach writing. I describe how cognitive psychological theory was adopted by composition researchers and instructors. I explore how cognitive psychology’s ideas about reading and reading processes helped to establish writing guidelines. I then focus on how the combination of cognitive psychology’s guidelines for both the way readers read and the way writers should write has influenced how we think students learn to write and the way we design instructional materials. This is demonstrated in a discussion of the role of cognitive psychology in the success of two online writing environments.

Specific questions that my thesis will address are: Why did cognitive psychology appeal to compositionists? What competing theories to the cognitive approach arose? How did compositionists respond to these modifications? What specific elements of the cognitive approach continue to be most relevant today? The goal of my thesis, ultimately, is to not only highlight the most important contributions cognitive psychology has made in helping researchers and teachers understand and
teach the writing process, but also to help students better understand the writing process with the goal of helping them become better writers.

To this end, it is important to mention that this thesis initially grew out of an article I read my first semester in the MTSC (Master of Technical and Scientific Communication) program at Miami University (Oxford, Ohio). The 1997 Janice Redish article, “Understanding People: The Relevance of Cognitive Psychology to Technical Communication,” was my introduction to the notion that cognitive psychology was, indeed, relevant to technical communication. This topic was of particular interest to me in the MTSC program due to my background—having recently obtained a bachelor’s degree in psychology from Ohio State University. I believe my background in psychology, along with my continued focus in psychology (choosing it as my specialty area in the MTSC program), has given me a unique point of view from which this thesis developed. As I worked on this thesis, not only could I appreciate how composition theorists have adopted and continue to adopt cognitive psychological ideas and theories from a compositional point of view, but also from a psychological point of view as well. In other words, I could view the material by considering the source from which it came. Deciding on the topic and purpose for my thesis, consequently, came from an understanding and appreciation that a great deal of what I studied in my MTSC classes could be traced back to cognitive psychological theories and ideas. This awareness, in and of itself, persuaded me of the fact that cognitive psychology has had a significant impact on the technical communication field and not only in its practice, but in its teaching as well.

Why is this important? While MTSC classes gave me an awareness and appreciation of cognitive psychology’s importance, I believe an in-depth look at how cognitive psychology came to be important to composition and what it continues to offer the field of composition, can give composition students—including those in the MTSC program—a deeper, fuller understanding and appreciation of the psychological principles behind some of the ideas taught in their composition classes. This “behind the scenes” look can benefit students by providing them with knowledge about the way people think, read, and learn—topics essential to any composition student and especially those studying technical communication. It is especially
important for technical communication students as they learn how to transform complex and difficult material into material more understandable for their readers. I believe composition students are already being exposed to ideas that can be traced back to cognitive psychology—only perhaps without realizing it. This thesis strives to bring composition students and teachers an awareness of these ideas, presenting the argument that a more comprehensive understanding of cognitive psychology can be an invaluable tool for composition students on their journey towards becoming experts in the composition field.

Among the lessons composition students and teachers should learn from this thesis is that cognitive psychology can teach us that it’s not only important to know how people in general think—it’s important to know how we ourselves think as well. How is this applicable to the field of composition? Technical communicators, for example, are often called upon to study and assimilate knowledge from other fields. The “lesson” learned from this thesis is that technical communicators (or any other writers) should first be aware of the expectations and experiences they bring to those areas with the knowledge that those expectations and experiences can guide the course of their writing.

All composition students should also have a high understanding of their own learning so that they may better understand how others learn. I believe if composition students personally reflect on their own learning process, developing an awareness of how they learn, then they will better learn how to communicate effectively with others. This thesis strives to create this awareness in the hopes that composition students, including MTSC students, will reflect on the ideas presented in this thesis and use them as a tool—not only in their composition classes—but in all their classes and in the workplace as well.

This thesis will start by explaining how the cognitive approach, which gained popularity in the 1970s, gave composition researchers a way to understand the writing process, not just the writing product. I will look at how cognitive psychology gave composition researchers a methodology for capturing what writers do and for theorizing about the internal processes involved in processing and creating text. Along the way, I will show how compositionists and cognitive psychologists
conducted reading research to discover how to make texts more “readable” or more easily understood in order to meet the needs and expectations of readers as they read. This focus on taking readers into account when writing texts will be highlighted, ultimately, in a discussion of the explanatory power of cognitive psychology regarding interactions in two online environments.

To understand the significance of cognitive psychology to composition, however, it is first necessary to provide a brief overview of some of its key concepts. This thesis limits its discussion here to only those key concepts and theorists deemed relevant at the time that compositionists initially began incorporating cognitive psychological ideas into their theories. Theorists were chosen based on their prominence in the field and the significant amount of influence they had on it. Their prominence as well as their influence is evidenced, partly, by their inclusion in both early cognitive psychology textbooks as well as present day textbooks. It is also evidenced by the significant amount of research that their findings led to at the time and to the amount of times their research has been and continues to be cited in others’ works. Evolving theories in cognitive psychology will be addressed in later sections of the paper.

**Defining Cognitive Psychology: Key Concepts**

Robert Solso, in his 1979 text, *Cognitive Psychology*, defines cognitive psychology as follows:

Cognitive psychology deals with how we gain information of the world, how such information is represented and transformed as knowledge, how it is stored, and how that knowledge is used to direct our attention and behavior. It involves the total range of psychological processes—from sensation to perception, pattern recognition, attention, learning, memory, concept formation, thinking, imaging, remembering, language, emotions, and developmental processes. (p. 1)

Cognitive psychology, as it was conceptualized in the 1970s, consisted of three stages: the detection and processing of information, the formation of memory structures and processes, and the implementation of higher order cognition (Solso,
These stages represented the sequence whereby humans, as information processors, process information. Cognitive psychology’s conception of humans as information processors is representative of its key metaphor: the mind resembles a computer/machine. Within the first stage of the information processing sequence, the detection and processing of information, fall the areas of perception and attention.

**Perception**

Perception refers to the detection and interpretation of sensory stimuli, or “environmental cues.” However, perception involves more than just what we can see, taste, smell, touch, and hear. It also involves what we pay attention to. As Solso (1979) points out, there are an overwhelming number of environmental cues that are available. However, our capacity for processing information is limited on two levels: sensory and cognitive. We may become “overloaded” if we try to process too many sensory cues or too many events in our memory. As a result of being overloaded, we may suffer what Solso calls “a breakdown in performance” (Solso, 1979, p. 5). Consequently, attention is selective, meaning that people pay attention to some items while ignoring others. As such, perception is selective as well. What information in the environment people pay attention to, and how they then perceive, or interpret, this information, can differ depending on what the individual deems important in his/her environment at that particular time.

**Memory**

The second stage of cognitive psychology, the formation of memory structures and processes, deals with how information, once it has been detected, is stored, transformed, forgotten, and/or made available for recall.

Medin and Ross (1992) define some of the central functions that memory serves. The first function is that it allows us to store some facts, while deriving others as needed. These are called inferences. As an example, Medin and Ross use the question, “Did Julius Caesar have any toes?” While we may not have this information stored in our memory, we can infer that he did since most people have toes. A second major function of memory is that it helps us relate new events to prior knowledge so
that we can understand them. Finally, the third major function of memory is that it delivers relevant knowledge to us when it is needed (Medin and Ross, 1992, pp. 173-175).

Memory is generally divided into two types: short-term and long-term. Short-term memory, also known as working memory or primary memory, is the study of how information may be retained over very short periods. Short-term memory refers to active, available information that may be further processed and placed into more permanent storage. It also can refer to information that is recalled from more permanent memory in order to have that information readily available.

As Medin and Ross (1992) describe, our ability to incorporate greater amounts of information into our short-term memory is facilitated by the use of chunking. A chunk refers to any meaningful grouping of information. Thus, chunking refers to the process of combining several pieces of information into a single unit or code. The result of chunking is that rather than having each piece of information in the chunk stored in short-term memory, the idea is stored (Medin and Ross, 1992, p.178). For example, the string of letters IBMJFKCBS can be easily chunked because the string forms well-knows sets of initials: IBM, JFK, CBS. This string of letters can more easily be chunked and, thus, remembered better than, for example, the string of letters BVEFTOPZA. This idea of chunking was originally outlined by George Miller in his 1956 article, “The Magical Number Seven Plus or Minus Two.” In this article, Miller states that people, in general, can only hold five to nine pieces of information in short-time memory at any single time.

The second type of memory, long-term memory, is the term used to describe the retention of information in memory over a long period of time. The study of long-term memory focuses on how information is encoded into memory, as well as how it is retrieved. In discussing long-term memory, Redish (1997) states that “the issues of greatest interest to most cognitive psychologists are how people organize information into their minds and how they get to and retrieve that information” (Redish, 1997, pp. 68-69). She mentions several hypotheses that have been proposed for these various forms of organization. These hypotheses, which will be further discussed, include schemas, scripts, and mental models.
In “Schemata: The Building Blocks of Cognition,” David Rumelhart (1980) provides an overview of the characteristics and functions of schema, singular, or schemata or schemas, plural. (While discussing Rumelhart in this thesis, I use the term schemata as he does; elsewhere, I use the term schemas in its place as it is the more common term). Rumelhart says that schemata are the building blocks of cognition because they are the “fundamental elements upon which all information processing depends” and are “employed in the process of interpreting sensory data (both linguistic and nonlinguistic), in retrieving information, in organizing actions, in determining goals and subgoals, in allocating resources, and, generally, in guiding the flow of processing in the system” (Rumelhart, 1980, pp. 33-34). Rumelhart defines schemata through the use of three metaphors: schemata as plays, as theories, and as procedures.

In comparing schemata to plays, Rumelhart claims that the internal structure of a schema is in many ways similar to the script of a play. He states that while a play has characters that can be “played by different actors at different times without changing the essential nature of the play, so a schema has variables that can be associated with (bound to) different aspects of the environment on different instantiations of the play” (p. 35). In this case, the characters are examples of variables. Rumelhart uses the term variable constraints to refer to the associated knowledge that we have about variables of the schema. This associated knowledge, or the variable constraints, within the play metaphor would be comparable, for instance, to specific characteristics for characters that a script for a play would contain. Finally, in comparing schemata to plays, Rumelhart points out that both leave room for variation. As he says, “A schema is not so rigidly applied that no variation is allowed. The schema only provides the skeleton around which the situation is interpreted” (Rumelhart, 1980, p. 37).

Rumelhart does point out, however, that there are several ways schemata are not like plays. Schemata are more abstract than a play would ever be (because schemata apply to general events and incorporate many possibilities). Unlike plays which are usually about people and their actions, schemata can refer to events and
objects of any kind (i.e., an inactive object such as a chair), and consist of a number of subschemata, whereas a script for a play exists only on one level (p. 37).

While Rumelhart uses the term *script*, it is generally associated with the work of Schank and Abelson (1975). According to them, a script “is a structure that describes an appropriate sequence of events in a particular context” (Schank and Abelson, 1975, p. 422). A script consists of slots and requirements about what can fill those slots. Scripts have several features including props, roles to be played, and scenes. In general, scripts deal with routine, stereotypical situations and are not subject to much change. In addition, as Schank and Abelson point out, in a script, each action in a script is causally linked to the next, thus “each action results in conditions that enable the next to occur” (p. 424). Schank and Abelson use a restaurant script for their example. In the restaurant script, the sequence of events (the scenes) are entering, ordering, eating, getting and paying the check, and leaving. The props in this example are tables, a menu, food, a check, and money. The roles to be played are the customer, cook, server, and cashier. Scripts provide a way for people to access and retrieve information from their minds because, as scripts deal with routine situations, they center around situations that people are familiar with and have expectations of. In other words, based on their prior expectations and experience, people already know (or think they know) what to expect from the situation, and these expectations come from their schemas.

Rumelhart (1980) addresses this idea in his description of schemata as theories by stressing that the primary function of schemata might be in the construction of an interpretation of an event, object, or situation. In other words, the central function of schemata might be in the process of comprehension. Rumelhart states:

In all of this, it is useful to think of a schema as a kind of informal, private, unarticulated theory about the nature of the events, objects, or situations that we face. The total set of schemata we have available for interpreting our world in a sense constitutes our internal model of the situation we face at that moment in time, or, in the case of reading a text, a model of the situation depicted by the text. (p. 37)
Rumelhart’s major point here is that just as a great deal of time is spent evaluating a theory and comparing that theory to observations that have been made, so too is time spent with a schemata evaluating how well it adequately accounts for some aspect of a situation. For example, in reading, readers evaluate hypotheses about the most plausible interpretation of the text. Readers understand the text when they correctly determine the schemata (or configuration of hypotheses) that provides a “coherent account for the various aspects of the text” (p. 38). In summary, schemas, like theories, can become a source of predictions for unobserved events. People access and retrieve information from their schemata and then use this information to make predictions about future events. What schemata are selected are based, again, on how that individual constructs or interprets the situation.

Rumelhart’s third metaphor for schemata is procedures. Rumelhart (1980) stresses that schemata are like procedures because unlike theories and plays which, in Rumelhart’s opinion, are passive, procedures and schemata are both active processes. Just as procedures rely on results produced by subprocedures to carry out their task, a schema uses results produced by its subschemata to carry out its task, that being its evaluation of its goodness of fit to the situation (Rumelhart, 1980, p. 39). In other words, schemata can be used to make inferences about new situations.

Rumelhart (1980) describes how schemata, like procedures, have a very well-defined constituent structure. For example, while procedures have subprocedures, schemata have subschemata (Rumelhart, 1980, p. 38). An example of this well-defined structure would be a general schema of a face containing the subschema of mouth, nose, eyes, etc. The eye subschema would further consist of the subschema iris, eyelids, eyebrows, etc. The importance of the structure is that, by analyzing the subschemata of a schema, people can determine how well the schema fits the situation. In other words, if a person is able to identify the subschemata of a mouth, nose, and eyes, then he/she would be able to correctly identify the right schema, one for a face. People make inferences about new situations all the time. Schemata provide a way for people to make these inferences, based upon the way that people have organized their schemata and subschemata.
In summary, schemata have variables (characteristics). A schema for apples, for instance, would include the characteristic that apples are round. Schemata can embed, one within another. For example, a schema for animals can include a schema for monkeys, rabbits, turtles, and so on. Schemata represent knowledge at all levels of abstraction. For example, a schema for justice is more abstract than a schema for fruit. Schemata also represent knowledge rather than definitions. Schemata refer to one’s knowledge about the world, not to information in the world. Further, schemata are active processes. They help people make inferences. Finally, schemata and subschemata can be used to determine how well they fit the data being processed.

**Mental Models**

According to Medin and Ross (1992), while people use general knowledge schemata to understand a situation and to make predictions, people sometimes have more specific knowledge they can use. This knowledge, known as a mental model, can refer to how a specific object works (i.e., a thermostat). It can also refer to how a situation functions as a set of interacting processes and objects (Medin and Ross, 1992, p. 354). Redish (1997) defines a mental model, used as a psychology term, as “a vague, amorphous, individual, and changeable collection of associations in people’s minds” (Redish, 1997, p. 71). The importance of mental models is that they tell us that people make associations between objects and what those associations are. Redish uses the example of the trash can as an icon for removing materials on Macintosh computers as a good example of connecting to most people’s mental models. In this example, the trash can connects to most people’s mental models in that they can easily associate the image of a trash can used in “real life” for getting rid of or removing unwanted items with the image of the trash can on the computer as a means of disposing of items. The trash can image, in this case, works better than a random image would. In terms of writing, these mental models might affect how writers visualize how they will structure and/or organize texts to connect with readers’ mental models.

To illustrate, one might take the following example from Sternberg (2006) of a mental model, or internal representation, constructed by a reader while reading the
text, “The loud bang scared Alice.” The mental model, or internal representation created from this statement, might be a picture of Alice becoming scared after hearing a loud noise. How one person’s mental model might differ from another would depend on how each person represented the loud noise. This mental model might then be changed by reading the following text, “She tried to steer off the highway without losing control of the car,” or alternately, “She ducked to avoid being shot” (Sternberg, 2006, p. 379). Reading this additional text gives readers more information from which to construct their mental models. If the reader had assumed, for instance, that the loud bang that scared Alice was a gunshot, then after reading this additional text, the reader would have to substantiate or alter his/her mental model to accommodate this new information. As this example shows, mental models involve people making at least tentative inferences about what is being meant, but not said. Consequently, mental models can differ in their accuracy because they are based on people’s varying beliefs, which may or may not be accurate. Also, by being actively constructed in the process of understanding, mental models may undergo change and new mental models may be constructed.

As this example shows, mental models differ from schemata in significant ways. First, mental models, as Medin and Ross (1992) explain, differ from schemas in that they are not simply constructed by filling in expected values based on prior experience, but rather are actively constructed in the service of understanding and explaining experience. As they further explain, mental models are often constructed spontaneously to understand situations and to make predictions (via mental simulation of these models) about the future. Finally, they stress that mental models are often constrained by theories about the world rather than empirically derived through experience. (Medin and Ross, 1992, pp. 353-354). Their discussion clarifies how, returning to the example of the loud bang scaring Alice, readers would be able to create a mental model of the loud bang being caused by a gunshot without having had prior experience with such an event.

Though they have their differences, schemata, scripts, and mental models are alike in that they are all ways of describing how people organize, access, and retrieve information from their minds. They would be included under what Solso (1979)
refers to as higher-order cognition, cognition referring to the mental action or process of acquiring knowledge and understanding through thought, experience, and/or the senses; higher-order cognition referring to aspects of cognition based on the perception and memory stages and which normally occur at the end of the information-processing sequence (Solso, 1979, p. 287). Higher-order cognition also refers to such aspects of cognition as problem-solving and language.

**Problem-Solving**

A general model of problem-solving, as defined by cognitive psychologists, consists of five steps: 1) identifying a problem, 2) defining a problem, 3) designing and selecting an appropriate strategy, 4) implementing a strategy, and 5) evaluating a chosen solution.

After identifying and defining the problem, people will turn to the next step, selecting an appropriate strategy, for solving the problem. According to Bruning, Schraw, and Ronning (1999), in selecting an appropriate strategy, people will either use algorithms (rules) or heuristics, such as trial-and-error or means-end analysis. Means-end analysis involves three steps: 1) formulating a goal state, 2) breaking the problem down into subproblems, and 3) evaluating the success of one’s performance at each step before proceeding to the next (Bruning, Schraw, and Ronning, 1999, p. 189). After implementing the chosen strategy, the next step is to evaluate the solutions. Evaluating solutions involves evaluating both the process and the product(s). Cognitive psychology emphasizes that most improvements in learning come from this “purposeful” evaluation of the solution.

Essential to studying problem-solving is studying knowledge. The next section looks at how cognitive psychologists define knowledge.

**Defining Knowledge**

Cognitive psychologists distinguish between two main categories of knowledge: domain and general. Domain knowledge refers to knowledge about a particular area or field of study (i.e., geography). Knowledge of a domain encompasses both declarative and procedural knowledge. Declarative knowledge
refers to facts that can be stated such as the number of states in the U.S. or the number of continents in the world. Procedural knowledge refers to knowledge of procedures that can be implemented. Examples of procedural knowledge are knowing the steps to tying one’s shoes or driving a car. In the case of geography, procedural knowledge might refer to knowing how to determine the distance between two locations on a map. The difference between declarative and procedural knowledge is “knowing that” from “knowing how.” Domain knowledge can operate at both an explicit or tacit (implicit) level. When domain knowledge operates at an implicit level, it becomes knowledge used in an automatic kind of way, almost without conscious thought. Cognitive psychology studies not only how knowledge is defined but also how it is used.

**Nature of Knowledge and Expert Status**

Cognitive psychology focuses on the nature of knowledge and the process of using it. It focuses on questions such as: What do experts know? What do novices know? What do novices need to know to become experts? In other words, cognitive psychology looks at what knowledge and/or processes account for differences in performance between experts and novices.

According to Bruning et al. (1999), some common characteristics of experts that cognitive psychology has found are that: experts organize information more efficiently by chunking information into larger units; experts are faster than novices at processing meaningful information because they search and represent problems more effectively; and experts’ thoughts and actions are highly automatized (Bruning et al., 1999, pp. 194-196). This means by simply being an expert in their subject, they are able to implement solutions more efficiently by concentrating on the higher-level aspects of the problem. For example, using the subject of writing, an expert writer would already be familiar with the grammatical rules associated with writing. As such, the expert writer would not have to focus attention on making sure proper grammar was followed, but could instead focus on higher-level issues such as identifying the purpose of his/her writing and making sure the purpose was achieved.
According to Bruning et al. (1999), experts also represent problems differently from novices. They focus more of their attention on the underlying structure of the problem rather than on superficial surface features. They are also able to break problems into subproblems and then identify more easily attained goals. Furthermore, experts spend more time than novices analyzing the problem at the beginning of the problem-solving process. Finally, experts are better monitors—people with a high awareness of what they know and don’t know—than novices in most situations within their domain of expertise. This means, for example, that they may ask questions at all stages of the problem-solving process (Bruning et al., 1999, pp. 194-196).

**Critical Thinking**

Critical thinking—an important component to identifying and defining a problem—is reflective thinking focused on deciding what to believe or do. According to Bruning et al. (1999), critical thinking is reflective because its goal is not to solve a problem, but rather to understand the nature of the problem (Bruning et al., 1999, pp. 200-201). For example, a student might be assigned to write a paper about the environment. To write the paper, the student must first identify a problem. The student would do this by reflecting on key issues about the topic. The student, for instance, might reflect on global warming and ultimately decide to write a paper about global warming and its harmful effects on the environment. As Bruning et al. (1999) further explain, critical thinking is focused and is what ultimately enables us to make informed decisions. Essential skills for critical thinking include having the necessary knowledge and being able to make inferences. Making inferences means making some kind of connection between two or more units of knowledge. Two types of inference processes are deduction, the process by which we reach specific conclusions from general information, and induction, the process by which we reach general conclusions from particular or inferred information (Bruning et al., 1999, pp. 202-203).

Deductive reasoning can often follow the formula: If A, then B. If B, then C. A = C. For example, you could say: All writers are artists. All artists are creative. Therefore, all writers are creative. In this example, A = writers, B = artists, and
C = creative. Inductive reasoning can often take the form of analogies whereby people have to determine the relationship between two different sets of pairs. For example, you could say: Sugar is to sweet as lemon is to (a) yellow, (b) sour, (c) fruit, (d) tea. In this case, the correct answer would be (b) sour. The reason why sour is correct is because the relationship between the first pair is one of taste. Sugar is sweet. Sour is the only choice that refers to the property of taste; therefore, it is the correct one.

Besides being able to make inferences, another important skill in critical thinking is the ability to evaluate information. This process involves being able to analyze, judge, and weigh various pieces of information and to make value judgments about it. A final important skill is metacognition, which is important to critical thinking because it allows us to monitor the accuracy of the information on which we base our judgments/opinions. In addition to problem-solving, another important aspect of higher-order cognition as it applies here is language.

**Language and Language Study (Linguistics)—The Chomskian Revolution**

Language is the primary means of human communication and the way that most forms of information are exchanged. How people process language affects how they will store and interpret information. Solso (1979) states that language influences perception, as well as the thinking and problem solving processes (pp. 311-312).

Linguistics is the study of language. In general, linguists are interested in how sounds and words are organized into meaningful units. Carroll (1986) uses the metaphor of linguists as people who study the inner workings of a clock or an automobile engine in that they are interested in taking things apart, in this case units of language, and seeing how they work. Linguists call an overall description of a language, a grammar (Carroll, 1986, p. 30).

Cognitive psychologists in the 1950s and 1960s began to study language and linguistics from a different standpoint. They took into consideration the study of language development and cognitive representations of language. Hence, the discipline of psycholinguistics emerged, incorporating both the linguistic and cognitive psychological approaches to language.
An important precursor to the emergence of psycholinguistics was the work of linguist, Noam Chomsky. While behaviorism had its own theories about language acquisition and production, the behaviorists would be seriously critiqued in the 1960s by Chomsky’s work. He would be largely responsible for bringing in a new era of cognitively oriented perspectives toward language research and theory. Chomsky’s influence was in his linguistic principles of surface structure and deep structure, and in his overall theory of language which he called transformational grammar.

According to Carroll (1986), Chomsky emphasized that sentences were more than just simple strings of words, that they had a deeper or “constituent structure beneath their superficial appearance” (Carroll, 1986, p. 17). Carroll (1986) describes how Chomsky demonstrated this point with the sentence “Colorless green ideas sleep furiously.” While this sentence makes no semantic sense and may not appear to be grammatically correct, it is. Chomsky used this sentence to show that (1) it is possible for a sentence to be grammatical without carrying meaning, and (2) that our comprehension of its grammatical form is not based on past experiences with that sentence. Both of these points were important because they were fundamentally at odds with the behaviorist approach. They were at odds with the behavioral approach because they revealed that merely using grammatical rules to study language could be quite limiting and could result in meaningless information (sentence-wise), and because they showed that more than direct experience with a stimuli was necessary to produce a response (Carroll, 1986, pp.17-19). In other words, people needed more than just direct experience with a sentence (the stimuli) because it was shown they were able to comprehend and produce novel sentences. People could comprehend a sentence’s grammatical form because of some kind of mental representation they carried that transferred into new situations. Consequently, as a result of Chomsky’s work on deep and surface structure, linguistic study began to focus on more complex units of language, such as syntax (the ordering of and relationship between the words and other structural elements in phrases and sentences) and discourse (a unit of language longer than a sentence), and it also began to investigate the mental processes that influence our interpretation and storage of language (mental representations of language).
Psycholinguistic Exploration of Reading Processes

The work of Noam Chomsky led to a great deal of other work by psycholinguists. Much research focused on the study of discourse. This focus on discourse led to a great deal of discovery about readers and reading comprehension which, in turn, led to the development of principles and guidelines as to how texts could be structured to enhance their “readability.” (During the 1970s, cognitive psychologists began to direct a great deal of their efforts to conducting reading research. This research led to theories about the cognitive aspects of writing and “readability.”) In fact, a great deal of research was done that supported the idea that “readability formulas” alone were not enough to fully understand what made one text more readable than another. Before going any further, however, it is important to first clarify what is meant by the term “readability.”

Thomas Huckin (1983) defines readability as follows: “Writing is ‘readable’ to the extent that its meaning can be easily and quickly comprehended for an intended purpose for an intended reader operating under normal conditions of alertness, motivation, time-pressure, etc...readability is closely related to ease of recall; thus, in most cases, highly readable writing not only conveys its meaning effectively but also facilitates recall of that meaning” (Huckin, 1983, p. 91). In their review of research conducted on readability formulas, Felker et al. (1980) define readability formulas as mathematical equations for predicting the level of reading ability needed to comprehend particular items of prose. These formulas are developed by “counting certain features in passages of known difficulty and correlating the frequency of each feature with the level of difficulty in the passage” (Felker et al., 1980, p. 69). Examples of features that would be counted would be the average number of words per sentence, the percentage of different words, and the number of different “hard” words.

By the late 1970s, the problem composition theorists had with readability formulas was that they did nothing, as Felker et al. (1980) emphasize, to “specify the causes of problems people have in reading or understanding written material” (p. 69). In other words, composition theorists believed the counting of certain features in a text was not really a good predictor of semantic difficulty because it did not take into
consideration other factors that can affect whether or not a text is understood by its readers. This was mainly due, as Huckin (1983) explains, to the fact that readability formulas were designed primarily to assess the writing product, not to guide the writing process (Huckin, 1983, p. 90).

Cognitive, psycholinguistic, experimental research provided clues as to how readability might be viewed differently when cognitive aspects of writing were taken into consideration. From this research, composition theorists would develop theories and guidelines for how to increase the “readability” of a text.
Chapter 2: Cognitive Psychology, Reading Research, and Text Design

Cognitive psychology’s joining with linguistics led to new avenues of research. One of these avenues was how people interpret language and the kinds of mental representations they take from it. This chapter explores how cognitive psychologists studied this process, some of the early reading research that was conducted, and the text design principles that emerged from it. While this chapter does not discuss every researcher’s contribution (that would be beyond the scope of this paper), it does present the research and findings of some credited with making important discoveries and/or contributions in this area, selected by their inclusion in prominent scholarly works of the time and repeated references to their research in others’ works.

Encoding and Retrieving Information from Memory

As psycholinguists and reading researchers studied discourse processes, they were predominantly interested in how people stored, or encoded, information into memory and how they were able to retrieve information from it. Medin and Ross (1992) define encoding as “the initial processing of a stimulus that leads to a mental representation in memory” (Medin and Ross, 1992, p. 517). An important dimension of encoding is rehearsal. Two ways of rehearsing information are maintenance and elaborative rehearsal. Maintenance rehearsal refers to a direct recycling of information in order to keep it active in memory (i.e., repeating the digits of a telephone number in one’s head while getting ready to dial the number). Elaborative rehearsal is any form of rehearsal in which the to-be-remembered information is related to other information. Types of elaborative encoding strategies include mediation (tying difficult-to-remember items to something more meaningful),
imagery, and mnemonics (memory strategies that help people remember information and include, among other things, the use of rhymes, sayings, gestures, and imagery).

Research has shown that how we encode to-be-remembered information makes a huge difference in how we remember it. Research on rehearsal has also shown that different types of rehearsal are appropriate for different tasks. This chapter will discuss factors that influence encoding: organization, elaboration, and schema structures. As will be shown, most reading research focused on examining how people store and retrieve information and how best to structure information in order to enhance readers’ comprehension and retention of the to-be-remembered material.

Reading Research

In their article, “Writing for Human Performance: Relating Reading Research to Document Design,” Spyridakis and Wenger (1992) state that reading is one of the most heavily researched of all human cognitive behaviors. They suggest that it is “a favorite research topic because it involves nearly all the processes that interest cognitive scientists: perception; recognition; encoding, storing, and retrieving information from memory; use of the rules of language; and complex forms of reasoning and problem-solving” (Spyridakis and Wenger, 1992, p. 203). Reading research is especially important to technical communicators because they have to read and interpret complex information accurately and their primary goal is to make sure that their readers understand the material they are producing. Before engaging in a discussion of the specific textual and reader variables that reading researchers have studied, it is important to first address some of the theoretical concepts based on cognitive psychology that became highly relevant to reading research: schemas, the levels effect, and the leading edge strategy (construction-integration model).

Building Organized Knowledge through Reading: Schemas and Schema Activation

Perhaps the most influential way cognitive psychology has helped compositionists understand readers is through the concept of schemas. Using the concept of schemas, composition theorists were able to propose a number of helpful
document design guidelines. Based on the definition of schemas in Chapter 1, I provide a brief summary of how schemas affect reading comprehension.

Schemas changed the way composition theorists looked at readers because schemas emphasize that readers interpret documents based on their prior knowledge and expectations. According to Redish (1993), this understanding led to new ways of thinking about how to organize written material both on a large scale (the document as a whole) and on a small scale (in paragraphs and sentences) (Redish, 1993, p. 28). In order to make explicit connections to readers’ prior knowledge and expectations, composition theorists discovered that one way to make documents more successful was to help readers activate the appropriate schemas needed to comprehend the document. As Sternberg (2006) describes, psycholinguists such as Bransford and Johnson (1972, 1973) showed that something as simple as including a relevant title or heading at the beginning of a passage was one way to build organized knowledge that could enhance readers’ comprehension of the material by activating the appropriate schema. In their study, they had participants read a passage that described a series of steps. After reading the passage, they asked readers to recall the steps involved. Participants had difficulty comprehending and recalling the steps until they were given the title to the passage, “Washing Clothes.” Once they had the title, they were better able to recall the steps mentioned in the passage. The title gave them a way to better encode the information (Sternberg, 2006, p. 194).

Another study, conducted by Pinchert & Anderson (1977), showed the critical function an activated schema has on guiding peoples’ attention. As Bruning et al. (1999) explain, before presenting two groups of participants with a document, they told them that they were either looking at it from the perspective of a home buyer or as a burglar. Their “home buyer” v. “burglar” study showed that individuals pay most attention to and subsequently recall information that is most consistent with their currently activated schema. In other words, people reading the passage from the perspective of a home buyer remembered information in the story that would be important to a home buyer, such as the number of bedrooms in the house and which rooms were newly painted. People reading the story from the perspective of a burglar remembered information that would be important to a burglar, such as the presence of
jewelry and a valuable painting (Bruning et al., 1999, p. 57). This example shows how schema activation can guide readers’ attention in a way that influences how they comprehend and recall what they are reading.

Another effect of schema activation is that it helps people make inferences, on which text comprehension heavily depends. The “Death of Piggo” example that follows shows that people, when reconstructing their accounts of materials, will add details that were not included in the original materials, based on the schemas they hold about that particular topic. In this experiment, subjects were given a passage to read called “Death of Piggo.” They then made a list of characteristics about “Piggo,” a piggy bank. When reconstructing their accounts, they often added common characteristics to piggy banks not originally included in the passage. In other words, they made inferences based upon their schemas, in this case, of piggy banks. They might, for example, describe “Piggo” as holding money when the passage does not explicitly describe “Piggo” in this way. They do so because their schema of piggy banks contains the characteristic that piggy banks hold money. What this example shows is that as people read, they use their schemas to make inferences about what they are reading. These inferences help them make sense of what they read—sometimes incorrectly.

**The Levels Effect**

Schemas and schema activation play an active role in another theoretical principle that relates to text design: the levels effect. According to Huckin (1983), readers tend to process a text hierarchically; that is, readers attribute more importance to information higher in a hierarchy than information lower in a hierarchy. Not only do they pay more attention to high-level information, they absorb the information better and recall it better as well. Furthermore, readers are able to make more inferences about high-level information and are better able to integrate this information into their perception of the text as a whole (Huckin, 1983, p. 95). This theoretical principle is referred to as the levels effect.

The levels effect has a number of implications for how cognitive theorists believe documents should be structured. It suggests, for instance, that the important
points in a text should be given a high place in the hierarchy of a document, such as in the document’s headings, subheadings, and/or the topic sentences of sections and paragraphs (Huckin, 1983, p. 95). It also shows that readers need the higher order text to better comprehend and recall lower order text.

**The Levels Effect and the Leading Edge Strategy: A Discourse Processing Model**

A model that takes into account the previous two principles, schemas and the levels effect, and provides important insight into text design is the leading edge strategy, Walter Kintsch’s model of text comprehension. Kintsch’s model, according to Huckin (1983), takes into account the levels effect by stating that information is absorbed, stored, and later recalled as a joint function of (1) height in the text hierarchy, and (2) recency of presentation (Huckin, 1983, p. 96). The first point is the one that takes into account the levels effect. The second point refers to the limitation of our short-term memory. Basically, it (recency of presentation) refers, as Huckin (1983) describes it to the fact that “if two pieces of information are equally important, the more recently communicated one is more likely to be stored and later recalled than the earlier one” (p. 96). In terms of reading, the leading edge strategy supports the notion that people process a text from top to bottom, further stating that people simultaneously attend to both the larger framework, dictated by high-level schemata drawn from long-term memory, and to various low-level details as they “stream through” short-term memory. Thus, according to the model, text is coherent to the degree “that schemata create certain expectations about the kinds of details to follow and then the actual details fulfill these expectations” (p. 96).

This model brings up three important points. First, it shows one way that schemas influence and interact with text design. Second, it emphasizes the limitations of our short-term or working memory and its potential influence in hindering reading comprehension. Third, it brings up the notion of coherence, which entails having a global strategy that provides an overall unity to the text.

**Enhancing Readability Through Text Design**

As I hope to have demonstrated, cognitive psychology was helping to
redefine what constituted readability in documents, a goal that involved studying readers to see what text structures promoted readability. As Schriver (1989) states:

Research on text design concerns the effects of various text designs, both visual and verbal, on readers’ comprehension, performance, and textual preferences. This work has been directed to the question, “How can we design text that both appeals to an intended readership and enhances their ability to understand, learn, use and retrieve information…Through evaluating how texts operate, researchers in this area are providing us with information about the cognitive aspects of readability…By looking at readers’ responses to…verbal text features, researchers draw inferences about the text structures that promote or inhibit readers’ comprehension and use of text. (p. 320)

An early example of research into this issue can be found in *Guidelines for Document Designers*, published in 1980, which featured a chapter devoted to readability. In this chapter, Felker et al. convey their dissatisfaction with readability formulas. As researchers, they continued to look for other ways to enhance the readability of texts. The following discussion looks at some of the ways researchers, including Felker et al., discovered text design could enhance reader comprehension. At a global, organizational level, they believed that reader comprehension could be improved by using advance organizers, previews, headings, and logical connectives (following the given/new contract). They also demonstrated how it could be improved by using metaphors and analogies. At the more local level, the paragraph and sentence levels, they explained how reader comprehension could be improved by using the given/new contract, topic sentences, and the scenario principle.

**Text Design at the Global Level**

At a global level, an important aspect of effective text design is the use of signals. Signals are important to text design because they reveal the logic of a text’s organization to its readers. Many reading research studies have found improved comprehension for readers of texts that use signals to cue readers about content relationships. Text signals, according to Bruning et al. (1999), are “devices designed to improve the cohesion of reading materials or to indicate that certain elements of the
text are more important than others” (Bruning et al., 1999, p. 286). Examples of text signals are previews, headings, and logical connectives.

**Signal Use: Previews, Headings, and Logical Connectives**

Previews, such as preview sentences, signal upcoming content and help focus readers’ attention on important content. A preview sentence might begin with, “As we will see in Chapter 15.” Advance organizers are another way of signalling important material. They are, as Bruning et al. (1999) describe, “general overviews of new information provided to learners before they are actually exposed to the new information” (Bruning et al., 1999, p. 88). They can take many forms (e.g, discussions, diagrams, drawings) but function best when they contain concrete examples of what the reader might encounter later. For example, a chapter in a textbook might begin with an advance organizer that takes the form of key questions or objectives that will be addressed or explained in the chapter. Advance organizers are a key aspect to text design for reader comprehension because they activate relevant schemata for the information that’s about to be learned.

Headings are another important text signal. Headings help reduce the cognitive load of readers because they break up long segments of text into smaller, more thematically related, segments. Consequently, as Bruning et al. (1999) point out, headings also help readers more easily locate information, aiding search-and-retrieval tasks for specific information (Bruning et al., 1999, p. 287).

Logical connectives are also an important aspect of text design, especially if they follow what is known as the given/new principle. The given-new theory of comprehension (sometimes referred to as the given-new strategy or contract) developed in 1977 by psycholinguists Haviland and Clark emphasizes that new information is best comprehended when it is logically and temporally linked to understood, or given, information. In fact, readers anticipate this given-new contract when they are reading. Thus, as Redish (1993) states, readers understand new information best when it is presented in a framework of information that they already know or have been given (Redish, 1993, p. 31).
For the document as a whole, following the given-new contract can mean organizing a document with a title and headings that provide a logical framework for readers. It can also mean setting up visual patterns in a page layout that chunk information in ways that are meaningful to readers. As Redish (1993) states, repeated visual patterns in page layouts can quickly become “given” information and help readers rapidly find and comprehend what they need (Redish, 1993, p. 31). The given-new contract emphasizes, according to Spyridakis and Wenger (1992), the importance of “redundant cueing,” repeating information in a text in order to aid readers’ comprehension of the material (Spyridakis and Wenger, 1992, p. 208).

Metaphors and Analogies

Metaphors and analogies are another important aspect of text design at the global/organizational level. Metaphors are primarily used to convey ideas and feelings that are difficult to express. Blyler (1991) states that metaphors “allow readers to transfer characteristics associated with the metaphor directly to the compared item without the necessity of paying attention to each detail” (Blyler, 1991, p. 388). An example of a metaphor would be saying, “Skyscrapers are the giraffes of a city” (Carroll, 1986, p. 198). In this case, the transferred characteristic is that both are very tall compared to surrounding things (Carroll, p. 198). In a similar way, analogies can be used to connect a difficult concept to a more familiar concept. Reasoning analogically involves readers learning, according to Blyler (1991), that the “sensory input they are experiencing is similar to input they have experienced in the past and thus to schemata they already hold” (Blyler, 1991, p. 388). In doing so, readers are able to connect the analogy to an experience or to knowledge they already have and, thus, more easily comprehend the information.

For example, if one wanted to create an analogy between photography and the writing process, one might say that taking a digital picture would be comparable to writing a first draft of a paper. One might continue the analogy by saying that editing the picture on the computer through a photo-editing program would be comparable to revising the first draft and creating a second draft.
Metaphors and analogies are an important aspect of text design because by relating new information to subjects readers are familiar with and have schemas for, new information can often be more easily understood and recalled. It should be noted, however, that greater comprehension is not always the case. Sometimes metaphors contain information unknown to the reader and can actually hinder comprehension, delaying or ultimately denying comprehension of the material altogether. However, when used properly under the right circumstances, metaphors can be quite beneficial in enhancing reader comprehension of material, especially if the material is abstract or otherwise difficult to understand.

**Text Design at the Local Level**

At the more local, paragraph and sentence level, important aspects of effective text design operate as well. As previously described, one of these is the given/new contract.

**Given/New Contract**

At the paragraph level, following the given/new contract, again, involves presenting new information linked with old or given information. In this case, it involves, as Haviland and Clark discovered, using direct antecedents that explicitly mention a referent in a subsequent sentence. This technique would create the pattern of AB in one sentence, BC in the next. In terms of reading comprehension, it has been shown that placing direct antecedents in such positions produce the quickest response times (in terms of comprehension). An example of positioning a direct antecedent in such a way, as Spyridakis and Wenger (1992) describe, would be: “Ed was given *an alligator* for his birthday. The *alligator* was his favorite present. An example of using an indirect antecedent would be: “Ed was given *lots of things* for his birthday. The *alligator* was his favorite present” (Spyridakis and Wenger, 1992, p. 207). This example shows how repeating information from one sentence to the next in the text can help enhance reader recall by providing readers with more opportunities to link information they know with new information. This example is merely one way the
given-new contract can influence how text is designed and organized at the paragraph level.

**Topic Sentences**

Also important at the paragraph level is the topic sentence and the order in which sentences are presented. Spyridakis and Wenger (1992) cite David Kieras’s 1978 study that showed that subjects reliably and accurately choose the topic sentence when it is presented as the initial sentence in the paragraph. His study also showed that poorly ordered sentences create a high memory load for readers by forcing them to hold “unintegrable input in immediate memory” (Spyridakis and Wenger, 1992, p. 209). In addition, poor sentence order produces longer reading times and shorter recall. Using the given-new strategy to present sentences in a paragraph in an appropriate order can, thus, improve reader comprehension.

**Scenario Principle**

A final text design element, the scenario principle, is important to reading comprehension because research has shown that readers, especially when reading information that is difficult to understand, will translate the information into scenarios that, in turn, make the information more comprehensible to them. At the sentence level, as Flower, Hayes, and Swarts (1983) describe, the scenario principle involves text “structured around a human agent performing actions in a particularized situation” (Flower, Hayes, and Swarts, 1983, p. 42). An example of a sentence not using the scenario principle would be, “No changes will be made without approval of the committee.” Using the scenario principle, this sentence would read, “If a student wishes to make a change to his/her contract, he/she must request permission from the committee.” Often readers insert themselves into the text: “If I want to make changes…” In essence, as Flower et al. point out, scenarios address the active role humans play in the world. Using the scenario principle to aid reader comprehension entails providing examples and cases of the information being presented and writing sentences with agents and actions in the subject and verb positions (Flower et al., 1983, pp. 56-57).
In summary, text design can be enhanced through signals such as previews, headings, and logical connectives that serve as cues for selective attention. Research by Spyridakis and Wenger (1992) has shown “that signals (1) guide selective attention to conceptual information, and (2) that signals encourage readers to build coherent links between information for later transfer to novel situations” (Spyridakis and Wenger, 1992, p. 208). They stress that signals, especially for texts that are long, unfamiliar, or difficult for even good readers, help readers build hierarchical frameworks in memory that help them incorporate new information. Headings and previews help readers design the higher levels of the frameworks while logical connectives help readers fill in the lower levels (p. 208). Helping readers tie new information to information that has already been given or to which they already know something about (based on their schemas) is, thus, an important element in designing text in a way that optimizes reader comprehension.

**Research Focused on Readers and Reader Variables**

Research that focuses on readers and reader variables is also invaluable in helping writers to understand the needs and expectations of readers as they are engaged in reading and comprehending a text. By understanding better who the readers of their texts will be, writers can tailor their texts to meet those readers’ specific needs and expectations. Research into readers’ needs and expectations explores the goals of readers, their prior knowledge with the material, their reading style, and their metacognition.

**Readers’ Goals**

Schriver (1989) provides a thorough listing of readers’ possible goals for documents: to learn, enjoy, do a task, write, understand, be persuaded, find information quickly, compare and contrast, learn to do, make a decision, and interpret and use information for a purpose other than the text’s intended purpose (Schriver, 1989, p. 322). Whatever the readers’ goals for the text may be, those goals are arguably the most important reader variable discussed in this section. I would suggest this because readers’ varying goals for texts directly influence and/or interact with
several of the other variables yet to be mentioned—such as readers’ prior knowledge with the material and their reading style. Knowing readers’ goals for a text, what readers are planning on doing with it, is thus essential in knowing how to structure one’s text. For example, if a writer knew that the goal of his/her readers was to be able to find information quickly, then the writer might put information in numbered or bulleted lists, which would make the information more easily accessible than if it was buried in long paragraphs. This text design element might then not only match with the goal of the reader—to find information quickly—but to his/her reading style as well (i.e., skimming the document). Knowing how well one’s readers know the subject matter is also important in helping the writer know what the readers’ goals for the document may be. Readers with varying degrees of knowledge about the subject matter will have different goals for the document, from learning introductory knowledge about the material to highly advanced, intricate knowledge about the material. This is explained further in the next section.

Readers’ Prior Knowledge or Familiarity with Subject Matter

Readers’ prior knowledge or familiarity with the subject matter is another important factor in deciding how to structure a text. In discussing readers’ familiarity with a text’s subject matter, Huckin (1983) states that when writers are writing for nonspecialist readers, they should be sure to clarify the most important point in their text by using examples, operational definitions, analogies, and other forms of illustration. In other words, writers should strive to use familiar concepts to help explain unfamiliar concepts. However, when writers are writing for readers who are specialists, writers should be careful not to overexplain. In this case, writers should refrain from using lengthy examples or operational analogies for concepts that the reader is likely to already be familiar with. Instead, Huckin suggests that writers rely on the standard terminology of the specialist’s field, even when that terminology is long and complicated (Huckin, 1983, pp. 98-99).
Reading Style

Huckin (1983) also discusses five kinds of reading styles that reading theorists have identified. These five styles consist of the following: “skimming, or reading for the general drift of the passage; scanning, or reading quickly for the purpose of finding specific items of information; search reading, or scanning with attention to the meaning of specific items; receptive reading, or reading for thorough comprehension; and critical reading, or reading for evaluation” (Huckin, 1983, p. 99). Huckin states that most readers can switch easily from one style to another, depending on their purpose in reading a text. Due to the existence of various reading styles, Huckin further points out that it is not uncommon for a single technical document to be subjected to a number of different reading styles, especially if it is given to a large number of readers.

An issue for researchers is the speed with which various reading styles can be performed. This difference in speed is attributed to two different types of text processing: macrostructural, or conceptual processing, and microstructural, or linguistic processing. Performance of macrostructural processing has been shown to remain the same, regardless of which reading style is used, while performance of microstructural processing has been shown to be dependent on the type of reading style used. Thus, as Huckin concludes, the “speed associated with any particular reading style appears to derive from (1) the speed at which macrostructural processing is carried out; and (2) the degree to which microstructural processing is called into play” (Huckin, 1983, p. 100). Consequently, skimming is fast because it uses quick macrostructural processing and hardly any microstructural processing while receptive reading, reading for thorough comprehension, is slow because it requires slow macrostructural processing and a great deal of microstructural processing as well (p. 100).

Metacognition

The final reader variable mentioned here is metacognition. Cognition itself refers to the mental action or process of acquiring knowledge and understanding through either thought, experience, and/or the senses. According to Sternberg (2006),
metacognition can be defined as “our understanding and control of our
cognition…our ability to think about and control our own processes of thought and
ways of enhancing our thinking” (Sternberg, 2006, p. 534). Cognitive psychologists
and reading researchers have found that people’s ability to construct meaning from
text is partly related to their ability to think about their own understanding as they
read. This kind of knowledge about one’s own understanding is what is referred to as
metacognitive knowledge. As Bruning et al. (1999), describe it, metacognition
doesn’t just refer to the knowledge one has about one’s own thinking; it refers to an
individual’s ability to use this knowledge or awareness to regulate his/her own
cognitive processes as well (Bruning et al., 1999, p. 8). Teaching readers to use
metacognitive strategies is an important way of improving reader comprehension.
While these strategies will be discussed in greater detail later in the paper, it is
important to note here that making readers recognize and use metacognitive strategies
calls for readers to think about what they already know, their schemas, and the
elements in the text design.

According to Bruning et al. (1999), people’s knowledge of cognition involves
declarative knowledge, procedural knowledge, and conditional knowledge.
Declarative knowledge involves what people know about themselves as learners and
what factors they believe affect their performance. Procedural knowledge pertains to
people’s knowledge about strategies. These strategies can include taking notes,
skimming, using mnemonics, summarizing main ideas, and conducting periodic self-
testing. Conditional knowledge refers to people’s knowledge about when or why to
use a strategy (Bruning et al., 1999, pp. 95-96). Research has shown that readers are
more likely to remember more information and to remember it more accurately if
they use metacognitive strategies. Researchers study metacognition in different ways,
one of which is through the use of think-aloud protocols, a method for gathering
information about thought processes during an activity.

By using this method, researchers have subjects read and interpret a text,
while at the same time voicing out loud everything going through their minds as they
read. The think-aloud protocols, or protocol analyses, can help researchers discover
where and why people encounter difficulty in comprehending the text. As Flower et
al. (1983) explain, in a think-aloud protocol, places might occur where subjects, instead of fluently reading the text, stop, reread the text, and consciously think over what that part of the text might mean (Flower et al., 1983, pp. 42-43). In having subjects voice their thoughts about what the text might mean, researchers can learn to what extent readers have metacognitive awareness and, more specifically, what strategies they use to aid in their comprehension and to what extent the strategies they use are the appropriate ones.

Research on readers, their needs and expectations, has given compositionists a greater understanding of readers’ goals for texts. By understanding these goals, compositionists can structure their texts in ways that match their readers’ goals. In structuring their texts to meet these goals, writers can use the elements of text design discussed in this chapter to accomplish this objective.

**Cognitive Psychology, Writers, and the Writing Process**

The next chapter will look at how composition theorists Linda Flower and John R. Hayes developed a cognitive model of the writing process by being two of the first researchers to use cognitive psychology’s think-aloud protocols. Their model demonstrates the way that cognitive psychology influenced composition theorists through its problem-solving process theories (i.e., Newell & Simon). In fact, the next chapter shows how the Flower-Hayes model helped shift the focus on writing from product to process (begun by Janet Emig, 1971). By their method of tying writers’ cognitive processes to their composing process, Flower and Hayes associated good writing with the ability to think and to deliberately plan. The chapter will also look at the knowledge-telling/knowledge-transformation model of writing developed by Carl Bereiter and Marlene Scardamalia and discuss how it differs from that of Flower and Hayes.
Chapter 3: Cognitive Psychological Research, Writers, and the Writing Process

Not only did cognitive psychology have an effect on understanding how people read and on subsequently enhancing the understandability of a text, it also had an influence on the way researchers, and subsequently, teachers thought about how mental processes were involved in producing a text. Specifically, researchers began to try to understand the writing process. In understanding this process, researchers could figure out how to take steps to improve upon it. Teachers could then implement these steps in the classroom.

Cognitive Psychology and Composition

Cognitive psychology became important to the field of composition for its unique focus, among other things, on memory, language, thinking, and problem solving. For these reasons, composition would be substantially influenced by cognitive psychology. This interaction would change composition by affecting how composition theorists and/or teachers of composition viewed the activities of reading and writing and their appropriate methods of teaching.

There are several reasons why cognitive psychology had an influence on composition, some of the early reasons being major shifts that took place in the evolution of composition studies in the 1940s and 1950s. According to Schriver (1997), by the late 1940s the field of writing began to change in significant ways. Teachers began to rethink what they did from the perspective of rhetoric. They also began to “value their own expertise about communication practices and recognize that they were much more than proofreaders and grammar doctors” (Schriver, 1997, p. 68). Also, more writing teachers began to align themselves professionally. In 1949, the Conference on College Composition and Communication (CCCC) was formed and in 1950 started its own journal, providing a forum for its members. Also going on
at this time, according to Vipond (1993), was the “communications movement” that was sweeping the country. This movement sought to integrate the activities of speaking, writing, listening, and reading (Vipond, 1993, p. 15). Thus, in the 1940s and 1950s, the changing perspectives of writing teachers, the growing professional alliances of teachers, and the communications movement all came together to help forge a new field: composition studies.

By the 1970s, when cognitive psychology was “popular,” compositionists were also anxious to be considered part of a “scholarly” field. Vipond (1993) suggests that, as a result, there was an effort for composition studies “to boost its relatively low status and to differentiate itself from English studies and speech communication” by associating itself with the “relatively high-status discipline of scientific psychology” (Vipond, 1993, p. 15). Vipond also suggests, drawing on work from Bridwell-Bowles, that because composition specialists often had to justify new writing programs to administrators, they were “forced to adopt the empirical, quantified language that administrators understood” (p. 15). In other words, for the newly developing field of composition, Vipond concludes that associating itself with a high-status scientific field such as cognitive psychology was a matter of survival. Whether or not the need truly existed is a matter of debate. However, a debate going on for certain at that time was one between product and process.

During the 1970s, a promising field of research centered on developing a process approach to composition. Up until the 1970s, the focus in the classroom had been on the writing product, not the writing process. Teachers and researchers of composition had, for some time now, thought that there was too much emphasis being given to the writing product, and not enough to the writing process. The problem with focusing on the writing product was that the product, the written material, was seen as being “discovered,” written in some mysterious way because the author just knew how it should be written. By viewing writing in this way, as some mysterious, inherent activity known only to the writer, writing became incredibly difficult to teach and to understand. In addition, students were only evaluated once, that being when the final product was handed in. They were not taught how to rethink a text in
progress. Process approaches allowed writing to be seen as something that could be taught, demystifying writing along the way.

Another problem, according to Schriver (1997) with having the focus on the product was that it emphasized style and grammar which, although important, were shown not to help students conceptualize the entire text they were working on, nor to organize their writing around a guiding sense of purpose (Schriver, 1997, p. 65). In other words, students became preoccupied with making sure they used correct style and grammar in their texts. The teachers’ primary role was, thus, to teach these rules and check for errors. The student’s main goal was to not make any mistakes and, if they did so, to correct them. The problem with this approach, as with other aspects of the product approach, was that by focusing on superficial aspects of the text, the student never learned about any deeper problems in his/her writing related to whether the text achieved its purpose.

Thus, composition theorists’ adoption of cognitive psychology’s problem-solving approach and its emphasis on studying differences between experts and novices influenced composition by providing a way of exposing and theorizing how writers write and by creating a way for students and teachers to address the larger, deeper aspects of writing, not just ones related to style and grammar. While many aspects of writing have been theorized, this thesis looks at two of the more prominent process theories: the Flower-Hayes model and the Bereiter-Scardamalia model of writing. The Flower-Hayes model was chosen for the enormous impact it had both in scholarly research and in the classroom. The Bereiter-Scardamalia model was chosen for its unique way of hypothesizing different forms of writing that may occur and for the model’s future impact on the design of learning environments discussed in Chapter 5.

**Flower-Hayes Model of the Writing Process**

The most prominent cognitive models of the writing process are based largely on a study of the problem-solving process. In terms of the writing process, the most prominent, well-known, cognitively based model is that of Linda Flower and John R. Hayes (see Appendix A). Hayes and Flower (1980) describe the unique features of
their model by saying that (1) “It identifies not only subprocesses of the composing process, but also the organization of those subprocesses”, and (2) “Minor variations in its simple control structure allow it to describe individual differences in composing styles” (Hayes and Flower, 1980, p. 10). In their model, they break up the writer’s world into three main areas: (1) the task environment, (2) the writer’s long-term memory, and (3) the writing process. The writer’s long-term memory and the task environment are the context in which the model operates (p. 10).

The task environment includes everything outside of the writer that affects the performance of the task including the writing assignment and the writer’s motivation. After the writer begins, the task environment also includes the text that the writer has produced so far. This text becomes important to the extent that the writer refers to it a significant number of times during the composing process. As for long-term memory, Hayes and Flower assume that writers have topic knowledge and generalized writing plans stored in memory.

Hayes and Flower (1980) see writing as consisting of three main processes: planning, translating, and reviewing. The purpose of the planning phase is to “take information from the task environment and from long-term memory and use it to establish goals and a writing plan that will guide the production of a text that will meet these goals” (Hayes and Flower, 1980, p. 12). The planning process consists of the following three subprocesses: goal-setting, generating, and organizing.

The first subprocess, goal-setting, entails establishing objectives for writing and can refer to making both short-term and long-term goals. A long-term goal, for example, could be a student deciding that he/she will finish the paper in one week’s time. A short-term goal could be something as simple as coming up with the title of the paper or writing an introduction to it. Goal-setting occurs at all times during the writing process.

The purpose of the generating subprocess is to retrieve information from long-term memory that is relevant to the writing task. One way of performing retrieval is by brainstorming. For example, if a student had to write a report for a class based on class lectures, he/she might brainstorm and write down information that he/she remembered from the class discussion or from source materials about the
topic. After the writer has generated ideas, the function of the organizing subprocess is to select the most useful materials and organize them into a writing plan, a meaningful structure. A meaningful structure might take the form of an outline in which the order of the topics to be discussed is laid out.

During the second part of the writing process, the translating process, material is taken from memory under the guidance of the writing plan and converted into written text. Translating involves finding the vocabulary to express one’s ideas, putting words into sentences, and reading off words as they are written.

Finally, in the third process, reviewing, the function, according to Hayes and Flower (1980), is to improve the quality of the written text. The reviewing process consists of two subprocesses: reading and editing (Hayes and Flower, 1980, pp. 14-16). The reading subprocess essentially entails rereading the text, not with the goal of writing more text but with the goal of reviewing the content and form of the text already produced. According to Hayes and Flower, the editing process (known in later versions of the model as the evaluating process) “examines any material that the writer put into words, whether by reading, writing, or speaking. Its purpose is to detect and correct violations in writing conventions and inaccuracies of meaning and to evaluate materials with respect to the writing goals” (p. 16). The distinction made between reviewing and editing is that editing can take place automatically and can occur spontaneously, while reviewing is “not a spur-of-the-moment activity but rather one in which the writer decides to devote a period of time to systematic examination and improvement of the text” (p. 18).

The monitor in the Flower-Hayes model refers to the entity that executes switches between the composing subprocesses. It essentially refers to the writer’s mind as it makes decisions while writing. According to Hayes and Flower (1980), this switching occurs for different reasons. For instance, the generating and editing subprocesses may interrupt other processes (Hayes and Flower, 1980, p. 19). While organizing his/her material, a writer may come up with new material in his/her short-term memory that he/she wishes to add (generating) or the writer may find a sentence he/she wishes to rewrite (editing). For this reason, writing was not seen as a series of
set stages; the stages in the Flower-Hayes model were viewed as recursive, occurring at any time.

The Flower-Hayes model had a significant effect on the study of writing. By thinking of writing as a process, researchers could consider writing as a problem to be solved. Planning, drafting, revising, and evaluating became more prominent activities in the classroom. Students’ writing difficulties could be more easily diagnosed by teachers discovering under which process or sub-process of the model they fell. For instance, teachers could look at a student’s outline and point out missing elements of the outline that were necessary for completing the goal of the assignment. The student’s outline became a concrete object from which the teacher, as well as the student, could reflect on the student’s writing and diagnose how it did or didn’t meet the purpose or goal of the project. Problems in the outline would indicate writing difficulties that fell under the planning process of the model within the generating or organizing subprocess. Solving this problem in the student’s writing might require the student to reflect on what aspects of the problem he/she neglected to consider and to work on generating different ideas. Alternately, if the student already had the right ideas but didn’t execute them correctly, it might require the student to think about how he/she didn’t organize his/her ideas appropriately. In this case, the student would learn to reflect differently on the relationships between the ideas. In this sense, because writing problems could be more easily diagnosed and solved, writing became something that could be more easily taught.

The focus on process instead of product changed the nature of how teachers and others defined a “good writer.” Good writers weren’t just those that didn’t make mistakes or those who followed proper style and grammar. Also, good writers weren’t good writers necessarily because of high ability (which was thought to be innate). Anyone, it now seemed, could learn to become a good writer over time by learning how to manage processes and subprocesses. To reiterate, writing was not seen as a series of set stages; the stages in the Flower-Hayes model were recursive and could occur at any time.

In the next section I look at the Bereiter-Scardamalia knowledge-telling and knowledge-transformation models of the writing process. These models focus on how
texts are generated. Bereiter and Scardamalia further suggest some ways that text can be characterized based on the model being used. In this way, the Bereiter-Scardamalia models differ from the Flower-Hayes model.

**Bereiter-Scardamalia Knowledge-Telling and Knowledge-Transformation Models**

With the publication of their 1987 book, *The Psychology of Written Composition*, Carl Bereiter and Marlene Scardamalia, with expertise in the fields of psychology and composition (between the two of them), laid out in great detail their two models of the composing process: knowledge telling and knowledge transformation. (Earlier descriptions of their model had appeared in various articles and edited collections prior to publication of their book). In their book, the authors state that it is possible to write well following either model. Of the two models they write:

One model makes writing a fairly natural task. The task has its difficulties, but the model handles these in ways that make maximum use of already existing cognitive structures and that minimize the extent of novel problems that must be solved. The other model makes writing a task that keeps growing in complexity to match the expanding confidence of the writer. Thus, as skill increases, old difficulties tend to be replaced by new ones of a higher order. It is important to point out that knowledge telling and knowledge transformation refer to mental processes by which texts are composed, not to texts themselves. (p. 13)

**Knowledge-Telling Model**

Bereiter and Scardamalia’s models do suggest certain text characteristics that would result from use of the model, although they deal with how texts are generated and not with what those texts will be like. Scardamalia and Bereiter (1986) state that using the knowledge-telling model would result in text characteristics such as: 1) topical coherence, 2) well-formedness, and 3) writer-based prose (Scardamalia and Bereiter, 1986, pp. 63-64). Writer-based prose can be identified by an egocentric focus on the writer, a narrative organization that is focused on the writer’s own
discovery process (a think-say approach), or a “textbook” organizational structure of
the writer’s information (writing that is not, for example, organized around the
readers’ needs or questions). An example of a text following such a model on a topic
of say, frogs, might read like one big run-on sentence in which the writer describes
what frogs are, all different kinds of frogs, why he/she chose to write about frogs, etc.
This text would have few subheadings and be difficult to read. Readers would not
know what sort of information to expect in the text or how it related to them. In a
sense, it would be like reading a long narrative.

Scardamlia and Bereiter (1986) further state that writers who follow a
knowledge-telling model also do not engage in a lot of goal setting, planning, and
problem solving. They begin writing fairly quickly and, when it comes to revision,
their revisions are largely limited to proofreading and making cosmetic alterations.
The authors suggest that revisions are largely cosmetic for knowledge tellers because
they cannot check what they have written against their goals and translate problem
areas into solutions. Instead, the knowledge-telling model supports a ‘try-again’
approach to revision of content, meaning that knowledge tellers would have to start
again with a blank slate until they develop goals for their texts (Scardamalia and
Bereiter, 1986, p. 65).

**Knowledge-Transformation Model**

According to Scardamalia and Bereiter (1986), in the knowledge-
transformation model, the knowledge-telling process becomes part of a more complex
problem-solving process involving two different kinds of problem spaces: content and
rhetorical spaces (Scardamalia and Bereiter, 1986, p. 67). Content problems concern
the matter of what to say. Rhetorical problems concern the matter of how to say what
needs saying. Kellogg (1996) states that problem analysis results in establishing goals
that lie either in the content or the rhetorical problem space (Kellogg, 1996, p. 302).
Scardamalia and Bereiter (1986) explain how in the process of writing, these two
problem spaces interact, and knowledge is transformed through this interaction of the
problem spaces. The authors argue that it is this interaction between the problem
spaces that is the basis for reflective thought in writing. Expert writers, from their
point of view, thus display the following kinds of mental activities: 1) alternating, checking, and coordinating procedures; 2) conducting memory searches; and 3) having mental representations of the text (Scardamalia and Bereiter, 1986, pp. 67-68). What these activities mean is that experts alternate between activities of the composing processes, checking to make sure what they’ve written meets their rhetorical goals. They are also able to engage deeper levels of memory in their search for solutions to problems and are able to reformulate problems in different ways. Finally, experts are able to understand the overall purpose of the text—the gist of it. As such, they have deeper, or higher-level-mental representations of the text that help make their writing more effective.

Writers who follow the knowledge-transformation model would have more reader-based prose. They would organize the material around their reader’s needs and questions. They might even use these questions as headings in their text. Continuing the frog example, the text might contain headings such as: What are frogs? What are the different kinds of frogs? Where do frogs come from? What do frogs eat? These headings would be appropriate for a text designed around a reader’s need, for instance, for an introductory text on frogs and their environment. It would also help readers understand what information was being addressed and in which part of the text they could find this information. In other words, writers who follow the knowledge-transformation model are able, by addressing their reader’s needs and the goals of the texts, to keep rhetorical problems of the texts in mind while working on the contents of their texts.

In conclusion, while Flower and Hayes focused on the steps involved in the composing process, Bereiter and Scardamalia focused on, among other things, conceptualizing how the form of the composition could appear as a result of the writer’s analysis of the problem at hand. Bereiter and Scardamalia’s contributions to writing research center on addressing the problem analysis that goes on as writers engage in writing, focusing on the differences between experts and novices, and emphasizing the importance of reflective thought.
Chapter 4: Cognition and Context

By the mid to late 1980s, some composition theorists were beginning to question the ability of the cognitive models to fully explain the writing process. The debate over the cognitive approach centered on its ability to adequately take into account context. It was at this time that social psychological theories on writing began to grow more prominent. As a result, composition theorists who were supportive of the cognitive approach began to look at ways that the cognitive model of writing and context could interact. This chapter focuses on the views of researchers/theorists who were at the center/source of the debate and on those who brought a different emphasis to the discussion; it does not pretend to provide a thorough review of every critique of the cognitive approach, nor a thorough review of every alternative to it.

Questioning the Cognitive Approach

One influential article that described composition theorists’ differing points of view was Patricia Bizzell’s 1982 “Cognition, Convention, and Certainty: What We Need to Know about Writing.” Bizzell breaks up the two theoretical camps into inner-directed theorists, those supportive of the cognitive approach, and outer-directed theorists, those supportive of the social approach. Of the first camp, Bizzell says, “One theoretical camp sees writing as primarily inner-directed, and so is more interested in the structure of language-learning and thinking processes in their earliest state, prior to social influence” (Bizzell, 1982, p. 215). She goes on to say that inner-directed theorists “seek to discover writing processes that are so fundamental as to be universal” and that these theorists go on to further claim, in what she considers a paradox, that “the universal, fundamental structures of thought and language can be taught” (p. 215).

Of the second theoretical camp, Bizzell states that it sees “writing as primarily outer-directed, and so is more interested in the social processes whereby language-
learning and thinking capacities are shaped and used in particular communities” (p. 215). Furthermore, she says, in contrast to the inner-directed theorists’ idea that universal, fundamental structures of thought and language can be taught, outer-directed theorists’ do not believe they can be and believe instead that “thinking and language can never occur free of a social context that conditions them” (p. 217).

Outer-directed theorists believe in what they call “discourse conventions” and “discourse communities.” They are skeptical of how we can learn which thinking and language-learning processes are innate. Instead, they believe that an individual is already inside a discourse community upon learning his/her native tongue.

Bizzell provides a specific critique of inner-directed theory in her analysis of Flower and Hayes’ cognitive process model of writing. She describes ways in which the model can be “enlarged” or “shored up” by the inclusion of outer-directed theory. Two critical areas that she mentions are the planning and translating areas. Bizzell’s main argument is that planning and translating should not be considered separate activities from one another. She says that “to look at writing as situated in a discourse community is to blur over the lines between translating and planning” (p. 226). She further states that finding words cannot be viewed as a separate process from setting goals, but rather that it is setting goals. By this, she means that the writer, when he or she is finding words is, in fact, aligning himself or herself within a discourse community. In other words, the discourse community gives meaning to the words. Bizzell, although critical of the Flower and Hayes model, seems more concerned by what she terms the cognitive approaches’ need for certainty; their need to find a universal model. She suggests a need for caution before rushing into believing that such a universal, certain model has been found.

Another article that critiques Flower and Hayes’ cognitive process model of writing is Marilyn Cooper’s (1986), “The Ecology of Writing.” Cooper stresses how cognitive psychology has blinded composition researchers and instructors to other aspects of writing that are not just peripheral—such as the social environment. She refers to the cognitive model of writing as being too confining, and even tyrannical at one point, in reference to its use in educational classrooms. She emphasizes that there is an increasing awareness that language and texts are not simply the means by which
individuals discover and communicate information. Instead, language and texts are essentially social activities that are dependent on social structures and processes in their interpretive and constructive phases (Cooper, 1986, pp. 4-5).

Cooper (1986) proposes an ecological model of writing “whose fundamental tenet is that writing is an activity through which a person is continually engaged with a variety of socially constituted systems” (p. 6). The system of ideas refers to how writers understand their world and how they turn their personal experiences and observations into knowledge. The system of purposes links the actions of many different writers. The system of interpersonal interactions is how writers relate to each other, depending on the degree of intimacy they have and the amount of control they have over the other. The system of cultural norms refers to the attitudes and structure of the larger social groups of which writers are members. The system of textual forms refers to the means by which writers communicate (Cooper, 1986, pp. 8-9).

In describing her model, Cooper emphasizes that these systems are inherently dynamic and concrete. By being dynamic, Cooper means that “The systems are not given, not limitations on writers; instead they are made and remade by writers in the act of writing” (p. 7). In other words, writers have the power to shape and alter these systems through their writing. Cooper believes it is in this sense that writing can change reality and be a form of action. Besides being dynamic, these systems are also concrete. By this, she means that the systems exist in reality and not just as an idea. They reflect the ways writers connect with one another through writing. By way of comparison, Cooper refers to her model using the metaphor of a web in which anything that affects one strand vibrates throughout the whole.

One particular concept that Cooper discusses is that of audience. While she says that the internalization of audience by the author is inescapable within the cognitive process model, Cooper suggests that her ecological model, by focusing our attention on the real social context of writing, enables us to see that “writers not only analyze or invent audiences, they, more specifically, communicate with and know their audiences” (p. 10). Writers do this by giving their works to colleagues to read and respond to and by reading other peoples’ critiques of their writing.
Finally, in summing up how the ecological model differs from the cognitive process model, Cooper says, “In contrast, then, to the solitary author projected by the cognitive process model, the ideal image the ecological model projects is of an infinitely extended group of people who interact through writing, who are connected by the various systems that constitute the activity of writing” (p. 12). In conclusion, for Cooper, writing is not simply a way of thinking, but a way of acting. Her goal is to bring focus to imbalances in social systems that prevent good writing and to take the focus away from characteristics of the individual writer.

In reviewing the literature on critiques of the cognitive approach, I became aware that critiques of the cognitive approach should not have come as a surprise. The proposal of a competing theory to the cognitive approach was merely part of a dialectic—defined by Sternberg (2006) as a developmental process whereby ideas evolve over time through a pattern of transformation (Sternberg, 2006, p. 3). The dialectic began when a thesis was proposed—that thesis being the cognitive approach to writing and the writing process. The dialectic continued when an antithesis—a statement that counters a previous statement of belief—emerged. In this case, the antitheses is the social approach. The final result of a dialectic is usually a synthesis of the thesis and antithesis. A synthesis involves integrating the most credible features of each view. In this case, that would mean in the debate between the cognitive and social models, the interaction between the two models is what guides writing and the writing process. In other words, both approaches are important and work together. This interactive approach will be discussed throughout the remainder of this thesis.

Closing the Gap: Positing a Social Cognitive Theory of Writing

One article that attempts to combine or unite the competing cognitive and social approaches is Michael Carter’s (1990) article, “The Idea of Expertise: An Exploration of Cognitive and Social Dimensions of Writing.” Carter’s purpose is to clarify how we can answer the questions, what does it mean to be an expert writer and how do writers become experts? In this way, he differs from those previously mentioned authors because, while also addressing how cognitive and social
“rhetorics” differ on what writing is and how to teach it, he brings up the point that the two “rhetorics” also have different views of expertise in writing.

In talking about why the approaches are at odds, Carter frames the distinction in terms of the kind of knowledge deemed important by each one. According to Carter, for the cognitive theorists, general knowledge is deemed more important; for the social theorists, local knowledge is deemed more important. From the perspective of the social theorists, Carter writes, the cognitive theorists’ “emphasis on general knowledge is a naïve reduction of writing to a set of procedures, ignoring the crucial historical and cultural influences of the context in which writers write” (Carter, 1990, p. 266). In contrast, from the perspective of the cognitive theorists, the social theorists’ “emphasis on local knowledge posits a concept of composition that jeopardizes the possibility of pedagogy” (p. 266). In other words, no general rules can be applied to guide the writing process because it is different in every “locality.”

In terms of expertise, the cognitive definition of expertise in writing, according to Carter, is “the ability to bring to a writing task certain rich, well-developed, general strategies that guide the process and increase the chances for success” (p. 266). From the social perspective, an expert writer is one who has “attained the local knowledge that enables her to write as a member of a discourse community” (p. 266). What Carter suggests is that a new conception of expertise has to be put into practice, one that will balance the two approaches.

What Carter proposes is that the knowledge that guides performance can be thought of as existing along a continuum. This continuum goes from very general strategies to relatively general strategies to increasingly less general strategies to more local strategies. By thinking of knowledge along a continuum, both kinds of knowledge take on new importance.

How are general strategies important? First, as Carter (1990) describes, research has shown that experts refer to relatively general strategies when they are faced with unusual problems in their field. Second, research has shown that when students are taught general strategies in a way that emphasizes both their contextual use and their control through self-monitoring procedures, students dramatically improve in their performance in a particular context. General-process strategies can
be useful in helping students acquire local knowledge. As novices in a domain, they rely on certain global strategies. These general strategies let novices gain greater knowledge of the domain, helping them become more effective within it. Finally, general strategies enable the transfer of learning, the ability to generalize from performance in one specific context to performance in another context. This transfer of learning, however, only occurs under certain conditions (Carter, 1990, p. 270).

General knowledge, or strategies, can thus be complementary to domain knowledge in that, though it may not relate to the specific domain, it is essential for completing the problem. An example of general knowledge would be knowing the procedural skills (the “know how”) for using a computer. These skills would be considered general knowledge because one could use these skills for a variety of tasks (i.e., surfing the internet, checking email, writing a report). This general knowledge of knowing how to use the computer would then be essential to using the computer to write a persuasive report tied to a particular domain (i.e., psychology). To carry out the example further, the general strategies learned for writing the persuasive paper for that particular domain could then be transferred to writing a persuasive paper for a new domain at a later time.

Carter’s article, in essence, highlights the key problem of thinking of the social and cognitive approaches as opposed to one another. Neither approach on its own fully accounts for the complexity of the writing process. Looking at ways in which the two complement one another is the only way to fully describe what it takes to become an expert, in this case, of writing. Understanding how both kinds of expertise complement one another can lead to a better idea of implications to the field of composition and technical communication. Writing can serve many purposes. The purposes of writing for technical communication can vary and can be thought of differently than those that may make up the field of composition in general. Because of the varying purposes for their writings’, technical communicators can greatly benefit from knowing general knowledge and strategies that can be effective in improving their writing across a variety of writing situations in a variety of writing domains. However, because technical communicators often have to become temporary members of a discourse community, they also need to know specific, or
local, knowledge important to that community in order to best speak for it. Consequently, both kinds of expertise can be important for technical communicators depending on the purpose of their writing. If technical communicators are writing a grant proposal, for example, for a particular organization, then having local knowledge of that organization would be important. For instance, a technical communicator might be asked to write a grant proposal for a non-profit organization interested in obtaining funding to create educational products that reflect the organization’s goals. Such an organization would approach the funding authority with terminology that is appropriate to funding authority’s understanding of the intertwining missions of the two organizations. However, if a technical communicator is writing, for example, a user’s guide for a software program, then he/she would not want to rely on using local knowledge or terminology that may be unfamiliar and confusing to a broad audience. Thus, the purpose and audience behind the text being produced can determine whether local knowledge is best used. Ultimately, however, general knowledge can be used regardless of the purpose and audience because it can be applicable to a variety of situations. Consequently, knowing and studying the cognitive approach to writing can be incredibly beneficial for technical communicators.

The next section describes some of the ways cognitive researchers further theorized about how the social approach could be complementary to the cognitive approach and some of the ways they studied the relationship.

**Changes in Composition Research: A New Agenda for Cognitive Researchers**

As previously stated, while the benefits of a social theory of writing were being addressed, cognitive theorists looked for ways to lessen the polarization of cognition and context and to show instead how they might interact. Such is the case in Flower’s 1989 article “Cognition, Context, and Theory Building.”

Flower’s purpose in the article is not to propose a specific theory but to instead suggest ways that observational research might be used to “create a well-supported theoretical understanding” of the interaction between cognition and context. She speaks of the need to have a “grounded theory,” a vision grounded in
specific knowledge about real people writing in various situations (Flower, 1989, p. 283).

Flower proposes that “both cognition and context may in a sense construct one another… [in that] cultural and social context can provide direct cues to cognition…[and that] context is always mediated by the cognition of the individual writer” (Flower, 1989, p. 287). Context can guide cognition, indirectly, by affecting us in the form of our past experiences which carry with them prior knowledge, assumptions, and expectations, many of which we might be unconsciously aware of. However, in a more direct way, context can also interact with the mind of the writer as a “cue to action.” These cues influence three key areas of cognition in writing: goals, criteria, and strategies (p. 288). When context influences the process of setting goals, it can affect the nature of the problem the writer tries to solve. In terms of criteria, context can guide action by “setting the criteria by which a text or even one’s own thinking process is monitored and evaluated” (p. 288). In other words, one’s prior knowledge with the subject of the text, for example, can affect how one evaluates the text. Finally, context can cue action by conveying appropriate strategies. Flower further states that, “Context is a powerful force. However, it does not produce a text through immaculate conception…context in its many forms is mediated—at all levels of awareness—by the cognition of the individual writer” (Flower, 1989, p. 289).

As Schriver discusses in her 1992 article, “Connecting Cognition and Context in Composition,” while early cognitive research tended to focus on the “context independent” dimensions of writing, the cognitive research agenda has been expanded to investigate the “context-dependent” dimensions of writing. As she puts it, “There is now more interest in exploring how an individual writer’s ability to access relevant prior knowledge and to use heuristics for writing interacts strongly with the unique features of a given rhetorical situation” (Schriver, 1992, pp. 194-195). She furthermore states about researchers with a cognitive orientation that “A central concern lies in knowing what aspects of cognition in writing are more or less situation-specific or domain-specific than others. The goal is to understand how cognition and context interact” (pp. 195-196). In other words, Schriver stresses,
composition researchers in the 1990s were interested in how people generalize their knowledge of writing and how they transfer writing ability from one rhetorical context to the next (p. 197). She also makes the point that connecting cognition and context means more than just studying people’s thinking processes; it also entails studying the role of affect and motivation in writing (p. 197).

Of major importance, Schriver (1992) emphasizes the following: “Even as scholars try to understand the uniqueness of contexts, they are not abandoning the enterprise of trying to find out what is common across writing situations” (p. 197). In other words, researchers with a cognitive orientation are, and will continue to be, interested in constructing knowledge useful in a variety of situations.

Cognitive researchers, however, began to look at how cognition is contextually mediated by looking at classroom contexts and by looking at writing in nonacademic settings (i.e., the workplace). By looking at how cognition is contextually mediated (or affected) in such environments, cognitive researchers also used different methodologies. Instead of the “laboratory-like experiments” normally associated with cognitive research, new methods, such as field observations and case studies, began to be used more frequently. These methods took into account the problem of making cognitively oriented research “ecologically valid” because cognitive research occurred as researchers studied writing in normal, or natural, environments in which writing would occur (p. 201).

In summary, cognitive researchers began to explore how cognition and context interact with one another in various social settings; consequently, they also created new social cognitive theories of writing. These social cognitive theories of writing will be explored in the following section of this paper. However, before moving on to that discussion, I believe it is important to point out that social cognitive theories did not, by their very existence, do anything to diminish the strength of the cognitive approach. In other words, while both approaches interact, each one has merits on its own. As Schriver (1992) stresses, it is too simple to assume that either individual cognition or context weighs the heaviest in the choices people make during composing. A relative balance between context and cognition needs to be addressed. As she so eloquently puts it, there need to be theories that “go beyond perspectives
stating that learners are simply reproductions of their culture, with nothing to say, nothing to contribute, because they are nothing more than social products” (p. 198). As Schriver puts it, these “overdetermined social theories erase the individual and deny individual creativity in the social process” (p. 198). Thus, her concluding point is that individual choices matter. Also, as Hayes (1996) states, just discovering social methods does not mean that we should simply decide never to use cognitive ones again.

I agree with Schriver and Hayes. After conducting a thorough review of cognitive psychology’s contributions to the field of composition, it struck me that the strength of the cognitive approach is and will always be its focus on the individual. The cognitive approach emphasizes the individual—his/her choices, decisions, and creativity—and these aspects of the individual will always remain relevant regardless of context. Consequently, while social theories direct attention to aspects of writing that may not have been fully addressed previously, they do not take away from the cognitive approach. How the individual thinks within a social environment is still dependent to some degree on the individual. The next chapter explores this issue in depth and looks at how the cognitive approach is still relevant in the classroom today as learning transitions from the traditional classroom learning environment to online learning.
Chapter 5: Cognitive Psychology, Learning to Write, and Online Applications

While the previous chapters have explored how cognitive psychology has influenced how we have theorized about how readers read and write, this chapter looks at how these processes, reading and writing, interact and how that interaction has guided how we believe students learn and how best to instruct them. This chapter will address changes being made to the cognitive approach to writing and how these changes reflect larger ideological changes being made within the field of cognitive psychology itself. Greater recognition of the importance of the social context of learning, as well as the affective aspects of learning, have begun to appear in cognitive psychology text and theory. The following discussion highlights some of these new perspectives on learning.

Cognitive Themes for Education

Cognitive psychology has a great deal to offer in terms of understanding learning as well as the nature of learners. For instance, according to Bruning et al. (1999), whose text focuses on cognitive psychology and its implications for education, cognitive psychology helps us see learning as a constructive, not a receptive process. In other words, learning is a “product of the interaction among what learners already know, the information they encounter, and what they do as they learn” (Bruning et al., 1999, p. 6). What motivates learning is the search for meaning. Cognitive psychology also emphasizes the importance of structuring knowledge. Schemas are the primary way by which we organize knowledge (p. 7).

Cognitive psychology emphasizes self-awareness and self-regulation of cognition (p. 7). A major effect of cognitive psychology on education has been the advancement of the idea of a self-directed, strategic, reflective learner. This portrayal of a learner has been supported by a large body of research on metacognition.
Cognitive psychology emphasizes that motivation and beliefs direct learning. While early cognitive research focused strictly on memory, thinking, and problem-solving processes and their applications for instruction, cognitive psychology, as Bruning et al. (1999) describe, now “includes not only the ‘purely cognitive’ variables of memory and thought but also the motivational and belief systems of learners as well” (p. 8). Thus, new emphasis has been given to the importance of learners’ overall cognitive frameworks for motivating and regulating learning. In other words, “Cognitive activity occurs within a framework of learners’ goals, expectancies, and beliefs, all of which have important consequences for determining what students choose to do, how persistent they are, and how much success they enjoy” (p. 9).

Cognitive psychology also stresses the role of social interaction in cognitive development. According to Bruning et al. (1999), cognitive psychology has “helped us see that ‘ways of knowing’ and ‘ways of thinking’ need to be nurtured in a supportive social context (p. 9). While individual study was previously stressed by educators as the route to cognitive growth, research now shows that “social-cognitive activities, such as well-managed cooperative learning and classroom discussions, stimulate learners to clarify, elaborate, reorganize, and reconceptualize information” (p. 9).

Finally, cognitive psychology stresses the contextual nature of knowledge, strategies, and expertise (p. 9). While the dominant metaphor of cognitive psychology has always been that of mind as machine, another metaphor, or worldview, states that cognitive psychology is not mind as machine, but rather the event, which emphasizes history and situation (p. 9). Currently, this worldview underlies much of the interest in cognitive strategy instruction and self-regulated learning (p. 10). As Bruning et al. state, “Effective strategy use and self-regulation, in short, are thoroughly contextual; they need to be used at the right time and place and to be grounded in learners’ understanding of themselves as learners and their knowledge and beliefs about what they are learning” (p. 10). This chapter explains that these cognitive themes for instruction have affected much of the way that reading and writing is taught and understood.
Revisiting the Flower-Hayes Model: The New Model of Writing

As cognitive psychology began to acknowledge more the influential role that affect and social context have on cognition, so did cognitive psychological theories of writing. In particular, the Flower-Hayes cognitive process model of writing underwent a revision reflective of these new ideas. The purpose of the new model, as described by Hayes (1996), is to provide a more accurate and comprehensive description of the writing process than the one provided in the earlier 1980 model (see Appendix B). Hayes’ “major changes in focus in the new framework are: greater attention to the role of working memory in writing, inclusion of the visual-spatial dimension, the integration of motivation and affect with the cognitive processes, and a reorganization of the cognitive processes which places greater emphasis on the function of text interpretation processes in writing” (Hayes, 1996, p. 40). Hayes’ new framework also includes new and specific models for planning, text production, and revision. Before describing the particulars of the new model, it should be noted that Hayes points out that instead of the model being viewed as a social-cognitive model, it could instead be viewed as an individual-environmental model (p. 11). By making this statement, he, in my opinion, once again emphasizes the strength of the cognitive approach—the focus on the individual.

While the 1980 model had three major components, the task environment, the cognitive processes involved in writing, and the writer’s long-term memory, the new model has only two major components: the task environment and the individual. The task environment has two components: social and physical. The social environment consists of the audience and other texts that the writer may read during writing. The physical environment consists of the text that the writer has produced so far and the writing medium. As for the other major component, the individual, this element includes: motivation and affect, cognitive processes, working memory, and long-term memory (p. 10-11). It is this component, the individual, that has undergone the most change within the model.

In particular, with regard to motivation and affect, Hayes discusses four different areas he believes especially important for writing: (1) the nature of motivation in writing, (2) interaction among goals, (3) choice among methods, and
(4) affective responses in reading and writing (pp. 16-21). Of the second area, interaction among goals, Hayes points out that, “in writing, there are many situations…that involve multiple goals which interact with each other to determine the course of action” (p. 17). What this statement means is that writers will typically have more than one goal when they write and that, in all writing situations, the text will be shaped by the writer’s need to achieve a balance among competing goals (p. 18).

The third area Hayes addresses, with regard to motivation and affect, is choice among methods: the idea that “even for situations in which goals are specified, motivational factors can additionally influence action by influencing strategy selection” (p. 18). Hayes suggests that motivation can be seen as shaping the course of action through a form of cost-benefit analysis. Thus, even when the overall goal of an activity is specified, individuals will choose the strategy that, in that situation, is least costly or least likely to lead to error (p. 18).

The fourth area Hayes discusses is affective responses in reading and writing. In terms of responses to reading, Hayes describes how researchers have found that people have a tendency to blame themselves for their misunderstandings after reading poorly designed instructional text, though the text is at fault. People will then believe they are incompetent at reading such text and will be reluctant to read it in the future. This research, as Hayes points out, shows that addressing the affective component to readers’ and writers’ perceptions of their ability to read and to write is an important factor in altering and improving their learning process.

Additional revisions to the model will be addressed in the following section, which describes some of the new directions that cognitive psychology has taken in writing instruction.

**Reading and Writing in the Classroom**

While previous chapters discussed the activities of reading and writing separately, this section focuses on how reading and writing came to be viewed more as processes that are intertwined. It explains how researchers began to study what came to be known as “reading-to-write” or composing from sources. It also looks at
how metacognition and metacognitive strategies both for reading and writing can be taught and applied in classroom settings. The section ends with a discussion of literacy communities, a social cognitive approach to teaching writing in the classroom.

**Writing in the Classroom: Discussion of Reading-to-Write**

Around the time that writing began to be studied within an academic context, increasing emphasis was being given to the fact that reading and writing are not just separate processes, but ones that are highly intertwined and overlapping. The idea at this time was that the boundaries between what came from reading and what came from writing were blurred. Consequently, researchers began doing studies to determine what material in texts could be traced back to various sources readers used in the process of writing. This research emphasis came to be called “reading-to-write” or composing from sources. One of the key researchers in this area was Nancy Spivey. By composing from sources, Spivey (1990) states, she is referring to “instances when writers draw directly from other texts, instances in which the prior texts are knowable and traceable and when those prior texts might be compared with the new texts created from them. In these acts, the writer has two kinds of knowledge sources: what is available in the immediate source texts and what can be generated from previously acquired knowledge in long-term memory” (Spivey, 1990, p. 257). She states that both kinds of sources can exert powerful forces on the way the writer organizes meaning, the selections the writer makes, and the elaborations and inventions the writer generates. It is in this respect that writers are then able to “transform” texts.

In discussing the blurring of boundaries between reading and writing, she says that, “Although we see evidence of organizing, selecting, and connecting, we often cannot say whether a writer performs a certain operation to make meaning of the text that is read or to make meaning for the text that is being written” (p. 258). The acts of composing from sources are “hybrid acts of literacy” in which writing influences reading and reading influences writing. Research on composing from sources has led to a focus on studying reading when it is being done for the purposes of writing (not
just for the purpose of understanding it) and to questions about how various tasks of composing from sources lead to different kinds of texts and, consequently, to different kinds of representations of meaning (p. 260).

With regard to revisions made to the Flower-Hayes model, the inclusion of reading source texts under the area of cognitive processes carried out within the model is a direct connection to this idea of composing from sources. As Hayes (1996) states, reading source texts provides readers with more than just topic information. From source texts, readers develop representations of the topic discussed, the writer’s persona, and the text as a spatial display (Hayes, 1996, p. 29). In terms of the writer’s persona, or personality, studies have even found that “in some cases, the acceptance of a writer’s argument may depend more on how the writer comes across as a person than on the logical quality of the argument itself” (p. 30).

**Writing in the Classroom: Metacognition**

An area that has been extensively studied in the classroom and which suggests that reading and writing are reciprocal and overlapping processes is that of metacognition. As previously explained in Chapter 2, metacognition can be defined as “our understanding and control of our cognition…our ability to think about and control our own processes of thought and ways of enhancing our thinking” (Sternberg, 2006, p. 534). Cognitive psychologists and reading researchers have found that people’s ability to construct meaning from text is partly related to their ability to think about their own understanding as they read. This kind of knowledge about one’s own understanding is what is referred to as metacognitive knowledge. Simply put, metacognition doesn’t just refer to the knowledge one has about one’s own thinking; as Bruning et al. (1999) state, it refers to an individual’s ability to use this knowledge or awareness to regulate his/her own cognitive processes as well (Bruning et al., 1999, p. 8). Teaching readers to use metacognitive strategies is an important way of improving reader comprehension.

Metacognition is now considered a significant factor in the encoding and retrieval memory processes. Bruning et al. (1999) describe how knowledge of cognition is made up of three components: declarative knowledge, procedural
knowledge, and conditional knowledge. With regard to learning, declarative knowledge refers to knowledge about ourselves as learners and what factors influence our performance. Procedural knowledge refers to knowledge about strategies. These strategies can include note-taking, skimming, using mnemonics, summarizing main ideas, and conducting periodic self-testing. Conditional knowledge refers to knowing when or why to use a strategy (Bruning et al. 1999, pp. 95-96). Research has shown that readers are more likely to remember more information and to remember it more accurately if they use metacognitive strategies.

Researchers study metacognition in different ways, one of which is through the use of think-aloud protocols. Using this method, researchers have subjects read and interpret a text, while at the same time voicing out loud everything going through their minds as they read. The think-aloud protocols, or protocol analyses, help researchers discover where and why people encounter difficulty in comprehending the text. As Flower et al. (1983) describe, instead of fluently reading the text, the reader will stop, reread the text, and consciously think over what that part of the text might mean (Flower et al., 1983, pp. 42-43). In having subjects voice out loud their thoughts on what the text might mean, researchers can learn to what extent readers have metacognitive awareness and, more specifically, what strategies they use to aid in their comprehension and to what extent the strategies they use are the appropriate ones.

Metacognitive strategies for improving reading comprehension can differ for each point in the reading process. According to Bruning et al. (1999), prior to reading new information, research suggests that readers should engage in the following metacognitive strategies. First, they should determine their goals. Second, they should determine how much information to learn. Third, they should think about how this information relates to what they already know (Bruning et al., 1999, p. 103).

The first metacognitive strategy for readers, determining their goals, is an important one. Readers should ask themselves, “Why am I reading this material? What do I hope to use this information for?” Readers’ goals for reading can affect how much and what kind of information they decide to learn. For example, if readers need to read the material for a test, they should think about what kind of information
they might need to know to be successful on the test. This choice might be affected by the kind of test a reader expects.

Medin and Ross (1992) provide the following example. Suppose a student has read in an assignment that John B. Watson is the founder of behaviorism. The student could be tested in two ways. The first way would be to present the student with the statement, “The founder of behaviorism was John B. Watson” and ask the student to state “true” or “false.” A second way would be to ask the student, “Who founded behaviorism?” In this example, the first way (recognition) would be easier than the second way (recall). The reason for the difference in degree of difficulty is that the first way, presenting the student with the statement, provides nearly all of the elements the student attended to at the time of the original learning. On the other hand, in the question, part of the original context is missing, making it more difficult to recall (Medin and Ross, 1992, p. 187).

This example shows that how information is encoded at the time it is read and learned affects, to a large extent, what is recalled. This is known as encoding specificity. Readers’ goals for reading text should, therefore, influence how they encode the information they read. Understanding one’s goals for reading should lead to increased comprehension.

The second metacognitive strategy for enhancing reading and reading comprehension, determining how much information to learn, again depends on the readers’ goals. If readers know prior to reading the text what information they will be tested on, they might then determine to read only the information pertaining to what they will need to know. By knowing their goals and what information they need to learn, readers can better comprehend the information they need to know by focusing their efforts on that information and by not being distracted by “nonessential” information.

The third metacognitive strategy prior to reading new information, thinking about how the information relates to what they already know, entails having readers think about their prior knowledge and expectations about the information: in other words, their schemas. In this respect, schemas and metacognitive strategies interact with one another. For example, if students were preparing to read a psychology text,
they might think about what they already know about psychology based on their previous experiences with psychology classes and the knowledge they learned. By activating their schemas, they will have identified a knowledge base upon which to draw and add new information.

Bruning et al. (1999) describe how, in addition to reading preparation, metacognitive strategies are also important while reading. Research suggests that, as they read, readers should identify important information. They should also monitor their learning as they read. Finally, they should analyze and interpret the information they read (Bruning et al., 1999, p. 103).

While they read, readers should be able to identify important information by looking at aspects of the text design. Based on their schemas of how text should be designed, readers should already know the places where important information is likely to be found. Examples of places readers should look in the text are the titles, headings, and topic sentences. They should also look at the introductions and conclusions of texts.

Further, readers should be monitoring their learning as they read. They should, as Schraw (2001) suggests, ask themselves if they have a clear understanding of what it is they are reading. They should also ask themselves if the text is making sense to them, if they are reaching their goals, and if they need to make any changes (Schraw, 2001, p. 11).

Finally, readers should be analyzing and interpreting what they read. At this point, they should be trying to, for example, generate meaningful cues for retrieval as they are encoding information to enhance recall (Sternberg, 2006, p. 226). They should, for example, be thinking about how the information they are reading relates back to the advance organizers and previews in the text.

Bruning et al. (1999) notes that there are also metacognitive strategies readers should engage in after reading a text. Research shows that readers should review, organize, and reflect on the information they have read (Bruning et al., 1999, p. 103).

Kamil (2004) notes that one way readers can review the information is by answering, as well as generating, questions about what they have just read. Answering questions helps readers’ comprehension because it helps them locate the
information in the text (Kamil, 2004, p. 224). In addition, answering questions can also teach readers that “answering a question does not always depend on finding the answer in the text and that they can combine information in the text with their prior knowledge” (p. 224). Question generation gets readers more actively involved in the process. It helps them construct better memory representations and increases their awareness of whether they understood the text (p. 224). In this way, generating and answering questions also helps readers reflect on the information.

Another way for readers to reflect on the information is to think about whether they have met their goals or not. If not, they may have to go back and reread some information or come up with better retrieval cues for recalling the information. By reflecting on whether they have met goals, the readers focus on the extent to which they have comprehended the text they have just read.

Finally, another way for readers to reflect on the information, as well as to review it, is by organizing it. This organization, according to Kamil (2004), can come from creating a graphic organizer. Graphic organizers, visual or spatial representations of a text, enhance reader comprehension because they help readers visualize the connections among various items in the text. They also help readers recognize the important elements in the text. Creating graphic organizers after reading a text can also help readers write a summary of the text they have just read, another way of organizing and reflecting toward comprehension (Kamil, 2004, p. 223).

In summary, metacognitive strategies exist for all stages of the reading process. Helping readers become more aware of and have more control over their thinking processes as they read can aid them in improving their reading comprehension. As readers’ develop their metacognitive skills, the skills can become more and more automatic. Consequently, metacognition can have a powerful effect upon reading comprehension.

Metacognitive strategies also can influence the effectiveness of the writing process. Good writers need to apply similar metacognitive strategies when they are writing. While writing, writers also should be constantly rereading what they have written. They should also be writing with an audience in mind. They should already be familiar with how best to enhance reader comprehension—through the design and
organization of the text as well as by the connections made to readers’ schemas. Writers, just like readers, need to ask themselves the following questions before writing: Why am I writing this text? What do I hope to accomplish with this information? They also need to think about how what they are writing relates to what they already know—the writers’ schemas—as well as to what their readers know.

While writing, writers also need to be monitoring themselves. They need to ask themselves the following questions: Do I understand what I have just written? Could my writing be improved? Have I written in such a way that my readers will be able to easily comprehend the information?

After writing, writers need to reflect on whether they have met their goals or not. If not, they may have to go back and rewrite part of their text. By analyzing whether they have met their goals, writers will be able to better see if they have remained focused and met their objectives.

The importance of metacognition cannot be overstated. Metacognition has a tremendous impact on how well readers comprehend material and how well writers write material in a way that readers can easily comprehend. Because of the power of metacognition, teaching metacognitive strategies is an important lesson that composition instructors should continue to acknowledge and implement in their writing classes.

**Writing in the Classroom: Development of Literacy Communities**

Another way writing has been studied in the classroom is through the development of literacy communities. In describing the development of literacy communities, Bruning et al. (1999) say that, “Like other areas of cognitive research, writing research increasingly has drawn on a social cognitive perspective in designing and testing ways to help young writers improve their skills” (Bruning et al., 1999, p. 307). In other words, the social cognitive perspective is evident in the design and implementation of literacy communities. According to Bruning et al. (1999), a literacy community is a community in which teachers use writing as a “tool for learning,” rather than as a way to display what students have already learned in a test or essay. In a literacy community, writing is motivated by a student’s desire to
communicate and is valued as an expression of what he or she wants to say. Social interactions are fundamental to a literacy community, whose main activities consist of reading, writing, speaking, and listening. Two important dimensions of a literacy community are students (1) engaging in dialogue with one another, and (2) using each other as editors. In a literacy community, teachers: have students write frequently; create an informal, supportive climate for writing; emphasize prewriting strategies; stress knowledge transforming, not knowledge telling; encourage students to develop productive revision strategies; use computer-based technology as needed; and keep grammar and language mechanics in perspective (Bruning et al., 1999, p. 308).

The influence of cognitive theory on writing instruction can be seen in several ways. By having students write frequently, develop productive revision strategies, and use each other as peer editors, emphasis is placed on the writing process, not just the final product. Instead of focusing on a single, final draft, students are given the opportunity to revise at several points in the process: after turning in a first draft, after having a peer review, and so forth. Developing productive revision strategies in and of themselves is reflective of cognitive theory because prior to cognitive theory, no emphasis on productive revision strategies was needed as multiple drafts of papers were not something required in the classroom. The influence of cognitive theory as applied to online literacy communities will be discussed later in the chapter.

**Reading, Writing, and the Computer**

The computer had a significant impact on the study of the composing process as well as on the composing process itself. Consequently, at the same time that writing was being studied in an academic context, the effects of reading and writing with a computer were also being researched. While most of this research is beyond the scope of this paper, this section will briefly address how the computer led to new ways of structuring text. It will also address how the computer allowed new forms of content to be taught. It will end with a detailed discussion of how online learning has affected the process by which writing can be taught.

Research has shown that effective learning with a computer can sometimes require the use of different methods and strategies than those used in more traditional
settings. For example, people read differently when they use a computer. Research has shown that learners do not like to scroll through long screens of text on a computer screen. They prefer to read shorter chunks of text. However, while reading methods at the computer may vary from those used elsewhere, it is important to realize that they follow the same fundamental principles used in reading any kind of text. For instance, information organization is important to cognition. Just as readers might look to the title and headings on a paper for key information, so learners on computers will also look toward headings, but they will also look toward hyperlinks for connections to important information.

Of course, a primary difference between learning in the classroom and learning on the computer is the environment. Online learning requires a change in the environment that has led to changes in how learners interact with texts. It has also led to changes in how learners interact with others.

For instance, computers have allowed different kinds of content to be taught than could be taught in traditional classroom environments. For example, the computer allows teachers to create environments that mimic situations in the real world that they couldn’t otherwise realize in a classroom. For example, environments that mimic situations in the real world provide the contexts for what Collins (1991) refers to as “situated learning.” Situated learning is the notion of “learning knowledge and skills in contexts that reflect the way the knowledge will be useful in real life” (Collins, 1991, p. 122). The benefits of situated learning are that: 1) students learn conditions for applying knowledge, 2) situations foster invention, 3) students see the implications of the knowledge, and 4) context structures knowledge appropriate to its uses. With this last benefit, the implication is that when knowledge is learned in the context of its uses, it is more likely to be stored in a form that is usable in novel contexts (Collins, pp. 122-123). Collins’ approach is to advocate teaching in multiple contexts and then generalize from these contexts, rather than teaching abstract knowledge and how to apply it in contexts. By doing this, Collins claims that knowledge becomes both specific and general (p. 123).

Situated learning occurs in Collins’ “cognitive apprenticeship” approach to designing learning environments. Collins says that before the invention of schooling,
everything was taught by apprenticeship, where learning was situated in the context of work. The basic method of apprenticeship involves modeling, coaching, and fading. In concrete terms, this strategy means first showing apprentices what to do, then next observing and helping them as they try to do it for themselves, and finally fading the help as they take on more responsibility. It also encompasses teaching methods that include reflection on performance, articulation, and exploration. The cognitive apprenticeship model attempts to apply this approach to teach thinking and problem solving (Collins, 1996). For the field of composition, this approach can be used to teach writing and the metacognitive skills needed for successful writing. I provide examples of this approach in the following section.

**Writing and the Computer: Metacognition**

As computers have become standard educational tools, one kind of online learning environment that has developed is a MOO (Multi-user Domain, Object-Oriented). In his 1998 article, English discusses how MOOing, or using the online environment, can incorporate online and offline reflection into the writing process. The primary method used in this learning environment is synchronous online conferencing. In online conferencing, students take part in substantial written conversation about their writing with their teacher (as well as tutors and peers). In doing so, students engage in metacognitive discourse about their writing. Among other benefits, students can learn from the transcripts that are created during these online conversations. The students can print these transcripts, or logs, of their conversations and thus be prompted to remember what was said in the conversation so that they can reflect again upon the information—making the ideas mentioned in the conversation more concrete and beneficial in helping the student develop a new plan of action.

A second benefit of the online conferencing process occurs when students annotate the logs themselves. By re-engaging with the material through the logs, the students have another opportunity for reflection which, in turn, fosters new learning. Students write down what they found to be the most helpful advice given in the
conference, the least helpful advice, what they will incorporate in their revision, and so forth.

How does the cognitive apprenticeship model work within the MOO environment? The MOO environment is a new world created on the computer that allows for different forms of interaction. These written interactions are different representations of oral conversation that could exist in the traditional classroom. The MOO environment is a learning environment in which new methods of teaching can be used and different kinds of content addressed and assessed.

The teaching methods used in the cognitive apprenticeship model can also be used in the MOO environment. Coaching, modeling, and explaining are all done by the teacher (as well as writing tutors) in the MOO environment. The teacher provides coaching that usually entails observing the students as they try to complete their tasks and providing hints and help as needed. The coach, or teacher, tries to provide help at critical times—providing as much help as needed to accomplish the task.

The teacher uses the methods of modeling and explaining in the MOO environment as well. According to Collins (1991), modeling refers to “showing how a process unfolds” and explaining refers to “giving reasons why it [the process] happens that way” (Collins, 1991, p. 124). Modeling can represent the modeling of processes in the world or the modeling of expert performance. Computers, Collins says, can make the invisible visible. They can also make tacit, or implicit, knowledge explicit by showing the strategies that experts use to solve problems that students set for them (Collins, 1991, pp. 124-125).

Within the MOO environment, English (1998) says he attempts to act as a coach for the students by “raising issues in their writing that could use attention and allowing them to follow through with the reflective (and projective) writing” (English, 1998, Discussion of Annotated Logs, para. 2). He uses an example from an online conference with one of his students, Mindy. The student’s writing assignment is to persuade a person or specific group of people to adopt an action or belief. In his conference with Mindy, he asks her what she wants to accomplish with her letter (the writing form she’s decided to use). Mindy attempts to articulate in writing what she wants to accomplish in her letter, something she hadn’t yet articulated in her paper.
She describes how she’s writing to the editor of a magazine about an article they’ve printed to persuade the magazine and its readers that the article was not entirely correct. As a result of articulating what she wants to accomplish in her letter during her online conference, Mindy thus has a better understanding of the purpose behind her letter as she proceeds in writing it.

English also gives an example of his modeling and explaining methods: he refers to a conference he had with another student, Anne. He asks Anne to come up with some arguments to support her proposal in her paper and to develop arguments that would refute her audience’s possible counter-arguments. He offers Anne an example of an argument and a refutation, modeling the process. Afterward, he asks her to think up some arguments and refutations of her own. She is able to do so, creating more effective arguments. This process all took place online in written communication during which Anne was able to revise her arguments, receive instant feedback, and revise again accordingly (English, 1998, para. 2).

The primary teaching methods from Collins’ approach as they are relevant here, are those of reflection, articulation, and exploration. As described, reflection and articulation involve having students think about and give reasons for their choices, making their tacit knowledge more explicit. According to Collins (1991), besides making tacit knowledge explicit, articulation can also make students’ knowledge more easily available for other tasks, allow them to see how the same strategies can apply in different contexts, and give them insights into alternative perspectives (based on other students’ articulations). Exploration involves encouraging students to try out different strategies to observe their effects. Benefits of exploration are that students learn how to set achievable goals, how to form and test hypotheses, and how to make discoveries on their own (Collins, 1991, p. 135).

Students making discoveries on their own is what English (1998) refers to as the students experiencing moments of acquired insight. Referring again to his conference with Anne, he describes how they talked (wrote) about the structure of her paper. After she articulated how she planned to present her argument, English notes her reaction: “I think i [sic] am starting to see the light at the end of the tunnel” (English, 1998, Discussion of Annotated Logs, para. 4). He further describes how
she made an executive decision about her paper: “This kind of executive decision on the direction of a paper is what happens in the best writing conferences: the teacher offers some options, and the writer discovers the most effective direction for her paper and clings to it, establishing not only a clear plan for revision, but also the ultimate authority over the writing” (para. 4).

What the MOO environment essentially explores is the difference between speaking and writing, between oral and written communication and conversation. This—the connections between speaking and writing—is a research area being given greater attention. The process of transcription is, in fact, one way that researchers are studying the demands of writing and how they may be eased. For instance, research has shown that when one is speaking (into a tape recorder, articulating information to be written later), one doesn’t have to worry, for instance, about the grammatical aspects of written text. In other words, the more “superficial” aspects of written material don’t play a role. Studying the MOO logs can give researchers a way of looking at the differences between oral and written communication; one reason being that students in the MOO also, to a certain extent, don’t have to worry about grammar or other superficial aspects of writing.

The uniqueness of the MOO environment—why it is especially relevant here—is that it is an environment designed for promoting metacognitive awareness and teaching metacognitive strategies. Some may argue, based on the examples mentioned, that there is no difference between the feedback a teacher gives on the MOO and the feedback a teacher writes on a student’s paper. The difference, however, is that in the MOO students are forced to pay attention to this feedback. A teacher may write comments and advice on a student’s paper, but there is no guarantee that the student will read or pay any attention to those comments, much less reflect upon them. In other words, the act of the teacher simply providing feedback on a student’s paper does not necessarily lead to any metacognitive awareness on the part of the student, nor does any teaching of metacognitive strategies to the student necessarily take place. In the MOO, however, the teaching of metacognitive awareness and metacognitive strategies is of primary concern. One variable that increases the likelihood of teaching these metacognitive strategies on the MOO is
timing. On the MOO, students have (to some extent) more immediate access to their teachers and their feedback. There is less delay between when a student may get feedback about his/her draft and when the student and teacher may meet face-to-face to discuss it. It is for these reasons that MOOs are presented in this paper as an excellent example of metacognition and online applications for teaching writing (although MOOs are not a typical example of the use of computers in a classroom environment and may represent a limited view of the way computers are used in composition today).

It is also important to point out that within the MOO environment, affective responses to writing are also taken into consideration. First, the MOO environment, by consisting of written communication instead of oral, alleviates any anxiety that students might have about discussing their writing in a face-to-face conference. Second, it has been suggested that when writing in a MOO environment, the feeling that one is writing can disappear. By discussing while writing, students can address their writing in a more informal way and they can become more confident as they discuss their writing—realizing when they look back at their logs that they had a better understanding of the writing process than they realized. Finally, teachers and tutors provide students with positive feedback on their writing, making them feel more comfortable and confident about their writing. The affective components of the MOO environment are, thus, very important in that they help keep students engaged in the writing process.

However, MOOs are not the only online learning environment that promotes metacognitive awareness. Another online learning environment that does so is a Knowledge Forum. Like MOOs, Knowledge Forums promote metacognitive strategies and do so in an online world that centers on writing—its purposes and its demands.

**Writing and the Computer: Knowledge Building**

Another kind of online learning environment, a Knowledge Forum, originally known as a Computer Supported Intentional Learning Environment (CSILE), was primarily developed by Bereiter and Scardamalia. A Knowledge Forum (as it’s been
called since 1995) is a knowledge-building community in which individuals are
dedicated to sharing and advancing the knowledge of the group. Knowledge Forums
are multimedia databases that contain the ongoing research of a particular class or
topic. They provide a collaborative environment in which students can enter text and
notes about the topic under study. All participants in the database can read and
comment on each other’s notes and build on each other’s ideas. Important features of
Knowledge Forums are: (1) supporting educationally effective peer interactions, (2)
integrating different forms of discourse, (3) focusing students on common problems,
(4) promoting awareness of participants’ contributions, and (5) encouraging students
to build on each other’s work as a community (pp. 229-230). Knowledge Forums are
important because they create a context for cognitive growth.

Knowledge Forums developed out of research that Bereiter and Scardamalia
conducted in the late 1980s on intentional cognition and expertise. Intentional
learning refers to “cognitive processes that have learning as a goal rather than an
incidental outcome” (Bereiter and Scardamalia, 1989, p. 363). Whether intentional
learning occurs depends on both situational and intrinsic factors such as “what the
situation affords in goal-attainment opportunities and what the student’s mental
resources are for attaining those goals” (p. 363). Intentional cognition in writing
refers to the communicative goals of the writer. Students that encounter difficulty
with knowledge transformation are those who have problems with intentional
cognition, such as trouble in setting and achieving their writing goals.

Knowledge Forums are used to encourage active learning strategies and
promote students’ taking greater responsibility for the learning process. They
courage students to state their goals, what they anticipate they will learn, and what
they will do in the process of attaining these goals. Knowledge Forums also provide
different ways of representing knowledge. In doing so, they provide alternate ways
for students to connect new information to information they already know—altering
and enhancing their schemas in the process.

They also provide an environment of reflective thinking. Knowledge Forums
give students more time to think about, or reflect on, the material in written responses
than they would be able to do in an oral discussion in a classroom. Students also gain
more awareness of what they have learned or need to learn. If there is something they need to learn, students write an I Need to Understand (INTU) note. INTU notes are one of a set of “scaffolds” used in the Knowledge Forum.

Scaffolding is a technique in which learners use a specific set of prompts that direct them toward other cognitive operations which help improve their understanding. Scaffolding is a term originally associated with Lev Vygotsky and his theory of dialectical constructivism (published in 1978). According to Bruning et al. (1999), dialectical constructivism places the source of knowledge in the interactions between learners and their environments and is linked to the philosophical point of view of contextualism, which holds that thought and experience are inextricably intertwined with the context in which they occur (Bruning et al., 1999, pp. 216-217).

Vygotsky’s theory is based on the integration of internal and external aspects of learning and an emphasis on the social environment for learning. The most important concept in Vygotsky’s theory is the zone of proximal development. This can be defined as “the difference between the difficulty level of a problem a child can cope with independently and the level that can be accomplished with adult help” (Bruning et al., 1999, p. 218). In this zone, a child and an adult, or a novice and expert, work together to solve problems that the child, or novice, could not successfully solve alone (p. 218). According to Vygotsky, as child and adult interact, they share “cultural tools.” By doing so, cognitive change occurs as the “culturally mediated interaction” is internalized and becomes a new function of the individual (p. 218). In other words, “as children and adults interact, children are exposed to adults’ advanced systems of understanding, and change becomes possible” (p. 218).

Vygotsky’s theory is considered important because it emphasizes social influences on cognitive change. Because of these social influences, Bruning et al. (1999) state that “cognitive development, in Vygotsky’s view, is not simply a matter of individual change, but rather is the result of social interactions in cultural contexts” (p. 218). From Vygotsky’s view, the primary source of cognitive growth is seen as the social exchanges between individuals. Such social exchange can be found in Knowledge Forums.
Knowledge Forums provide students with access and opportunities to respond to what a number of other students have written, something not as easily accomplished in the traditional classroom. Also, every student contributes to the database, unlike class discussions where very often a few students will dominate. Because students are able to see so many other students’ writing, they are able to gain a better awareness of what is considered “good writing.” They then have examples from which they can model their own writing. In this respect, Knowledge Forums represent the cognitive apprenticeship approach whereby the students’ peers can act, if capable, as coaches and “models” to other students’ writing.

Some may argue that Knowledge Forums are no different from computer classrooms in this respect. However, while it is true that online classrooms can have discussions to which many students contribute, these discussions often stray into various tangents and do not remain focused on a single topic. Also, unlike Knowledge Forums, most online classrooms do not have such a specific structure set up for what kinds of comments should be posted and how students should then organize these comments. In contrast, Knowledge Forums provide a specific framework of categories into which students should organize their discussions. Forcing students to write material that matches these categories and then to organize this material in a meaningful way makes them reflect on the material and engage in metacognitive strategies.

Knowledge Forums also represent the cognitive apprenticeship approach in that they try to mimic real life. In this case, according to Scardamalia and Bereiter (1996), Knowledge Forums resemble real life in that they support a “publication process” similar to that of scholarly journals. Students produce notes of various types and frequently revise them. Then, when they think they have a note that makes a solid contribution to the knowledge base in some respect, they have the choice to mark it as a candidate for publication. They fill out a form describing what they feel the distinctive contribution of their note is, and then, after a review process, the note is identified as published (Scardamalia and Bereiter, 1996, p. 263).

Ultimately, Knowledge Forums strive to bring to students an awareness that knowledge can enable the acquisition of other knowledge and/or can lead to a
revision of other knowledge. It does this by using a problem-solving framework for approaching learning. In this framework, students identifying what they don’t know becomes an act of problem finding. By encouraging student awareness, using a problem-solving framework, and helping students recognize what they don’t know—Knowledge Forums create a path for intentional learning by incorporating the teaching of metacognitive strategies.
Chapter 6: Cognitive Psychology’s Contributions

Reviewing Cognitive Psychology’s Contributions

One of my main goals in this thesis was to show how cognitive psychology has helped members of the field of composition better understand the reading and writing process. Another goal was to show how cognitive psychology has enabled instructors to better understand how to teach both reading and writing. With an historical approach, I have reviewed some of the major theories and ideas that cognitive psychology has contributed to the study and teaching of composition.

This thesis began by arguing that cognitive psychology studies how people think. It is the study of how people attend to, perceive, learn, remember, and think about information. These basic processes that cognitive psychology addresses affect our everyday lives and can be applied to any subject or to any situation. However, I have focused in this thesis on how these processes are intimately connected to those of reading and writing. In fact, this thesis argues that because cognitive psychology addresses such fundamental activities, it is inherently important to the study of composition. No study of composition can be complete without addressing how mental processes influence the activities of reading and writing.

In Chapter 2, I describe some of cognitive psychology’s contributions to the study of reading. I explain how cognitive psychology brought to the field of composition the knowledge that readers play an active role in the reading process. I discuss how cognitive research is interested in addressing the problems readers encounter with texts that negatively affect their reading comprehension. I show how cognitive research, by studying what readers pay the most or least attention to in a text, as well as how readers perceive, learn, and remember information in a text, is able to identify problems readers have with a text as well as provide solutions to these
problems. Cognitive research has shown that understanding readers’ goals, expectations, and prior knowledge and experience with the subject matter of the text are important because they can influence how a text is designed to best promote reader comprehension. I describe, for instance, how people perceive information through their schemas and how, by activating readers’ schemas, writers can help readers pay attention to, learn, and remember information by guiding readers through the reading process. Cognitive research in the study of reading has provided composition with a number of text design guidelines writers can use to best enhance reader comprehension.

In Chapter 3, I describe some of cognitive psychology’s contributions to the study of writing and the writing process. Cognitive psychology’s main contribution, as asserted in this paper, is the adoption, by composition theorists, of its problem-solving process. By adopting cognitive psychology’s problem-solving process, compositionists created a whole new way of studying writing which, in turn, led to new ways of theorizing about writing and how best to teach it. In addition, cognitive psychology’s focus on studying differences between experts and novices directly carried over into the field of composition whereby researchers were able, by studying differences in the writing processes of novices and experts, to consequently determine what makes writers experts in their fields.

In Chapter 4, I address some of the concerns that social theorists have had about the cognitive approach. In the end, however, I show how composition theory, representative of the cognitive approach, has adapted and changed to accommodate these concerns. These changes, reflective of changes in the field of cognitive psychology itself, involve the development and inclusion of new theories—ones that allow a role for context. These theories show that cognition and context interact and that studying both cognitive and social aspects of writing are important.

That being said, one of cognitive psychology’s greatest contributions to the field of composition is its capability of providing universal theories. However, sometimes, because these theories seem to focus exclusively on general knowledge, they have been deemed by some researchers as less useful once people are considered experts in their fields. Nevertheless, cognitive psychology’s universal theories are
what helped create the view that writing was something that could be taught and understood. These general strategies, furthermore, have been shown not only to help make one an expert in one’s field, they also can lead to a transfer of skills to other contexts. The notion of transfer, the ability to generalize from performance in one specific context to performance in another context is, thus, one of the most significant reasons why cognitive psychology remains continually relevant to the field of composition.

In Chapter 5, I address how instructors can apply cognitive research and theories to their traditional or online classrooms. I describe how cognitive research has shown that reading and writing processes can be highly intertwined. I especially look at the role metacognition plays in all parts of the reading and writing process. Examples of online environments such as MOOs and Knowledge Forums are discussed to illustrate how cognitive theories of problem solving and the use and instruction of metacognitive strategies can be enhanced by online technologies.

And, as online learning environments become more and more the norm, and distance learning becomes more popular, how the individual thinks is going to become even more important as the learning context changes from a learner in a traditional classroom to a learner studying in a different and potentially isolated environment. As learners assume more responsibility for their learning, they are going to need to rely more heavily on successfully using metacognitive strategies at all stages of the reading and writing process. Consequently, I believe the study of these strategies by composition researchers is going to become even more important. While online learning environments such as MOOs and Knowledge Forums are successful examples of teaching metacognitive strategies, more online learning environments, especially those more commonly used in distance learning, are going to have to emphasize the importance, understanding, and teaching of metacognitive strategies.

Cognitive psychology not only studies how people think, it studies how the individual thinks. By focusing on the individual, cognitive psychology stresses how people bring their individual beliefs, their individual decisions, and their individual creativity to everything they do. For researchers to not study cognitive psychology or
for compositionists to not practice or teach it implies that the individual no longer makes a difference. To not study it would suggest that people are no more than products of their environments. As long as researchers continue to study it, and as long as compositionists continue to practice and teach it, the idea of the individual and how the individual thinks will continue to be important to the field of composition.

Cognitive psychology’s contributions to the field of composition are many. Ultimately, the goal of this thesis was to show how important these contributions are to compositionists and how they will continue to remain so because they bring an awareness, appreciation, and understanding of how the study of mental processes has and continues to benefit our understanding of reading, writing, and the teaching process. This thesis argues that such knowledge of cognitive psychology can be a powerful tool in helping composition students become experts in their field by making them more aware of their own learning as well as their own expectations and experiences they bring to their writing which guide them throughout the writing process. In terms of the teaching process, this means, for composition instructors, providing students with more opportunities to discover and understand their own learning process in the classroom. It also means providing students with opportunities to engage in different forms of writing—such as those presented in the MOOs and Knowledge Forums—to promote students’ reflective thinking and encourage their use of problem-solving methods.

For technical communicators, the contributions from cognitive psychology that have enhanced compositions’ understanding of reading and writing are especially important. Cognitive psychology provides general knowledge about, and strategies for, reading and writing that can be applicable to a variety of writing situations in a variety of writing domains. This is particularly important to technical communicators who are often called to write about a range of subjects in a variety of domains. It is uniquely applicable to technical communicators when they are engaged in designing texts that are intended to be read by a broad audience. Ultimately, research from the cognitive approach will always be relevant to technical communicators because
technical communicators, in any situation, are focused on designing texts that are easily comprehensible to their readers and which meet their readers’ goals.

Cognitive psychology provides a framework from which to view the field of composition. While other disciplines might build upon the guidelines and theories developed from cognitive psychology, cognitive psychology will remain a foundation upon which the fields of composition and technical communication are built. Consequently, as I suggest in this thesis, having a greater knowledge of cognitive psychology can benefit composition and technical communication students. It can provide them with knowledge about the way people think, read, learn, and solve problems. I would like to suggest further avenues of study that might be developed as a result of my thesis. These might include opening a dialogue between university English and Psychology departments where ideas could be shared or doing studies on whether composition students, after learning about cognitive psychology, experience changes in their writing process.

This thesis asserts that cognitive psychology can provide composition teachers and students with a solid foundation from which to build. Composition students, including MTSC students, are already being exposed to cognitive psychological ideas in their classrooms, only perhaps without realizing it. However, greater understanding of these ideas—the research and the reasoning behind them—can help both teachers and students gain a deeper, clearer understanding of what they are teaching and learning in their classrooms. I assert that more discussion of cognitive psychology in the composition classroom is needed. Perhaps technical communicators would benefit from taking a class in cognitive psychology itself to enhance and better understand their writing skills and the principles toward persuasive writing in technical documents. Until then, this thesis provides some of the knowledge and tools that composition students and teachers can use to help them on their way.
References


Appendix A: Flower-Hayes Model of the Writing Process

Appendix B: Hayes New Writing Model