Learning limitations of the on-line composition process

Kelly Rose Wavering

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LEARNING LIMITATIONS OF THE ON-LINE COMPOSITION PROCESS

A Thesis
Presented to the
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Master of Arts
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by
Kelly Rose Wavering

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ABSTRACT

There are many changes that occur in the composition process when computers are used. Research has shown that the composition process is altered in various ways when this tool is introduced and that these alterations do not always benefit the writer. The changes are both physical and mental. It is important that composition teachers understand the subtle differences that occur in the composition process when working on-line. This understanding will help instructors to adjust teaching strategies and suggest methods designed to overcome the inherent limitations of this writing tool.
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CHAPTER I

INTRODUCTION TO THE ON-LINE COMPOSITION PROCESS

In today's college composition classes, teachers often ask students to compose on a computer. This writing tool is rapidly being integrated into most educational institutions and is often thought to be the latest in a series of technological improvements designed to revolutionize the modern writing environment. Despite the growing use of computers in various writing environments, the controversy of how computers help writers write still exists.

Inquiry into the relationship between the computer and the composing process forms a presently evolving but solid research base. In an effort to validate the use of computers in the writing environment, the ongoing research seeks identification of those positive elements that are specific to composing on computers. However, closer examination of this research reveals a pattern defining several difficulties in the computer-based composing process, many of which are directly attributable to the actual tool itself.

Some of the problems writers encounter while using a computer relate to the way in which the text is perceived spatially. According to Cynthia L. Selfe, the computer lacks spatial-contextual clues (those elements which enable readers to locate themselves within the text), and this...
creates new reading-comprehension problems ("Redefining
Literacy" 7). Christina Haas's research reveals that
writers frequently experience difficulty orienting
themselves to the text on screen; they continually lose
their sense of location within the text because of its
transitory state (26). Other problem areas recognized by
Haas include formatting, proofreading or revising,
reorganizing, and critical reading (20). In addition to
overcoming these limitations, writers must also learn a new
(and for some, a very intimidating) set of rules governing
the use of various software packages.

Charles D. Holley and Donald F. Dansereau postulate
that effective learning strategies encourage users to engage
in activities and create structures that are similar to the
operating characteristics of the human memory (4). Harold
F. O'Neil, Jr. further defines learning strategies as a set
of processes that can be used "to facilitate the
acquisition, storage, and/or use of information" (xiv).
Since the spatial-contextual representation of on-screen
text appears to limit the comprehension of some writers,
perhaps a better understanding of the learning process that
occurs during on-line composition will identify strategies
to overcome these problem areas.

Teachers who use computers in their composition
classrooms need to be aware of both the limitations of the
computer and the learning theories that address those
limitations. For it is only after confronting those limitations that the presence of this tool in any writing program can be truly justified.
CHAPTER II

A COMPREHENSIVE LOOK AT THE STRENGTHS AND LIMITATIONS

In order to investigate the learning limitations of writing with a computer, it first becomes necessary to understand the many directions that research in this specialized composition field has followed. By examining this path, the research can be evaluated from several different perspectives including both pros and cons. The research can then be analyzed in the specific context of those on-line learning limitations that occur during the composition process.

The computer-based composition process has been researched ever since the introduction of computers into the writing environment. Unfortunately, however, the first investigations resulted in nothing more than those same findings that Stephen M. North claimed formed the basis of the composition research of the early 1980's: "an accumulated knowledge of a relatively impressive size, but one that lacks any clear coherence or methodological integrity" (3).

Research in writing, the parent field to computers and composition, has changed dramatically over the years and computer-composition researchers have learned important lessons from those changes. Today, in the field of writing,
the questions being asked have become broader than those in the past; the focus has gone from the actual writing product to the individual's writing process, and then one step further, to the study of individual writing processes within certain groups and social contexts. Andrea Herrmann further defines the change as that of one from "quantitative, experimental research designs, intended to measure how texts improved, to qualitative, descriptive research designs, whose purpose was to observe writers at work" (126). And in the same manner that the composition field has embraced broader standards for its own community, so too has the computer-composition field. As a result of this broadening of standards and the resulting larger scope, recent research into the writing process is more revealing than that of the past. The emerging knowledge base has continued to provided a more mature and perhaps more balanced view of the computer's role in today's writing environments. No longer are computer-composition researchers only contrasting before-and-after texts to discover the changes that occurred in writing as the result of using a computer. The emphasis of current research no longer focuses on just the writing product. Now, the questions being asked are related to the cognitive development and the composition process of the individual writer.

The findings from researchers compiling this growing knowledge base can be categorized into several topic areas.
These findings represent both the strengths and limitations of composing on a computer. Often, the very same finding that was thought to be a benefit can prove to be a handicap under different circumstances or in different environments. I will, therefore, address both the respective strengths and limitations of the relevant research findings. I have organized the research in the following categories: Invention, Prewriting, and Drafting; Revision, Editing, and Formatting; Collaboration; and A New Literacy.

**Invention, Prewriting, and Drafting**

For this section, I have combined the terms invention, prewriting, and drafting even though the terms all have different connotations and meanings. All three functions represent a subprocess that is typically performed at the beginning of the writing process to generate ideas, organize thoughts, and generally get writers on the writing track. These three subprocesses also occur intermittently throughout the writing process during almost every phase. The tendency of a writer to engage or to not engage these three subprocesses is prevalent during the entire composition process. Therefore, for simplicity's sake, I am only addressing the subprocesses as related to the beginning phase of the composition process.

Today, writers who use a computer to compose have the option of utilizing a wide variety of invention and
prewriting software programs. (Drafting programs, as discussed below, are less commonly used.) Most of the invention and prewriting programs on the market today are designed to raise rhetorically significant questions, to stimulate original thought, to help students develop workable outlines, and to anticipate problem areas in their writing. When the ease of revision is taken into consideration, it would seem logical that writers would be willing to experiment with many different strategies while still in the early developmental stages of their work. However, as Anna Liechty's research suggests, computer writers do not spend more time and effort during the beginning stages of the writing process than their pen-and-paper counterparts (43). As a matter of fact, Liechty's research concludes just the opposite: "planning or invention--the first step in generating material for writing--was unanimously found to occur less frequently in writing done at the computer" (43). Perhaps the very knowledge of the ease of revision and editing on a computer inadvertently causes writers not to spend the additional time up front. With the use of a computer, writers know they can readily return to their prose and through careful revision and editing fix many of the problems that resulted from a lack of prewriting or invention. However, what writers who follow this line of reasoning fail to realize is that they are actually using a drafting technique. Their
whole first attempt at a paper merely becomes a first rough draft. Whether more or less time is actually expended by the writer who diligently uses invention, prewriting, and drafting at the outset of the composition process as opposed to the writer who does not consciously use these subprocesses at all and later spends time revising and editing after the fact remains unknown.

The beginning stage of writing is often the hardest part for many writers, beginner and experienced alike. And often it is this very stage that is not emphasized in classrooms. According to Michael Spitzer, "many teachers seem to leave students to their own devices when it comes to prewriting" ("Incorporating Prewriting" 205). There are many software packages available that are designed to stimulate the writer at this stage of the composition process. However, it is wise to remember that the programs cannot and do not become a substitute for creativity. Programming invention strategies without the use of artificial intelligence remains limited. These types of programs can still be used beneficially in many circumstances. For example, they can provide an excellent vehicle to jump start a stalled writer. The software programs are generally designed to ask a series of open-ended questions with no right or wrong answers. "The programs try to build on what students already know, and they try to stimulate students to see the relationships
among those thoughts" (Spitzer, "Incorporating Prewriting" 206). In addition to being able to help writers begin composing, an invention software program has other advantages. Spitzer claims that the program's analysis, which is neither a source of knowledge nor an authority figure, can put those students who are intimidated by their teachers at ease ("Incorporating Prewriting" 209). However, writers using these types of programs must always understand that it is the writer who remains in control. It is the writer who is providing the input and doing the thinking. If these types of programs are not carefully used by writers, then they cannot expect to gain the benefit these programs could provide. When used hastily without regard for quality, these programs become nothing more than a waste of valuable time and effort.

Another useful heuristic tool for this stage of the writing process involves drawing the spatial relationships between various topics and subtopics. Drafting strategies, such as mapping and treeing, could be considered to fall into this category. Unfortunately, as Lillian Bridwell states in "The Writing Process and the Writing Machine: Current Research on Word Processors Relevant to the Teaching of Composition," these strategies have not been transferred to many computer programs (385). Bridwell summarizes that perhaps these spatial heuristic strategies are not as prevalent because they require a computer with graphics
capabilities to depict the lines and arrows that commonly define the relationships (385). This limited availability of quality drafting programs is unfortunate because the visualization of spatial relationships can help to better define and illuminate a topic for many writers.

Revision, Editing, and Formatting

Although each function is distinctly different, revision, editing, and formatting are being combined in this section. All three of these functions describe methods that writers use to change their text. For the purpose of this section, revision will be defined as those "semantic and rhetorical changes that affect the content and organization of a piece of discourse" (Liechty 11) and editing will be defined as "the process of making surface changes in the rewriting of a composition" (Liechty 9). Formatting will be defined as the manipulations of the completed text that are necessary in order to achieve a standard prescribed format.

Research has shown that word processing programs aid the revision and editing processes by making it physically and psychologically easier to enter text. The rationale for the simplicity of this method is that the word processor allows for increased speed and ease in adding, deleting, changing, and moving text. Perhaps the speed and ease in which text can be manipulated on a computer enables writers to utilize less short-term memory on the mechanical
processes of writing and revision and more short-term memory on the actual knowledge and logic behind the manipulation of that same text.

Jean A. Lutz's research, "A Study of Professional and Experienced Writers Revising and Editing at the Computer and with Pen and Paper," confirms that writers do make more changes to their text when working on a computer; however, these changes are made on smaller units than when writers revise with pen and paper (407). Lutz postulates that the small portion of emerging text visible on the computer screen possibly limits the area of text that the writer can revise and edit (419). Writers do not seem to have the capability or the memory capacity to make changes to areas which they cannot view. The computer screen only allows the user to concentrate visually on a very small section of text which is defined and limited by the screen's capacity. In order to view other areas of a text, the computer user must use a 'scroll' or 'go to' function key to move around the text. In order to engage in extensive revision, writers continually scroll backwards and forwards, attempting to rearrange the text in a more suitable manner. The writer must remember the logical path that was taken during this revision process, as this will ensure that the actual revisions, themselves, do not become secondary to the location of the text. Writers who have to continually scroll their text, page by page, seeking a particular
paragraph may very well forget why they needed that paragraph in the first place.

The use of editing programs and spell checkers is still a highly controversial topic. Just as prewriting-heuristic programs cannot act as a substitute for creativity, these programs should not become substitutes for knowledge. Instead, editing and spell-checking programs are helpful because they alert writers to areas of the text which need to be re-examined. The users of such tools should realize, as David Dobrin states in "A Limitation on the Use of Computers in Composition," that "computers can respond only to the form of a text, not to its meaning" (40). Writers should continue to be sensitive to the fact that the benefits derived from using these types of programs are limited. Writers who use these programs should continue to let the rhetorical purpose be the guide in their writing. The suggestions, questions, and/or error messages of these editing and spell-checking programs should be considered within the context of the rhetorical purpose of the paper. When such programs are used carelessly, or without any reference to the rhetorical purpose of the paper, the writing could actually be changed for the worse. Writers using these programs need to consider the programmed prompts within the context of their specific writing task in order to take maximum advantage of the programs.

One area that actually requires more time and effort in
the computer-based composition process, as opposed to the relatively small amount of time spent in the traditional pen-and-pencil composition process, is formatting. Formatting problems on the computer are common to both novice and expert users alike. During their study on the collaborative effects of computers, Cynthia Selfe and Billie J. Wahlstrom noted that many of the most frequently asked questions were those about the computer software and hardware (9). Teachers who teach composition on a computer should realize that learning the various idiosyncrasies of a software program takes much time and effort. Oftentimes, figuring out the proper formatting codes can take as long as revising the actual text. For some writers, the real work begins once the text is completed. In addition, some student writers may experience immense pressure when trying to learn the composition process as well as a particular software program. If more effort is expended in learning the mechanics of the tool, then the writing will suffer as a result. Guidance should be readily available and easily understood so that students can concentrate their efforts on the process of composing versus the techniques of formatting.

Collaboration

The process method of teaching composition fosters collaboration between both students and their teachers and
students and their peers. Collaboration encourages and facilitates the valuable exchange of information between readers and writers. When working with a computer, collaboration can be easily facilitated. Students in a computerized composition class can interact with other students and teachers by working in small, collaborative groups or through computerized networks.

When composing on a computer, writing becomes more public than is the case with the traditional pen-and-paper method, because it is easily viewed on the monitor by others (Liechty 48). In addition, the printed text is in a familiar format and type, one that is uniform to all readers. Consequently, the printed text becomes mutually accessible to all, and conversations about the writing versus the legibility of the writing can easily occur. Readers no longer have to struggle with penmanship problems; they can fully concentrate on the work itself. On the other hand, this lack of privacy and individuality could discourage some writers from performing certain types of writing such as personal writing or experimental drafts.

There are two reasons why a public writing forum may be detrimental rather than helpful. First of all, student writers may not be comfortable enough to reveal publicly their emerging texts. They may not yet have the confidence in their ability to craft a written piece. The public forum may add immense pressure which could inhibit or block all
writing skills. Secondly, student writers may not be as open to certain topics if the writing is public. Writing is not just grammar and style; it is also a growing and learning experience. Writing is a tool with which writers can explore thoughts and follow the paths of their minds. Students need to be encouraged to explore their inner thoughts and feelings, and they need to be given an environment which is conducive to this philosophy. As a result of this public forum in the writing labs and classes, computer users have quickly started "developing a set of social 'rules' that will serve to protect the author's right to keep screen copy private until it is in a form that he or she is willing to release" (Selfe and Wahlstrom 16).

David Dickinson's study of first and second graders found that "collaborative writing sessions included considerable talk conducive to planning, self-monitoring and responding to what was being written" (357). The collaborative environment (students clustered around a terminal) fostered talk about the writing. Under these circumstances, collaboration turns the writing into a group effort, one of which all of the students can be equally proud. When comments are made or questions are asked, they are not likely to be taken as personal attacks as the writing does not really belong to any one person. In addition, Dickinson's research states that collaboration was more frequent at the computer (358). This collaboration
increased students' awareness of ambiguous information in their writing, as they had to "analyze it sufficiently to cast it into words" (Dickinson 359). Selfe and Wahlstrom concluded, after studying 11 teachers and 16 students at a midwestern university, that computers not only encouraged but actually intensified collaborative writing efforts (1).

Networking is another method of computer-based, collaborative writing that allows students and teachers to communicate while writing. A network is a series of computers that are linked together and that have the capacity to communicate from terminal to terminal. "Combining this interactive ability with the display ability of the video network produces the tools for true collaborative writing. Now writing can serve as a means of communication" (Batson 250). Teachers working with a network can participate in their students' writing processes, by providing immediate solutions to problems encountered with the developing composition. Students can also participate in prewriting exercises together via a network. "Because they can change the social dynamics of a classroom and also provide student writers with a genuine and uncontrived audience, networks have the potential to transform student writing from listless academic drudgery into writing that is purposeful and reader-based" (Spitzer, "Local and Global" 59).

Other researchers, however, caution that increased
collaboration does not automatically occur when students write on a networked computer. Hawisher and Selfe postulate that students who know they are being observed by an instructor via a network will "self-discipline themselves and their prose in ways they consider socially and educationally appropriate" (63). In essence, this could actually inhibit the composing process and prevent students from developing personal and meaningful prose.

Computers may also serve to isolate students from the classroom and the instructor. Students attending a composition course in a computer lab will perform a majority of their writing tasks during the class. This leaves little time for intense instruction in the writing process. As a result of this arrangement, the computer lab or classroom environment could possibly pre-empt valuable exchanges between teachers and students. So, far from creating an environment conducive to collaborative learning, the computer may actually encourage a less collaborative writing environment than the traditional classroom.

A New Literacy

Cynthia Selfe defines literacy as an act that "involves both reading and writing, and concerns the ways in which human beings make meaning from printed texts by interpreting content in light of their own purposes and needs" ("Redefining Literacy" 4). Traditional printed texts (those
produced with paper and pen) have certain known formats and characteristics, such as: pages produced and read from left to right and concurrently from top to bottom, titles listed before the text, indented paragraphs, etc. Computerized texts follow the same format rules; however, in addition to knowing these traditional forms, computer writers must also assimilate the characteristics related to the computer and the various software packages utilized in order to achieve these standard forms. To successfully master the writing process using a computer, writers need to know how to perform keyboarding, word processing, and printing. This requirement for multi-layered literacy skills is intimidating for some writers and could potentially block development of the composition process.

"Literacy historian Harvey Graff has demonstrated that in Western culture literacy encompasses a constellation of values and beliefs far beyond what might be attributed to the mechanical ability to read and write" (Edwards 1). Graff's definition of literacy, which is more encompassing and more socially oriented than Selfe's, addresses the value system of a culture. If the characteristics that constitute literacy, as defined by Selfe, change to those of a multi-layered form, then literacy, as defined by Graff, must change also. Societal values will coincide with the new form of multi-layered literacy, and as a result of this conceptual change of literacy, a new form of illiteracy will
emerge. With the increasing integration of the computer into today's society, a new concept of literacy is being created, and, at the same time, so too is a new class of illiterates.

The question that remains is both political and ethical. According to Helen J. Schwartz, "the major responsibility for equal access to an educational resource lies with the society providing education" (29). However, in educational institutions today, there is not even a consensus as to who should teach keyboarding skills and at what grade levels. Society is not equal on many levels, including socially and economically. Even different school districts across the country do not operate with the same budgetary constraints. Some campuses may have large computing centers with the latest software programs while others may have nothing available for the students to use. Students are individuals, and as individuals they have different likes and dislikes. They also have different skill levels, including keyboarding skills. Computer keyboarding skills can be honed to a high degree of competency with much practice, but writers in certain socioeconomic classes may not have access to a computer with which to practice. "Persons from higher income backgrounds are far more likely to have access, either through schools, jobs or homes" (Harvey 55).

In an effort to eliminate the skill gap between users
and nonusers, current software manufacturers are attempting to create user-friendly programs which will not appear intimidating to those with little or no computer experience. However, since these programs are not available to all, there is still have much disparity among users and potential users. These inequalities further widen the gap between computer-skill levels and are just one area of concern that must be recognized and continuously analyzed by computer-based composition teachers.

On the one hand, computer skills are viewed as a valuable acquisition, one that could enable students to compete in the technological world. Therefore, teachers encouraging students to write on computers are performing essential duties. On the other hand, until computers are as common as pen and paper, how can teachers introduce this tool to students who are indeed afraid of the technology without setting them up to fail? How can educational institutions and society avoid labeling students with the stigma of being computer illiterate just because they do not come from affluent neighborhoods and school districts?

It should be obvious that the computer can indeed be used very successfully as a writing tool. However, teachers must remember that the computer is just that—a tool. And in order for students to be able to successfully incorporate the computer into their own writing process, teachers must develop strategies aimed at teaching students how to reap
the benefits while overcoming the limitations. The computer is not a panacea for the writing teacher or the student and if used improperly (without regard to the limitations) it could possibly prevent good teaching, enhance rigid authority structures, and block student writers.
CHAPTER III

THE WRITING PROCESS AND THE COMPUTER

Although the writing process varies with every individual, several phases and key elements have been defined that are present in all writers' composition processes. Writers may vary when and how they use these elements according to the writing environment and the rhetorical situation, but the same key elements are always present. Through the years, researchers have developed models for the writing process which illustrate the relationships between these key elements. Although the composition process has been defined from different perspectives and with different models, a recurrent theme emerges when the many models are viewed as a whole. It is this theme that depicts what I have termed the common writing process. When computers are introduced into the writing environment, writers adapt their composition processes in different ways; some writers may alter their process consciously while others do so with a lack of conscious awareness. However, just as a common writing process exists, so too does a common adaptation to this process. Through careful study of writers composing on computers, similar patterns emerge depicting this adaptation. It is the knowledge of this adaptation that will empower teachers to help students compose with
computers.

Since research about the writing process has reached the level of cognitive processing, this is where I will begin to search for those pertinent differences and similarities between the writing process and the common adaptation that occurs when computers are introduced into the equation. Also, since computer-composition research has repeatedly addressed the problems of reading text on screen, a look at current reading theories and spatial-learning theories may provide valuable insight into how the writing process is changed when computers are used.

The Common Writing Process

Before searching for and understanding how this common writing process is altered when computers are utilized, it is necessary to first understand the writing process itself. Composition researchers, over the past two decades, have developed many workable and detailed models depicting the writing process.

In an effort to define the common writing process, I shall use two models: the model developed by Flower and Hayes in their landmark essay "A Cognitive Process Theory of Writing," and the description of the composition process as stated by Donald M. Murray in his essay "Writing as Process: How Writing Finds Its Own Meaning." Although these are not the only models available, a combination of these two
different approaches provides an accurate representation of the common writing process. Flower and Hayes's model of the composition process, which has been used as a basis for other researchers to build upon, clearly and concisely depicts the composition process. It becomes readily apparent, when looking at Flower and Hayes's model and Donald Murray's descriptions that Murray's definitions are somewhat analogous to the writing process model as defined by Flower and Hayes. Both models contain excellent descriptions of the writing process. When combined, the two descriptions allow for a cohesive and comprehensive depiction of a common writing process.

In their model, Flower and Hayes set the writing process in the context of both the task environment and the writer's long-term memory; the writing process contains three elements: planning, translating, and reviewing (369). Several of these elements also contain lower sub-goals or subprocesses, all of which could occur at any time during the writing process. Murray, on the other hand, defines his process in terms of discovery, "of using written language to find out what we have to say" (20).

The planning element of Flower and Hayes's model involves a number of subprocesses; such as generating ideas, organization, and goal-setting (372). According to Flower and Hayes's theory of the writing process, "the act of composing itself is a goal-directed thinking process, guided
by the writer's own growing network of goals" (366). This planning phase is similar to that first termed rehearsing by Donald Graves and later defined by Donald Murray as the "stage of the writing process where the writer in the mind and on the page prepares himself or herself for writing before knowing for sure that there will be writing" (4).

This stage is apparent in many different guises. Writers talking about an idea, mapping out a strategy, or just daydreaming about a topic are engaged in the planning or preparatory stage of the writing process.

The middle phase, or the translating element, of Flower and Hayes's model involves "putting ideas into visible language" (373). It is this process of translating that requires the writer to put words into the various conventional formats. Ideally, the format will be of secondary concern to the writer at this stage in the composition process. However, if the formats to be used are not familiar to the writer they may consume the writer's concentration. For example, some writers may concentrate solely on the format (i.e., Did I write a proper sentence?) and as a result pay little attention to the other phases of the writing process such as planning and reviewing. Donald Murray calls this central stage "drafting," and he defines the stage as being "the process of writing finding its own meaning . . . when the writing physically removes itself from the writer . . . it can be examined as something which
may eventually stand on its own before a reader" (5). Writers drafting their text, writing an introductory paragraph, or outlining an essay are working in the central stage of the writing process.

The last phase or the reviewing element of Flower and Hayes's model is further broken down into the subprocesses of evaluating and revising. These subprocesses "along with generating, share the special distinction of being able to interrupt any other process and occur at any time in the act of writing" (374). Writers are continually reviewing, over and over again, both the thoughts in their minds and the words on their papers. Donald Murray terms this last phase of the composition process "revision," and he defines it as that stage when "the writing stands apart from the writer, and the writer interacts with it, first to find out what the writing has to say, and then to help the writing say it clearly and gracefully" (5). Murray further notes that the revision phase of an unpublished work quickly becomes "the most significant kind of rehearsal for the next draft," and thus the recursive process continues (5). Revision, editing, and proofreading are considered parts of this last stage.

One other common element that permeates much of the research on writing is the recursiveness of the process. In previous years, the writing process was understood and consequently depicted and explained in a linear fashion.
Just as writers continually embed thoughts, in the form of phrases, into sentences, so too does the writing process contain a similar embedding task. Writers continually interrupt their current process to embed another larger or smaller subprocess. For example, when writing an introductory paragraph for a persuasive essay, writers may stop writing, re-read what they have written and rethink the rhetorical situation (Who is my audience? What side am I planning to take? What are the conventions for a persuasive essay?). This embedding process may or may not change the direction of the introductory paragraph the writer has started. A similar pattern continues as writers compose; they are always embedding different phases or subprocesses into the process currently being activated. Writing is recognized as a recursive process because of the continuous and repetitive embedding actions that that place. Sondra Perl, who aptly defined this recursiveness in 1979, states that

composing does not occur in a straight-forward, linear fashion. The process is one of accumulating discrete words or phrases down on the paper and then working from these bits to reflect upon, structure, and then further develop what one means to say. It can be thought of as a kind of 'retrospective structuring'; movement forward occurs only after one has reached back, which in turn occurs only after one has some sense of where one wants to go (qtd. in Murray 7).

**The Physical Differences**

With an understanding of the phases and key elements of
the common writing process, we can move to an investigation of those changes that occur when the computer is introduced into the writing environment. There are several obvious differences that should be taken into consideration when composing on a computer. For example, the actual writing tool itself is very different. When composing with a pen and paper, the writer holds a pen or pencil in one hand and makes contact with the paper, forming the letters and words that will eventually be the basis for sentences, paragraphs, and completed works immediately below his or her fingers. The writer who composes on a computer places his or her hands on a keyboard. The words do not form under this touch; instead, they pop up on a screen several inches away from the writer's hands. There is a tactile difference when composing on a computer, and this different sense of touch could perhaps even alter the writer's sense of distance.

Does this distance impact the writing process?

The impact that distance has on the writing process can be answered from two different perspectives: physical and mental. The physical effects of writing on a computer have been studied extensively for several years and appear more easily noted than the mental effects. Of course, both may vary from person to person, just as the actual composition process varies among individuals.

In order to use most computers, writers must possess certain physical capabilities such as a normal range of
motion among their fingers. (I am not addressing the special concerns of the handicapped writer in this thesis.) Writers also require certain characteristics from a computer system such as a visible screen and a keyboard laid out in a conventional format.

Extensive use of the computer has some inherent negative impacts on the physical well-being of the user. It has been well documented in medical journals that the constant typing motion could possibly aggravate carpal symptoms in some writers. This arthritis-like condition of the wrist and hand joints occurs after many long and extensive keyboarding sessions. Another physical characteristic of the computer that may impact writers is the glare from many ordinary computer screens. This glare can cause severe eyestrain and headaches, both of which can be temporarily debilitating to the writer and thus prevent the composition process from progressing.

However, people who spend a lot of time composing on a computer can take preventive steps to stop or alleviate these detrimental physical effects. Writers can take frequent, short breaks to rest both their hands and eyes. They can also adjust the distance and intensity of the screen so that it is not a strain to read. Some may even prefer to wear special glasses, designed particularly for computer users, to eliminate or reduce the glare and the resulting eyestrain associated with working on a computer.
Even special hand braces are now available and can be worn to support weak hand muscles and relieve tension from the joints. Every writer who works on a computer will eventually discover his or her own physical limitations and then experiment to find out what will alleviate or, better yet, prevent any negative physical symptoms totally.

One other important difference between composing on a computer and composing with pen and paper is the obvious necessity of keyboarding skills to operate a computer effectively. A lack of keyboarding skills can be a very real physical and mental handicap. The writer who composes on a computer will be more successful with adequate skills in this area. When writers do not have any keyboarding skills, the normal cognitive processes of planning and translating can be subordinated as the writer concentrates solely on gaining some semblance of control over the writing tool. Fortunately, keyboarding skills become better with practice, and the writer who in the beginning struggled with the keyboard will eventually not have to sacrifice other important writing processes. The potential physical limitations of composing on a computer are easily recognizable and can usually be overcome through simple preventive measures.

The Mental Differences

On the other hand, the cognitive differences that
result from the increased spatial distance when writers compose on a computer are not as easily discernible nor are they as easily compensated for. Similar questions have emerged in other fields of knowledge as technology produces machines capable of making tasks easier. Mathematicians questioned whether students would become dependent on the calculator and, as a result of this dependency, forget how to perform basic mathematical functions such as multiplication and division. Students are still taught basic mathematical functions without the aid of a calculator. However, once the functions are mastered, students are usually allowed to use a calculator. Do their skills become rusty? Do they become dependent on the technological tools of their trade? Those same questions arise when the emerging technology of the composition field is taken into consideration. And although there are some very obvious benefits to composing on a computer, we still need to ask the question: how does composing on a computer really impact a writer's cognitive processes?

A look at spatial-learning theories may reveal some of the changes or difficulties this technological advance has actually presented. "The basic premise [of spatial-learning strategies] is that learning and processing strategies will be more effective and efficient, if they encourage students to perform activities and create structures that are congruent with memory system operations" (Holley and
Dansereau 4).

In order to successfully apply spatial-learning strategies in the context of writing on a computer, it is necessary to merge the concepts of spatial theory with the aforementioned models of composition. Then we can begin to compare how the writer uses both writing tools, the computer versus the traditional pen and paper, in relation to what cognitive processes are followed during the applicable writing phases. And although the composition process is discussed in an unnaturally linear fashion, beginning with the first phase, we must not forget that one very important element of the process, itself, is its recursiveness. Therefore, even though the writing process is discussed linearly, in a phase by phase manner, many of the subprocesses can and do embed themselves into all of the phases. This embedding process, which occurs continually and in no particular pattern, is what makes the writing process recursive.

As a starting point we will begin with the planning phase described by Flower and Hayes and the rehearsing phase described by Donald Murray. From this point, we can begin to compare how writers utilize the different composition tools. As discussed in Chapter One, research suggests that writers composing on a computer do not spend more time than their pen-and-paper counterparts on planning and rehearsing their work. There are computer programs designed
specifically for this phase of the writing process; however, students composing on a computer are still not spending as much time during this phase of the writing process. Much of what happens in the minds of many writers during this stage is analysis and examination. Writers are toying with a topic or a task, turning it around in their minds. This introspective analysis helps writers formulate a strategy, whether conscious or not. The analysis would include among other things, an examination of the task, reference to other similar tasks, knowledge of the topic, and perhaps a plan of attack. Much of this analysis is done internally, although many writers use heuristic tools to help clarify the task and/or topic. Those writers working in a pen-and-paper mode may jot down ideas or key points, make a listing, answer questions, or just freewrite. Writers working on a computer may also do all of those same things. In addition, writers working with a computer may have access to prewriting programs. Depending on how writers save their work, it may or may not be available for later analysis. Also, depending on the type of computer and software being used, many writers may or may not be able to graph or adequately portray on screen what they could easily do on paper.

At this stage in the composition process, writers may need to have an intimate relationship with their work. The use of pen and paper during this phase may simulate that necessary intimacy and thus stimulate the cognitive
processes. This is the phase where many alternatives are examined and that small idea just beginning to formulate may become the thesis of the entire paper. At this point in the development, it may be important to writers psychologically, to be able to touch their words and ideas as they form and become molded into a finished product. This intimacy may help focus the writer on the task at hand.

During the beginning phase, writers can successfully use many of the software programs available. Teachers should introduce a variety of these programs, so that students may experiment and chose the ones that work best for them. Other writing students may prefer to use hard copy during this phase of the writing process. If students prefers to graphically portray the relationships of their topics, it may be easiest to draw these with a pen and paper. Teachers should re-enforce the notion that students using the computer should not bypass this stage of the writing process entirely. Students should always be encouraged to actively pursue their thoughts and the relationships of their topics prior to writing, whether they chose to use a computer or not.

The next step in the composition process is the translating phase (Flower and Hayes) or the drafting phase (Donald Murray). It is during this phase that the writer begins to put the topic down on paper. The obvious benefit of using a computer during this stage is the ease and speed
with which the paper can be formulated. Writers using a computer can attempt to put in writing what their mind is formulating very quickly. Meanwhile, their pen-and-paper counterparts are struggling to get in writing all of the thoughts dashing about their heads. This scenario assumes that the writer using the computer is proficient at keyboarding and familiar with the programs being used. If this assumption is not true, then the writer could easily sabotage the whole process and pay attention to little else except the format and the computer program.

A distinct disadvantage of using the computer during this phase is the loss of the cognitive markings. When writers determines mid-sentence that the words are not right, they can easily backspace over the offending words and begin again. In comparison, writers working in the traditional pen-and-paper mode will usually line out the offending words. The consequence is that the writer composing on a computer cannot easily go back and recreate the same sentence, if at later time it is deemed necessary, while the writer working in the pen-and-paper mode can easily trace the cognitive pattern that led him/her to cross out the words in the first place and re-examine the use of the sentence. The writer using a computer loses the change and the logic behind it forever.

Ironically, it is also during this phase that the computer appears to benefit students the most. The ease
with which students can prepare their writing is multiplied many times when using a computer. Prose can be generated and put down quickly, thus encouraging students to spend their remaining time and effort revising and editing.

During the reviewing phase (Flower and Hayes) or the revision phase (Donald Murray) writers working on a computer again lose the cognitive paths that logically define why changes were made in their writing. This loss can be very detrimental when the recursive nature of writing is taken into consideration. Writers may need to have access to their previous thoughts as their texts evolve into finished products. Oftentimes, writers will distance themselves from a text in order to approach the text later from a fresh and objective perspective. When using a computer, this distancing, which helps writers focus anew on a text, may also sever many of the logical cognitive paths that were followed during the evolution of the text.

On the other hand, because of the ease and speed with which texts can be created, the computer may actually encourage writers to make dramatic changes and try different approaches. In contrast, it takes more time and effort to recreate a handwritten product. During this phase the writer using a computer may initially be able to keep up with and, as a result, closely follow the cognitive process of the mind. However, after writers have distanced themselves from their work, it may be very difficult to
re-enter the text because many of the cognitive paths taken cannot be recreated.

Because many writers have problems detecting errors in their writing on screen, this phase may best be performed with a hard copy. Many writers print their prose and edit on hard copy. Later, the edits can easily be integrated into the text on-line. This practice allows the writer to maintain an audit trail of the cognitive process of revision for later analysis. This is one area where teachers should encourage students to maintain their pen-and-paper texts.

Recursiveness is one of the most unique and valuable elements of the composition process. As such, this key element should be represented in the cognitive process of composing on a computer. Recursiveness is usually readily apparent on most developing drafts when the writer works in the pen-and-paper mode. The texts are marked up with pen or pencil at some time during the composition process; writers may scratch out words or whole sentences and paragraphs, pencil in additional notes, or even move paragraphs into a more logical or desirable structure. This thinking and rethinking, examining and re-examining of a topic is readily apparent when the writer is composing with a pen and paper. The recursive cognitive processes are evident on the page, usually in the form of editing symbols, notes for the author, key words, numbers, or other markings. As a result of this visual trail, the writer can easily go back to an
area and reconstruct what thoughts preceded the changes. The logic behind the revision is not lost. While working in a traditional pen-and-paper environment, the writer does not have to clutter his or her short-term memory with the logic behind any of the previously made changes. This, in turn, frees the writer's short-term memory, so that he or she can concentrate more fully on the specific phase or task at hand.

On the other hand, a writer composing on a computer does not have this visual trail of edits to follow. When editing with a computer, writers do not usually have the capability to go back in time and reconstruct the logic behind their edits. Often, after the computerized text has been revised, there are no visual clues left in the text to remind the author of the edits. As a result, these writers have to store in their short-term memory more data pertinent to the text itself than do writers working in a pen-and-paper mode. If any length of time passes, the computer-based writer may have great difficulty reconstructing and/or rationalizing any changes. The extra effort expended on the short-term memory is greater when composing on a computer and the writing process then becomes one that may easily frustrate and discourage some writers.

When composing with a computer, writers also lose their spatial relationship and visual bearing to the text as a whole. Because computer screens do not display a large
amount of text at one time, the writer's short-term memory must work even more efficiently than in a traditional pen-and-paper environment. For example, when working with a pen and paper, most writers can tell immediately where they are in the text. To the writer, it is quite obvious from glancing at the height of the stack of pages on both the right and the left whether they are at the middle, beginning, or end of their work. The writer who is working on the computer does not have this information readily available. The spatial location of text is not a constant on a computer screen. The horizontal and vertical markers are not even stable on most machines. As a result, the writer has no constant physical configuration of the text to use as a reference point. Of course, the computer user can easily look at the top of the screen to see if they are on page one, or 12, or 120, but this location marker is subject to change with editing, and the writer may still have difficulty relating the specific page number to the work as a whole. Since the "physical and spatial aspects of the text may provide cues to writers, helping them represent structure, meaning, and intent" those writers who compose on a computer are missing some very important information about their writing (Haas 26).

The Reading Factor

Reading is inherent throughout the composition process;
it occurs at almost every phase. Reading cannot be separated from the writing process because it is integral to the process itself. Consequently, when writers frequently complain about reading text on screen, composition researchers take note because "effective instruction is grounded in understanding the nature of literacy skills and how they are acquired" (Orasanu viii). A degraded or diminished level of reading, whether real or imagined, could reduce the effectiveness of the writer and is certainly cause for concern. The question composition researchers must address is: why does reading comprehension, "an interaction of reader expectations with textual information" (Garner 13), seem to diminish with the use of a computer and what can be done to overcome this problem?

A common complaint among computer users is that reading text on screen is very difficult, and this complaint presents some unique problems. Some writers prefer to have an idea of what the finished product will look like as they create their text. However, most word processing and text editor programs cannot adequately portray or graphically represent on screen the evolving or finished product. Some of the programs available may have a function that depicts the page, such as a page previewer; however, this function is of limited use when working with large texts. Other writers may experience difficulty in detecting errors on screen, and this may be partially attributed to a different
reading of the text on screen. A different reading of the text on screen may also account for the fact that most people read slower when working on a computer (Haas 18).

In her research, Christina Haas has identified four areas of difficulty for the computer user when reading text on screen; she categorized these areas as "formatting, proofreading, reorganizing, and critical reading or 'getting a sense of the text'" (20).

The formatting problem area relates to the student who wants to see what the finished product really looks like. Unfortunately, not all computer programs can generate a complete picture or graphic of the final product. Writers often do not recognize uneven margins and spacing, or inaccurate page breaks until the piece is printed out on hardcopy and the errors become readily apparent. In some styles of writing, such as poetry, the form may be as important as the actual content. Using a computer on these types of writing tasks could prove to be very frustrating to the writer who wants to see the whole piece. Multiple printings of the work may be necessary just to format the text accurately.

Computer users also have many problems proofreading their work. Haas's research cites many studies that show that "while computers may greatly facilitate a writer's ability to make low-level changes, the skill and speed with which writers detect the need for changes may be decreased
when using a computer screen" (21). This decrease in the quality of proofreading and editing may be attributed to a slower and less thorough reading of the text on screen. Even students who utilize the spelling and grammar checkers do not trust their own ability to locate all of the errors in their text on screen.

Perhaps some of the conflict arises when writers rely solely on the spell-checkers or the grammar-checkers and do not use the programs in a beneficial or efficient manner. These writers may be allowing the programs to become a substitute for careful proofreading and editing when, in fact, the programs are merely designed to bring words and/or structures to the writer's attention. Writers must apply their knowledge of the writing task to determine whether the structure and/or word is correct and whether the highlighted area needs additional work. Also, these programs cannot spot all errors such as "missing pluralization or the mistyping of one word for another, for example, 'test' for 'text'" (Haas 21).

Writers also have difficulty when reorganizing large sections of text at one time (Haas 21). Again, because the writer does not have the ability to see the text as a whole on the computer screen, the task of reorganization often becomes difficult and frustrating. (Reorganization of smaller units does not present as many difficulties, as the author can visualize more of the area to be changed on the
computer screen.) "Planning a reorganization is also difficult because writers often 'get lost' in computer texts, which provide fewer cues for spatial recall than do paper texts" (Haas 21). For example, when moving a large block of text, writers must first mark and block the text. Then they will scroll to the new location where the text will be placed. By the time these writers reach the new location, they may not even recall what was in the block of marked text. Much time, effort, and short-term memory are used in keeping track of the change. Also, the cognitive thought process, which was interrupted while the change was made, may not be easily retrievable. As a result, Haas states that "it may be an inherent shortcoming in the computer as a writing tool that planning a text change is difficult without executing that change" (23).

The problem Haas refers to as the "text-sense problem" is not so easily defined (23). She states that the text-sense problem seems to be a complex constructive reading problem—a problem of reading to construct, or reconstruct, the macrostructure of meaning in one's own text.

When writers speak of the text-sense problem, they may be describing a difficulty in representing their text, that is, its meaning and structure, to themselves. To detect a mismatch between intended text and actual text, a writer must have a representation not only of his or her intended or "projected" text but also a representation of the actual text. If reading to "get a sense of text" is important for representing a text to oneself, it is much more closely tied to the compositional or "meaning-making" aspect of writing than are proofreading or checking
format and therefore may be a more important problem for computer writers (Haas 24).

Clearly there are problems inherent in reading text on a computer, and those problems are exacerbated as the topics or writing assignments become more complex. Although the above mentioned problems are directly related to reading the text rather than actually writing the text, the role of reading cannot be separated from the composition process. At most stages of the writing process, the author is reading or rereading. However, if the computer changes the way in which text is read, then by the very nature of composition and by the recursiveness of reading and writing, the writing process also changes.

Useful Tools

There is no doubt that the computer is a powerful tool. However, writers cannot rely solely on the computer. Most writers need to work at different stages with a tangible hard copy of their work. Some writers may need to use the pen-and-paper mode to perform prewriting exercises, others may use this mode to proofread and edit, and still other writers may use the pen-and-paper mode only to view their final product. This hard copy may alleviate the inherent limitations of the computer, since the hard copy can make the functions of formatting, editing, planning, and reading easier and more efficient for the reader. The manner in which writers introduces hardcopy into their writing also
changes as the writing task/product changes and as the writer's competency level and comfort zone on the computer increases.

Another set of tools which should never be replaced by the computer are the dictionary, thesaurus, and style guide. The computer cannot simulate meaning. It only recognizes patterns previously coded into the software. The computer is very capable of flagging a portion of the text for further examination; however, the computer cannot tell the writer how to change the text or even if the text should be changed at all. Only the writer, who knows the rhetorical context of the writing, can make that decision. Writers who rely on solely on the computer for the text editing and proofreading phases are maximizing one of the inherent limitations of the machine and are being overly reliant on a mere tool.

There are very real inherent difficulties associated with composing on a computer. It is logical to assume that those writers who have successfully incorporated the computer into their composition process have overcome those limitations. By taking the issue one step further, we can also assume that those writers who are using the computer as a writing tool for the first time and encountering the inherent limitations will be easily frustrated. They may even mistakenly assume that they are incompetent writers.

Writers who have successfully incorporated the computer
into their composition process may have done so consciously or subconsciously. The physical effects of using a computer, such as eyestrain, are easily recognizable and correctable. However, the reading comprehension problem, which is not so easily discovered, may have been overcome through a lack of conscious awareness. The writer may have subconsciously developed the habit of printing a hard copy frequently in order to overcome the reading problems associated with the text on screen. The novice computer user, meanwhile, may have higher expectations about the tool. These writers may not understand why so many errors went undetected when they carefully proofread the text beforehand.

Teachers who are incorporating computers into their composition classrooms need to be aware of the problems the tool presents. With this knowledge in hand, teachers can guide novice computer users toward strategies that will minimize the limitations that the computer presents.
CHAPTER IV

TEACHING IN AN ON-LINE ENVIRONMENT

Teaching composition in a computer-based environment challenges the traditional teaching role in many ways. The courses, the teachers' attitudes, and even the roles of both the students and teachers will undergo some changes with the incorporation of this new writing tool. All of these changes should be anticipated beforehand and viewed in an optimistic manner, for with the proper training and foresight the changes can be accomplished with a minimal amount of discord and a maximum amount of benefit.

Unfortunately "when it comes to computers, many public schools and universities have put the cart before the horse. They have purchased computers before they have figured out how teachers and students will use them" (Rodrigues 179). Much thought and perspective should go into establishing a credible and long-term game plan for incorporating computers into the classroom. This long-term planning should cover topics such as the curriculum, the context/configuration, the students, the teachers, and the role for the computer (Rodrigues 181).

The Curriculum

Before deciding to implement computers into a composition classroom, the curriculum must be sound. The introduction of computers will not solve any topic or course
problems that are already present. As a matter of fact, the advanced technology may even exacerbate existing problem areas. A close examination of the curriculum will reveal if it is based on pedagogically and theoretically sound theories of the writing process. If it is determined that the curriculum should be updated, then the computer can act as the catalyst for the necessary changes.

Other questions to be asked in relation to the curricula are:

- Do the participants' departments or districts have a curriculum or a syllabus that teachers are required to follow? Do the teachers follow the curriculum? What are the teachers' goals for their students? How is writing taught? How is literature taught? (Rodriguez 181).

Answers to the above questions will help administrators and teachers identify those areas that may need changing prior to the implementation of computers. An in-depth analysis of the curriculum can help to define a game plan that will successfully incorporate computer technology into composition classrooms, and, at the same time, make any changes necessary.

The Context/Configuration

The context/configuration or the environment is another factor that must be carefully considered when establishing new computer-aided composition classrooms. The classroom design will impact both how students are taught and how much on-line time they actually receive.
There are many different physical architectures available to incorporate the computer into a traditional classroom. "Currently no one model seems inherently better than others" (Rodrigues 183). According to Rodrigues, the design will likely have many "constraints, such as the budget, space availability, numbers of students taking English courses, and teachers' preferences for one configuration instead of others" (183).

One common design includes the use of a single computer, connected to a large monitor, which is used to demonstrate the writing process. If the teacher is the only person with a computer and the terminal area is displayed on a screen at the front of the class, then simple and basic explanations of how the computer can be incorporated into the writing process as the actual composition process is explored may be adequate. The writing process in this environment is very public and, consequently, may break down some of the barriers commonly associated with the personal bias in writing. If worked properly, this scenario could encourage collaborative writing on a very large scale. However, students in this scenario will receive very little, if any, on-line time themselves.

Another configuration may allow all students to have access to a terminal in the classroom. This allows maximum on-line time for the students, but may, inadvertently,
diminish the amount of time spent on actual instruction and lecturing. Also, in an architecture such as this, all students should be familiar with the operating software; otherwise, too much valuable lecture time is spent learning the software. If all students have their own terminals, it then becomes imperative that the instructor find out what level of computer experience the students already have and tailor the amount of lecture time dedicated to hardware and software instruction to that level. In the beginning, valuable lecture or writing time may be spent teaching computer usage. One way to alleviate the burden and lessen the amount of time spent teaching the software is to have a software course either as a prerequisite or as a corequisite lab. This requirement will ensure that all of the students can be taught from a common baseline.

Still other configurations may have small groups working with a shared computer. This environment could encourage collaborative writing and allow students to learn from one another. By polling students at the beginning of the course, teachers in this environment can ensure that the groups contain a mixture of novice and experienced computer users. The group can then work together to figure out many of the software problems on their own. This could be helpful by decreasing the amount of time that the teacher would have to spend explaining the software and operating systems.
Other environments may have the computers set up in a laboratory, separate from the composition classroom. The lab set-up requires that the students either spend time away from the actual composition class to work in the lab or find their own time to write in the lab. Before this scenario is decided upon, teachers and administrators must carefully consider how to develop the computer lab. The computer lab scenario raises a whole new set of questions that must be considered prior to implementation, such as: who will be able to use the lab and how will times be scheduled? How will the lab be staffed and will hardware and software training be available? What are the hours of operation?

Another contextual consideration is whether or not the computers will be networked. If they are to be networked, how will they be networked? Can the teachers communicate with the students while they are in the process of writing? Can students access and comment on other students' writing? Can the instructor edit from a remote terminal? Can students ask questions on-line during class?

The context/configuration of the classroom should not be taken lightly. Different architectures can help to enhance various areas of the writing process. On the other hand, other architectures could possibly limit participation and valuable lecture time. As clearly illustrated in the above examples, the different classroom designs and features
will determine which teaching strategy would be the most beneficial.

The Students

The students' level of computer competency is a major consideration in a computer-based composition course. The first question instructors need to ask in a computer-based composition course, is at what competency level are their students and with which programs are they familiar. This will give the teacher an idea of what teaching strategies could best be used to approach the class. If the students are all capable of working with the software programs and are all familiar with the hardware, then the teacher needs to spend only a nominal amount of time up front discussing the equipment and the programs. If however, there are students in the course who are not very proficient at using a computer, then the instructor needs to spend more time with those students, familiarizing them with the hardware and software. Administrators may require students to enroll in a word processing course or pass a proficiency examination prior to enrolling in a computer-based composition course. This would ensure that all students could meet a minimum standard level of computer usage. As a result, teachers would not be required to spend as much time on hardware and software instruction.

Teachers who teach composition on the computer must be
aware of the difficulties that the computer presents to students at all levels of competency, and teachers should be able to suggest better and more effective ways to use the computer in each student's writing process. Teachers should be aware of both the strengths and the limitations of the computer so they may present the tool properly to their students.

The Instructors

The instructors, themselves, should also be taken into consideration by the administration. Before being capable of teaching students to use a computer, the instructors, themselves, must be well trained and comfortable with the tool. If instructors are not, they risks sharing poor incorporation strategies and conveying the wrong attitude to students. Students, in this situation, may begin to think that the computer is little more than a fancy, modern typewriter. Colleges and universities that have introduced or required computer-based composition courses should ensure that the instructors are both proficient and knowledgeable about computers. Reputable universities hire professors who are considered experts and who are well-versed about their subject matter. Computer usage is no different. If professors are to teach with the aid of a computer, then they should be very knowledgeable about the tool.

For those instructors who feel they are not proficient
on the computer or who just want to brush up on their skills, training is available through a number of sources. Most colleges and universities offer word processing courses and some may even have graduate courses on computer-aided instruction. Also, local communities may have seminars or training on word processing and computer usage. Many manufacturers of software offer classes, training guides, and toll free numbers for those who have questions about the programs they have purchased. Instructors should spend time becoming familiar with the programs they will use in their course prior to entering the classroom. This familiarity will reduce the amount of time spent on equipment and software questions.

The Role of the Computer

The final consideration is how the computers will be used in the course or courses. Are the students going to be writing during class periods, or will they be required to spend time in a computer lab? When will lecture time be established? Will students be required to perform prewriting exercises at home without the aid of a computer? How will students, who may be required to use the computer, be guaranteed that they will be able to get computer time in the lab? These are all questions which are not easily answered, but which must be addressed prior to implementing a computer-based composition course.
A Process-Oriented Course

A process-oriented composition course may require students to submit multiple drafts of a paper. A rough draft may be submitted for the instructors' comments, drafts may be discussed during collaborative group sessions, or students may simply be required to readdress their work with a different focus. Whatever the purpose for multiple drafting may be, students will be able to fulfill the requirement easily when their work is stored on a computer or a computer disk. This ease in creating multiple drafts should encourage teachers to request multiple drafts frequently. These multiple drafts can serve as a prime illustration of the recursive element of the writing process. Students can learn how their own writing evolves by making comparisons of their early drafts with their later versions. This examination can help to depict their own individual writing process. In addition, these multiple drafts allow the teacher to view the student's composition process and suggest methods or exercises for improvement of that process.

Teaching Writing in a Computer Lab

Instructors who teach composition in a computer lab will spend less time lecturing during their courses. As a result, if the instructor has not carefully budgeted for time, the students could end up missing important material
on style, writing techniques, grammar, and other composition topics. Writing instructors need to streamline and adapt their material to the course. A specific time period of each class could be set aside for lecture, or a complete class period every week may be all that the instructor desires. Perhaps a more individually focused teaching method such as conferencing, which focuses on individual student's needs and concerns, will occur as a result of this environment. The individual attention can be quite beneficial to students during all phases of their writing. The emphasis is on not neglecting the students' education because the classroom contains computer equipment. Rather, it is on using the tools to the fullest and most effective means possible. Whether they are writing on a computer or using a pen and paper, students must still be taught the basics of the writing process.
CHAPTER V

CONCLUSION

There was a time when simple writing utensils and scrolls were considered a technological advancement. People who were used to carving crude symbols onto hardened surfaces marveled at the ease of painting or writing on stiff bark or hand-pressed paper. The advantages these newly-discovered items provided over their traditional writing tools were considerable. Eventually, these seemingly exotic writing utensils evolved into the ballpoint pen and bond paper as we know those items today.

Technology continued to advance and appeared to be on the leading edge with the advent of movable type. In the fifteenth century, the first printing presses churned out books in a fraction of the time it took a person to hand copy texts. Books, letters, and pictures could now be produced on a large scale, and the active presses were capable of turning out many titles a year. For the first time, the reading public had access to works which had never before been available.

In the not too distant past, most college students had their own personal typewriters. The frantic pounding of keys could be heard in dormitories across the country as students rushed to finish papers and reports due the next day. This tool was considered the ultimate luxury and a
real technological achievement. Students who were competent typists could produce papers in several hours.

Today, the computer has firmly established itself as the writing tool of the decade. Students can write as quickly as ever, and now they can revise much faster than before. By using a computer, students have the capability to manipulate text both as it is being produced and after it is completed. With the flick of a switch, multiple drafts can be stored and revised, formats can be arranged and rearranged, and pages can be added or deleted. Even software writing programs (such as spell-checkers and grammar-checkers) can be used to help improve a student's writing skills.

The computer is making its way into classrooms across the country. Composition instructors are teaching in writing labs, students are writing on personal computers, and even on-line grading and networking is being used in some schools. This technologically superior tool has been embraced by many and hailed as the cure to all failed writings. And as more and more people get caught up in the rising swell of enthusiasm, the limitations of the tool are forgotten or swept aside as unimportant and meaningless.

However, composition instructors have a responsibility when it comes to teaching on-line writing. They must ensure that students are comfortable with the writing tool and that it does not inhibit those who are unfamiliar with it. This
means that not only do teachers need to express the advantages of composing on-line, but they also need to clearly explain the limitations of the on-line composition process.

It is of the utmost importance that instructors understand the subtle changes in writing behaviors when students use different tools. Studies have consistently shown that the composition that occurs when a writer works on a computer is different than that which occurs when the writer works in the traditional pen-and-paper mode. The way in which the human mind processes data and the way in which short-term and long-term memory are utilized is not the same when working on a computer as it is when working with a pen and paper. In order to understand the potential limitations of using a computer, writing instructors need to know how the mind processes information when writing in different environments with different tools. For it is this cognitive knowledge, the knowledge of the ways in which human beings process information when using a computer, that will enable an instructor to tailor teaching strategies to the computerized classroom.

Composition is a cornerstone of the educational base. It is such an important asset that one cannot afford to suffer a degradation of skills merely because of the tool one uses. Instructors should not forget that the computer is just that—a tool. It is there for students to explore,
but it should not take away from their instruction in writing. Today, composition skills are required in many situations, and the tools used to compose are often quite different. The bottom line is that it really should not matter what tool the students use to attain their desired outcome, what should matter is that the tool does not inhibit, in any way, the result of that outcome.

The changes that occur in students' writing patterns fall into either the physical or mental categories and both should be fully addressed by writing instructors. Usually students experience the physical differences after much time has been spent on the computer. Adjusting their using habits or adopting special equipment (such as eyeglasses) can often help to overcome these problems. However, the mental differences that occur while the student composes on the computer versus the traditional pen-and-paper method are often the source of much frustration. The on-line limitations that impact the cognitive processes during composition are often not known nor are strategies to overcome these problems addressed. Composition instructors should be well aware of these differences, and they should adjust their teaching methods to compensate for the computer's inherent shortcomings.

Of course, not all students will require additional direction to write on a computer. As a matter of fact, some students may even utilize the computer more effectively and
efficiently than the instructors, themselves. However, it remains the duty of a composition teacher who teaches in a computerized classroom to ensure that students are given the best possible instruction available. This instruction should include an awareness of the tools utilized in the classroom.

The computer both simplifies and complicates the writing process. Composing on-line requires some adaptation to the traditional pen-and-paper method of composing. As instructors of composition, it is our duty to recognize these seemingly insignificant changes and formulate strategies to overcome the inherent difficulties. In the future, composing on-line may be considered the norm and the pen-and-paper method may be considered archaic. Now is the time to analyze the limitations of this tool and work to overcome any of the problems it presents to writers. The successful incorporation of the computer into composition courses depends on the educated and objective expectations of the administrators, the instructors, and the students.

It should remain the goal of all composition teachers to continually increase their understanding of the tools of their trade. If technology advances as rapidly as it has in the past, new writing tools will continue to emerge. Instructors should pursue an active and aggressive awareness of the modern tools that student writers are consistently asked to use.
The computer is a wonderful tool, one that will be around for many years to come. But it is not the perfect tool. Those of us working in the composition field must recognize the flaws and discover ways in which these shortcomings can be overcome. It is only through effective adaptation and proper usage that the computer can become a dynamic tool.
Works Cited


