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Teaching Critical and Creative Thinking Skills as Part of the Technical Communications Curriculum

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TEACHING CRITICAL AND CREATIVE THINKING SKILLS AS PART

OF THE TECHNICAL COMMUNICATIONS CURRICULUM

A thesis presented

by

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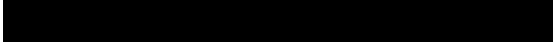
CRITICAL AND CREATIVE THINKING DEPARTMENT

TEACHING CRITICAL AND CREATIVE THINKING SKILLS AS PART

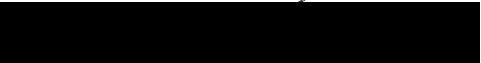OF THE TECHNICAL COMMUNICATIONS CURRICULUM

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by

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ABSTRACT

TEACHING CRITICAL AND CREATIVE THINKING SKILLS AS PART

OF THE TECHNICAL COMMUNICATIONS CURRICULUM

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I incorporated critical thinking instruction in the
writing curriculum by using three writing projects:
journal writing, a policy paper on AIDS, and an assignment
to evaluate grammar checkers. In their journal writing
students both generated and evaluated ideas. In the AIDS
project, they reinforced these convergent and divergent
thinking skills within the context of a real-world issue.
For the software project, students practiced thinking
skills in an arena that was more technical and objective,
but in which they were evaluating fundamental writing
criteria. These diverse assignments, based on a
philosophically compatible approach to the teaching of
writing, helped students develop critical and creative
thinking skills along with content knowledge and effective
written expression.

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INTRODUCTION

In this thesis I discuss the teaching of writing in conjunction with the teaching of critical and creative thinking skills. As I studied the theories of critical and creative thinking, I incorporated those ideas into the classroom and homework projects I was designing for my technical writing students at Wentworth Institute of Technology. I wanted to explore ways in which writing and thinking could be taught together because the process of writing and the process of thinking are so similar. My aim was to explore how I could infuse the teaching of critical and creative thinking into the technical writing curriculum. Three of the projects that I developed are described in Chapters Two, Three and Four.

Ideas from these assignments may be helpful to other college-level instructors of technical writing, as well as to high school and college teachers of English composition. While the projects do not represent a fully-developed curriculum for teaching critical and

creative thinking through writing, they incorporate ideas
and strategies recommended in the field of critical and
creative thinking.

The technical writing curriculum at Wentworth was
created because employers of Wentworth graduates
complained to the Wentworth faculty about the graduates'
inability to write. A recent study has suggested that
engineering students are falling behind in their writing
skills, because they do not get the practice and
instruction in writing that many non-engineering students
receive and because many engineering students believe that
non-technical problems are not worth serious
consideration.

The three projects discussed in this thesis address
both of these factors, lack of practice and lack of
concern, which are believed to contribute to poor writing
skills among engineers. To combat the problem of lack of
practice, I used journal writing as a way to get students
to write frequently. Because they were not graded for
correctness in their journal writing, the students could
practice getting their ideas on paper without worrying
about incorrect spelling, grammar or punctuation.

The suggestion that engineering students are reticent to discuss problems that "do not lend themselves to analytical solutions" is one reason that I included a non-technical, human problem in my technical writing curriculum. The AIDS project also focused on ideation, resource gathering, evaluation, and the construction of positions within a consciously-chosen frame of reference.

The software-writing-analyzer project, enabled the students to apply their improved writing skills to a project that was technical, but ambiguous. In this project, like the AIDS project, the experts disagreed about what was correct and what action should be taken. The students were challenged to grapple with this ambiguity, to make decisions and to present their position in writing. In addition, the software-writing-analyzer project focused on issues of revision, decision making and the uses and limits of computer assistance to the editing phase of writing.

Instruction in critical and creative thinking was easily incorporated within the technical writing curriculum, because writing is an extension and reflection of thought. Writing can also be a way of thinking.

The Writing Projects: An Overview

In Chapter Two I describe the journal writing
project. Although I taught journal writing as a separate
project, at the beginning of the semester, I also used
journal writing as a tool in the AIDS and
software-analyzer projects. If lack of writing practice
is one reason that engineering students are falling behind
in writing skills, journal writing is a project through
which students can be encouraged to write frequently and
for sustained periods. Journal writing is also a method
that can be used with other projects, both technical and
non-technical, to incorporate writing practice into other
subject-matter projects.

In brief, journal writing can help the student to
reflect privately, to engage in an inner dialogue, to
weigh value judgments and to make decisions based on
personal thoughtfulness rather than on the snap judgments
and conformist thinking that may attend the peer pressure
of group discussions. Journal writing allows the student
a place for reflective, tentative and experimental writing
while it also provides a structure for writing projects
that demand organizational skills. In this chapter I
offer a rationale for journal writing based on the work of
Elbow, Gere, Horton, Berthoff and Harding.

In Chapter Three I describe a writing project on AIDS in which the students are asked to assume the role of a mid-level manager who is asked to write a policy memorandum taking a position on whether the company should begin testing for AIDS. By writing a policy memo on the AIDS topic, the students confront, in their writing, a real-world, non-quantifiable, complex, perhaps insoluble problem, for which there is no technical solution.

Writing about a controversial topic challenges the students to think critically, in the conservative sense of the term, by using "discrete skills or operations each of which to some degree or other combines analysis and evaluation" (Beyer, 272). In addition, the AIDS topic presents an ill-defined problem that calls upon students to use the more broadly defined thinking skills and dispositions as defined by Passmore, Ennis and Sternberg.

The AIDS topic lends itself to the teaching of thinking because it invites students to analyze arguments, judge the credibility of a source, judge inductions and deductions and identify assumptions. Thus, direct instruction in these skills can be a natural result of discussion about this controversial topic. At the same time that students are improving these critical skills they are, within the classroom structure, attempting to remain open-minded in dealing with the parts of a complex

whole. This encouraged disposition of open-mindedness combined with the skills of analysis and good judgment is taught as an attitude that will prove helpful in any future writing project.

Finally, the AIDS assignment has a double-edged educational value because while students research and write as they would about any topic, they learn factual information that will help them take precautions against AIDS and function as informed persons in the workplace. It is important to remember that this project took place in the early months of 1985, when there was widespread complacency about AIDS.

One of the criticisms of teaching critical thinking is that it takes time and focus from content instruction. Although AIDS is not a textbook subject, the students quickly realized that knowledge about the disease is essential before one can employ critical thinking or rhetorical skills on the subject. This led to instruction and discussion on doing research. The students became deeply interested in the topic. I never taught a project in which so many students brought in so much material, although not assigned to do so.

I also assigned this writing project on a non-technical, controversial topic to help students realize that their ability to write well and easily is affected not only by the complexity of the subject matter, but also by audience receptiveness to the subject under discussion. If an audience does not know about the subject, and especially if an audience feels threatened and may be experiencing denial or cognitive dissonance on the subject, the writer must employ not only logical, but also rhetorical, skill in writing to that audience.

In Chapter Four I describe a project in which the students focused on revision and editing by evaluating software that analyzes writing for correctness and style. Although this may appear to be a project that would encourage students to become more passive in their approach to writing and more likely to rely upon external, unreflected standards, my goal is to use these software tools in a way that helps students to stand back from the writing process and see how standards for good writing are checked by a computer. This goal was made easier by the fact that the three different software packages sometimes made different suggestions for revision.

As "authorities" the software packages differed, for example, about how long or complex the average sentence should be. For technical students, computer data is often

viewed as the ultimate authority. With that mind-set, they are usually unlikely to question the information generated by the computer or the conclusions that are based on that information. In this case, because the computers, as authorities, disagreed, the students became interested in researching the underlying criteria on readability and sentence complexity to determine the basis for such conflicting recommendations.

Once the students understood the counting mechanism by which the computers rated readability, the students had to evaluate the philosophy about what "grade level" they should write to for their audience. Likewise, when the computers disagreed about grammar or usage, the students had to understand why active voice or passive voice is more appropriate in a given passage. To think about why grammar rules exist and how grammar can be used to strengthen meaning for the reader is, in my opinion, a long distance from feeling tyrannized by grammar rules that dictate rather than educate. As the instructor, I facilitated the students' observation of these conflicting views by the computer-as-authority, and was able to offer them the more traditional authorities, Follett, for example.

In addition to a new feeling of enthusiasm toward grammar, the students were more open to the "criticism" of the automated analyzers and seemed to take the suggestions less personally and less defensively than teacher feedback, perhaps because many other students were getting identical feedback. In brief, the computer feedback produced a distancing effect from their own writing that I have not witnessed when student papers are critiqued by other students or by the teacher. This distancing encouraged students to think about why grammar and usage rules exist. By creating an environment in which students learn mechanical skills as a means to an end, I hope to help them to write better documents and to learn grammar in a way that they understand not just the rules of grammar but the intention behind the rules. I also intend that students will be able to decide whether such software can be helpful within the discovered limitations.

These three assignments help the students improve their writing in very different ways. The journal writing assignment helps the students to first explore and later clarify their understanding of a subject matter. Writing about a controversial topic encourages them to consider their own biases as well as those of their audience, to use their critical analysis skills in doing research, and to improve their ability to develop logical arguments as they practice persuasive writing. Evaluating automated

writing analyzers motivates them to proofread their documents not only for correctness, but also for clarity and style. Behind each of these projects, the principles of critical and creative thinking provided the underlying theory in the design of exercises.

In Chapter Five I offer a review of the theoretical approaches to writing instruction to present a framework for my writing instruction choices. I begin with a brief overview of the two major approaches to the teaching of writing outlined by Knoblauch and Brannon in Rhetorical Traditions and the Teaching of Writing which summarizes the history of ancient rhetorical tradition and the evolution of modern rhetoric.

I will argue that the philosophy behind a teaching method is important because "method derives from philosophy" (Knoblauch and Brannon). My point is not to suggest that teachers must study philosophy in order to find the "right" method for teaching writing; but rather that teachers should be able to discern the assumptions implicit in the teaching methods they use; for to be philosophical means to be "aware of what one is doing and why" (Knoblauch and Brannon, 2).

The ancient rhetorical tradition evolved during a time in history when knowledge was considered to be complete. Within this philosophy, ideas "exist" almost as concrete objects. In learning, ideas are merely received by a passive mind. In writing, they need only to be assembled and presented to the reader.

Modern rhetoric, on the other hand, allows the notion of interdependence and interaction between the knower and the known, knowledge and experience, ideas and language, and thinking and writing. Modern rhetoric views knowledge not as complete, but as open-ended; the mind not as reactive, but as formative; and the learner not as passive, but as active in learning and interactive with knowledge and experience.

I was especially interested in Knoblauch and Brannon's theories because they offered insight into why so many students experience difficulty with expression, editing, and the esoteric notions of style and strategy. Knoblauch and Brannon demonstrate that the conservative approach to writing is based on the Ancient Rhetorical Tradition which places so much emphasis on correct prose decorum that both teachers and students lose sight of what Knoblauch and Brannon consider to be the main purpose of writing -- "an internal need to explore and convey personally important meanings". The projects described in

chapters two, three and four are based on the modern rhetorical tradition.

In Chapter Six I review approaches to writing instruction by drawing on the works of Ann Berthoff, Peter Elbow, Janet Emig and others. These authors have developed methods of writing instruction based on the modern rhetorical tradition.

C H A P T E R   I

TEACHING CRITICAL AND CREATIVE THINKING THROUGH WRITING

What Is Critical Thinking?

Writers within the field of critical and creative thinking disagree about the defining features of critical thinking and creative thinking and the relationship between the two kinds of thinking. Although all of these theorists agree that critical thinking is important, the writers at the more traditional end of the theoretical spectrum view critical thinking as skill-oriented and an almost purely cognitive process, while other writers in the field espouse a broader definition of critical thinking and believe that critical thinking involves attitudes and dispositions as well as skills.

Writers within the field of critical thinking also disagree about how critical thinking should be taught. Those who believe that critical thinking consists of skills usually view critical thinking as evaluative and reactive. Therefore, they believe that students should be taught to evaluate information, to look for poor logic and bias, etc.

Those who favor the inclusion of attitudes and dispositions within the definition of critical thinking take a more proactive view of critical thinking. They believe that critical thinking instruction should include not only evaluative skills, but should also emphasize decision-making and problem solving as broad contexts in which we use such skills.

For those who believe that critical thinking is proactive and should include problem solving, there is further disagreement -- Some believe that the problems used in teaching critical thinking should be well defined, others believe the problems should be both well-defined and ill-defined. Some believe that skills should be taught separately and then applied to problem solving; others believe that skills can be taught within the framework of problem solving.

Finally, there is a difference of opinion about how important metacognition is -- how much should students be taught about what and how they are thinking and learning. I will address each of these issues.

Are Attitudes a Component of Critical Thinking?

I will begin with the subject of critical thinking itself. Does critical thinking consist only of skill acquisition or is there an attitudinal component? In much of his work, Barry Beyer represents the most traditional end of the theoretical spectrum. Beyer has described critical thinking rather narrowly as the set of skills by which one evaluates information and evidence. The ten skills which Beyer believes constitute "the essential skills of critical thinking" are:

* Distinguishing between verifiable facts and value claims.

* Determining the reliability of a source.

* Determining the factual accuracy of a statement.

* Distinguishing relevant from irrelevant information, claims or reasons.

* Detecting bias.

* Identifying unstated assumptions.

* Identifying ambiguous or equivocal claims or arguments.

* Recognizing logical inconsistencies or fallacies in a line of reasoning.

* Distinguishing between warranted or unwarranted claims.

* Determining the strength of an argument

Although Beyer recognizes that there is an attitudinal aspect to critical thinking he refers to as "a frame of mind . . . an alertness to the need to evaluate information; a willingness to test opinions; and

a _desire_ to consider all viewpoints, he did not include these in this essential skills list which served as his instructional model in 1985.

This list reflects Beyer's belief that "the single most important criterion for acceptance as a critical thinking skill must remain that the skill seek primarily to differentiate truth from falsehood, fact from fiction (p 275). To Beyer, critical thinking is a purely evaluative activity. Much of his theory is based on the early work of Robert Ennis.

In an early and influential article, "A Concept of Critical Thinking" published in 1962, Ennis defined critical thinking as a strictly cognitive activity. His taxonomy of critical thinking skills was the basis for Beyer's list of essential skills for critical thinking and includes many of the same abilities. However, in 1983 Ennis revised his taxonomy of critical thinking skills and expanded his definition of critical thinking to include attitudes and dispositions as well as skills. Within his current definition of critical thinking, a person with critical thinking skills is not only able to focus on a question, analyze arguments, judge the credibility of a source, etc, but must also hold an attitude that is willing to: seek reasons, try to be well informed, look for alternatives, and be open minded. According to Ennis,

"these dispositions are essential to the critical thinker" (Baron and Sternberg, 16).

This change in Ennis' thinking reflects a movement away from his earlier concept of critical thinking as reactive and evaluative. His inclusion of dispositions and attitudes in his theory implies a more proactive understanding of critical thinking. Beyer, however, did not include attitudes in his theory of critical thinking until 1987, when he published an article in Cogitare which stated that critical thinking instruction should also focus instruction on attitudes. However, much of his writing in the field reflects his earlier, more conservative views.

Previous to Beyer's and Ennis' recognition of attitudes as part of critical thinking, they had believed that attitudes did not need to taught, because they believed the disposition to think critically would come along naturally as the discrete critical thinking skills were learned (Swartz, class notes).

Passmore values the dispositions and attitudes of the critical thinker far more than the skills themselves and argues that to describe a person as a critical thinker is to describe the person's nature rather than the person's skill level. He notes that "a critical person [in one sense] must possess initiative, independence, courage

[and] imagination of a kind which may be completely absent in, let us say, the skillful critic of the performance of a laboratory technician" (Passmore, 198). Passmore would prefer to inculcate in students what he calls the "critical spirit", because, he notes "The skills of a judge, or the skills of a critic, can be misused; justice or the critical spirit can be neither used nor misused. And this is because neither being just nor being critical is a skill" (Passmore, 196).

Although Passmore is somewhat unclear about whether teaching for critical thinking should focus instruction on attitudes as well as skills, he is clear that the attitudes of a critical thinker are as, if not more, important than the mastery of critical thinking skills. His lack of clarity about whether attitudes should be included as part of a critical thinking curriculum reflects an uncertainty within the field about whether attitudes should be taught -- or even could be taught. Because attitudes are difficult to measure, even some who believe that attitudes play an important role in critical thinking do not endorse teaching attitudes as part of the curriculum.

I take Passmore and Ennis' position that attitudes are an important part of critical thinking. Further, I endorse the ideas that attitudes can be taught. I cite

these as the first principle that underlies my teaching.

> Principle One: In teaching people to be
> better critical thinkers, it is important
> to teach good attitudes as well as
> teaching skills.

By teaching attitudes, I do not mean that students should be taught a specific point of view, but that they should be taught how to become more open-minded, more open to alternative points of view, more willing to research and to question within any given topic. This principle guides my instruction in the curriculum examples that I describe in later chapters.

Is Problem Solving Critical Thinking?

Beyer, in defending critical thinking as a strictly evaluative activity, argues that critical thinking differs from problem solving because "critical thinking begins with a previous claim, conclusion or product and considers the question, 'Of what truth or worth is it?' Problem solving, on the other hand, begins with a perceived problem and asks, "How might this difficulty be resolved?" (Social Education, 271).

Robert Sternberg describes critical thinking as problem solving. In fact, Sternberg focuses on ill-defined problems as his examples of critical thinking

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problems. These ill-defined problems give students experience in defining the problem, reformulating the problem and looking at the problem from more than one perspective, For example, Sternberg uses the classic nine-dot problem which the "students often fail to solve ... because they make an assumption about the problem that proves to be incorrect" (Baron and Sternberg, 201). These ill-defined problems that Sternberg uses challenge students to look at their approach to problem solving.

Solving ill-defined problems, such as those listed by Sternberg, would be seen as an act of creative thinking by more traditional experts like Beyer, who has a more restricted view of critical thinking. Beyer has stated emphatically that critical thinking is not problem solving.

However, if you expand the definition of critical thinking to include problem solving (as Ennis does), you arrive at a definition of critical thinking that encompasses creative thinking.

In his most recent work, Ennis uses a problem-solving, decision-making example in his model curriculum. He defines critical thinking in "A Taxonomy of Critical Thinking Dispositions and Abilities" as "reasonable reflective thinking that is focused on deciding what to believe or do" (Baron and Sternberg, 12).

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In fact, Ennis presents his theories within the context of a murder trial -- the problem at hand for the jurors is how to use critical thinking skills to return a proper verdict. Ennis, who based the jury example on his own experience as a juror, uses the courtroom situation to emphasize how critical thinking can be used in a real-life situation which involves problem solving.

Passmore not only includes problem solving as part of critical thinking, he stresses that one should "make of one's whole schooling a training in problem solving". He encourages teachers to "substitute problems for exercises", so that students practice skills rather than merely do rote learning.

In "On Teaching To Be Critical", Passmore, compares mastering the critical thinking skills in Max Black's Critical Thinking to learning how to drive from reading a book.

> "A person could answer any question we
> cared to ask him about a book called
> Better Driving, without being, after
> reading it, a better driver than he was
> before . . . The two examples, however,
> are not analogous. For in so far as
> critical thinking is a skill, it consists
> in being able to solve problems of the
> sort Black sets his readers [in Critical
> Thinking], in a sense in which skill in
> driving does not consist in being able to
> answer the question about driving which
> the author of Better Driving might ask his
> readers. One can answer the question
> 'What should you do when you are about to

descend a steep hill?' with the answer:
'Change to a lower gear' without being in
the slightest degree a skillful driver.
But one cannot be in a position to answer
such questions as 'In what does the
fallacy of the following argument
consist?' without being in some measure
skilled in criticism. If being critical
simply consisted in possessing a skill,
then it ought to be the case that to
master Black's Critical Thinking would be
to master or to gain mastery over, that
skill. Our line of reasoning suggests,
however, that one can master Black's book
without having learnt to be critical, even
in a slight degree. Being critical is,
indeed, more like... a character trait
than it is like a skill" (Passmore,
194-195).

Passmore makes the point that students can "learn"
skills but never internalize or apply them. Ennis'
application of critical thinking as a juror exemplifies
how students might apply critical thinking. It is the
expanded conception of critical thinking that I embrace.

How To Teach Critical Thinking

Just as there are two theories about what constitutes
critical thinking, there are also two approaches to the
teaching of critical thinking. One approach suggests that
critical thinking is learned by the practice of discrete
skills. The other approach suggests that critical
thinking is better learned within broader thinking
activities, such as problem solving and decision-making.

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Until 1987 Beyer insisted that only skills should be taught as part of the critical thinking curriculum. Although his attitude has softened, he continues to insist that instruction should focus on skills, because it is easier to standardize the evaluation of skills than the evaluation of attitudes and dispositions. Beyer has criticized Ennis for attempting to teach critical thinking through a problem-solving narrative, and recommends the Watson-Glaser test that evaluates specific skills through discrete items.

Others in the field, like Sternberg, believe that teachers need strategic techniques like problem solving and decision making as a framework in which to teach discrete skills. Sternberg believes that there are organizational strategies in which to fit skill instruction and he believes that activities like problem solving provide a broader context in which the discrete skills can be learned and practiced. Sternberg, however, does not believe that the discrete critical thinking skills should be directly taught within these broader thinking activities (Swartz, class notes).

Robert Swartz also argues that the discrete skills should be taught within the broad context of a problem solving activity.

> "It is also important to structure lessons
> in which students practice the use of a

number of skills appropriately blended
together in broader thinking activities
like making decisions and solving
problems. Major historical decisions
(e.g. Truman's decision to bomb Hiroshima
...) can serve as contexts for these more
complex activities. The challenge of good
teaching for critical and creative
thinking is to find such natural contexts
and structure exciting lessons that blend
teaching for these skills and teaching
standard content material in traditional
subject areas, K-12, and in college
teaching."

The second principle upon which I base my writing

instruction is harmonious with Robert Swartz:

Principle Two: It is important to focus
instruction of discrete skills within a
broader context, for example, problem
solving or decision making.

In my experience, a problem solving situation

presents the ideal way to teach critical thinking skills.

Although I introduce each skill separately, allowing

students to understand and practice one skill, the

students later apply their practiced skills in a more

ambiguous, problem-solving situation.

I applied this method in the writing-analyzer grammar

project. Most people think of grammar as very limited

information that is unambiguous and straightforward. The

typical grammar book presents a grammar rule, furnishes

some examples and then "tests" the students knowledge on

the material just presented with test questions very much

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like the examples. Recalling and applying the rule in this situation is much easier for a student than recalling and applying the same rule while working on an assignment in which the student has to recall and apply all the grammar rules simultaneously. When a grammar rule is correctly applied in this larger context, one would assume that the rule has been learned.

Learning grammar provides a good analogy to learning critical thinking skills. In isolation the skills may be recalled and applied, but if that learning cannot be transferred to a real-life situation, have the skills really been learned? Like the student who must apply all grammar rules within the context of a written assignment rather than a workbook page, Ennis' courtroom example challenges the critical thinker within a larger context.

What Is Creative Thinking?

J.P. Guilford, whose work has had a significant influence in the psychological study of creativity, defines creative thinking as "fluency of thought (generating ideas in a multitude of different categories), originality of thought (coming up with new ideas), and elaboration in one's thinking (generating as many details as possible) (Baron and Sternberg, 120).

> "the process by which one arrives at
> effective, useful, original responses to
> complex problems. It is characterized by
> the ability to see things in many
> different, often novel ways. It sees 'the
> familiar as strange and the strange as
> familiar' as J.J. Gordon describes it.
> Creative thinking can be described as
> divergent thinking; it is characterized by
> sensitive, original, fluent, flexible,
> elaborated ideation."

However, this does not mean that a creative thinker
is not also critical and purposeful.

In Educational Leadership, David Perkins suggested
that,

> "creative thinking depends on attention to
> purpose as much as to results. Creative
> people explore alternative goals and
> approaches early in an endeavor, evaluate
> them critically, understand the nature of
> the problem and the standards for a
> solution, remain ready to change their
> approach later, and even redefine the
> problem when necessary" (Perkins, 19).

In their journal writing, students are able to
explore their goals and approaches and reflect upon their
progress with a current project. The journal offers a
place in which to measure progress and reevaluate the
problem and one's strategies. Journal writing balances
the more risk-taking aspects of creativity.

Perkins also notes that,

> "Creative thinking depends on working at
> the edge more than at the center of one's
> competence. Creative people maintain high

> standards, accept confusion, uncertainty,
> and the higher risk of failure as normal,
> even interesting, and challenging ...."
> (Perkins, 19)

When I use the term "creative thinking", I am referring to these definitions of the process.

Rollo May has described creativity as simply "the encounter of the intensively conscious human being with his world" (Educational Leadership, 18). Although some creative thinkers appear to be born with a strong, innate tendency toward such creativity, like any other skill, it can be encouraged, developed and learned.

Are Critical and Creative Thinking Different?

More traditional writers in the field of critical and creative thinking, like Beyer, view critical and creative thinking as distinct activities. Just as Beyer implies that when one teaches critical thinking skills, then critical thinking attitudes and dispositions will follow, he likewise seems to imply that when one teaches critical thinking skills, creativity will follow. Ennis, however, states that his definition of critical thinking "does not exclude creative thinking. Formulating hypotheses, alternative ways of viewing a problem, questions, possible solutions, and plans for investigating something are creative acts that come under this definition" (10).

The view that critical and creative thinking skills are separate, even conflicting abilities has been reinforced by recent research into hemispheric specialization. Because data indicate that that critical and creative thinking activities use different brain hemispheres, educators have increasingly used different activities to improve either "critical" or "creative" skills. However, Robert Swartz, in "Teaching for Thinking," reminds us that there is a danger "in separating critical thinking from creative thinking" and Delores Gallo, in "Empathy, Reason and Imagination," warns that "the common polarizing differentiation made between critical thinking and creative thinking is deceptive, since it often leads one to see creative thinking as the discrete opposite of rational thought" (Baron and Sternberg, 120; Gallo, 8-9).

As one way of avoiding a misleading dichotomy between critical and creative thinking John Passmore introduced the term "critico-creative." Passmore explicitly includes the creative component of thinking in his conception "because [otherwise] critical thinking may suggest nothing more than the capacity to think up objections. Critical thinking as it is used in the great traditions conjoins imagination and criticism in a single form of thinking" (Passmore 1930, 168). The educator is interested in encouraging critical discussion, as distinct from the mere

raising of objections; and discussion is an exercise of the imagination" (Passmore, 201) As we have seen, this is in accord with Ennis' current definition of critical thinking as "reasonable reflective thinking that is focused on deciding what to believe or do" (Baron and Sternberg, 12). My third principle is built on this belief.

> Principle Three: It is important to teach for creative as well as critical thinking skills in teaching good thinking.

Although I believe that critical and creative thinking can involve different activities, both are important and both are involved in problem solving and decision making. I reject Beyer's implication that creativity cannot be taught. My curriculum activities demonstrate that basic, every-day creative skills can be developed by instruction. For example, in some of the curriculum activities I describe, students not only evaluate ideas, they generate them through brainstorming and free-writing activities. Though critical and creative activities may take place separately, both are important.

The Importance of Metacognition

Sternberg suggests that students should be aware of why they are being instructed in certain skills and by certain methods. He believes that "the confidence and pride that ensue are likely to result in performance that is better than if one simply undertakes a program blindly and without any knowledge of what the program is trying to accomplish, how it is trying to accomplish it, and why what it seeks to accomplish is indeed worth accomplishing in the first place".

Sternberg divides thinking skills into three categories: executive processes, nonexecutive performance processes, and nonexecutive learning processes. Executive processes, which he calls metacomponents, "are used to plan, monitor and evaluate one's thinking; performance processes are actually used to carry out the thinking; learning processes are used to learn how to think in the first place. Sternberg seeks to give the student an active part in the learning process. The student is instructed, not only about content, but also about the different theories of intelligence and learning. The student is expected to analyze, not only the content matter and skills being taught, but also how those skills are being taught and how they are being learned. According to Sternberg, metacognition is a crucial technique in learning good thinking.

Costa embraces this view also. In "Teaching for of and About Teaching" he states that it is not enough to teach _for_ thinking, we must engage in the teaching _of_ thinking and _about_ thinking as well. Costa defines teaching _of_ thinking as "instructing students in the skills and strategies directly", teaching _for_ thinking as "creating school and classroom conditions conducive to full cognitive development" and teaching _about_ thinking as "helping students become aware of their own and others' cognitive processes and their use in real life situations' (p. 2).

Robert Swartz, in discussing metacognition, states that

> "the effectiveness of metacognitive
> awareness of one's thinking has been amply
> researched, and it is structured into
> these activities by teachers in part
> because of their awareness of this
> research. If students develop the
> principles of their thinking out of
> reflection on their own thinking this
> seems a powerful vehicle towards providing
> them with basic principles of thinking
> that they can draw upon again and again
> (Swartz, 27).

I agree with Swartz, Sternberg and Costa and base my teaching on the following principle:

> Principle Four: In order to teach forms
> of thinking, skills as well as attitudes,
> it isn't enough to get students to use
> these skills, teachers must also prompt
> students to become aware of and critique

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the way they think. Metacognition is
important as a classroom tool.

In my technical writing classroom students practice
metacognition in several ways. First, they complete a
questionnaire that helps them identify writing skills they
already possess and those they need to learn or practice.

Through the grammar project, students become more
conscious of how dependence on authority (whether books or
teachers) can limit their decision-making ability.
Through the journal writing project, they are able to
monitor their progress toward project goals. Costa says
that "probably the major component of metacognition is
developing a plan of action and then maintaining that plan
in mind over time" (Educational Leadership, 58.) Journal
writing facilitates that process. Through the AIDS
project, students become more aware of how they and others
approach problem solving and decision making.

The Relationship between Writing and Thinking

In a more traditional writing class, writing skills
are viewed as different from thinking skills; writing
follows thinking, and is seen as a way to present ideas,
not as a way to explore ideas. Little attention is paid
to teaching students to practice writing and thinking
skills simultaneously.

In my opinion, part of the reason for the separation of thinking from writing is caused by a preoccupation with grammar. I found that students approach writing with the attitude that they should already know what to say. Their concern was with how to say it. By concentrating their energy on mechanics and grammar, they poorly presented the subject to their audience.

This preoccupation with form rather than meaning is an attitude that most students bring with them from previous English/writing classes. Knoblauch and Brannon in Rhetorical Traditions and the Teaching of Writing suggest that "too many [teachers] believe that learning to write is equivalent to learning these structures [of the five-paragraph theme], and that teaching writing means insisting on formal correctness... The consequence has been to promote a ceremonial view of discourse among students, a belief that writing is mainly a process of honoring the conventions that matter to English teachers rather than a process of discovering personal meanings, thinking well in language, or achieving serious, intellectual purposes." (31)

If classroom teaching revolves around how best to state information, little energy is "wasted" in understanding the topic. Student effort is focused on presenting the material without spelling or grammatical

mistakes. As the semester progresses, our effort is directed toward both exploring a new subject matter and then discussing how to best present that new knowledge to a number of audiences. By the end of the semester students were more able to explore and reflect on ideas through writing.

Writing persuasively becomes another way to think through the subject at hand. By assessing what the audience already knows, what preconceptions and/or false conceptions they may have, the students must revisit the subject from another aspect. Also, to present a strong argument, one needs facts and supporting evidence, as well as skillful rhetoric.

Through these and other tools in my curriculum, I intend to demonstrate that writing is a natural way for students to practice critical and creative thinking skills while practicing writing skills. Writing, within my curriculum, is not only writing as product, but also writing as process.

I attempt to foster both critical and creative thinking by designing assignments that are practical and relevant -- assignments that, by their nature, encourage thinking. In the projects I describe, I attempted to give equal attention to creative and to critical thinking. Although the projects appear very different on the

surface, what they have in common is the attitudes they focus on developing and the kind of environment in which they occur.

The Importance of the Classroom Environment and
Attitude in Learning

By environment I mean not only the physical arrangement of the classroom, but the impact that the physical arrangement of the classroom has on the attitudes of both teacher and students. There is wide agreement among educators that environment influences behavior and attitude. I work to create an environment that is flexible, open, psychologically safe and respectful of persons and questions. Passmore asserts that,

> "[any] sort of teaching which sets out to
> develop character traits relies to a
> considerable degree upon example and upon
> what is often called 'the atmosphere of
> the school'. Admittedly, whatever the
> character of school and teacher, an
> exceptional student - exceptional in any
> respect, with no implication in this
> description of moral superiority -- may
> react against it. But, for example, a
> school in which teachers never deviate
> from a fixed syllabus, in which masters
> and students alike frown on every
> deviation from the conventional norm, is
> unlikely to encourage originality in its
> pupils, although its products may be
> well-drilled and, within limits, highly
> skilled" (Passmore, 196).

Costa also emphasizes the importance of the classroom environment.

> "According to Piaget's constructivist theory, all knowledge arises -- or is constructed -- from interactions between learners and their environment....
>
> Different students need different classroom organizational patterns. Some students learn best individually; some learn best in groups. There are students who can only learn when an adult is present to constantly encourage and reinforce them; others can't learn when another person is nearby. Some students need noise; others need quiet...." (Costa, 130).

Beginning with the way we arrange ourselves in the classroom, I place responsibility for learning with the student. During class discussions we sit in a circle to emphasize our equality as colleagues, each with something valuable to contribute. By this physical arrangement I intend to minimize the more traditional emphasis upon the teacher as the authority figure and the holder of knowledge.

The physical arrangement of the class also changes to meet the task at hand: we break into groups, go to the library, or to the computer lab. Students actively complete their writing projects rather than wait to receive information. Students may also work in pairs or

groups of three or four because working in small units
mirrors the world of work more closely than the usual
classroom arrangement in which students sit and listen to
the teacher lecture. Because the passive environment of
listening to a teacher does not replicate the usual
writing situation, I attempt to create an environment in
which students experiment with how to get help and
feedback from several resources at every step of the
research, writing and editing processes.

The open interactive environment that I strive to
create in the classroom serves as a model for the kind of
attitude that I am hoping to foster in the class--an
attitude that allows students to engage in a learning
process that is, in Ennis' terms, both critical (focused,
dynamic, analytical, definitive and task-oriented) and at
the same time creative (thoughtful, open-minded and
flexible). Each project is designed to provide an
environment that encourages and supports critical
thinking. Through the writing projects I attempt to
foster risk-taking, openness, sensitivity, empathy and
curiosity. In addition, the projects that I designed
challenge the students with complexity and disorder and
require a tolerance for ambiguity. I also try to model
open-mindedness, truth seeking and flexibility.

C H A P T E R   II

JOURNAL WRITING IN THE CLASSROOM

Writing and Thinking Are Cognate Activities

The journal can serve as an important tool for teaching writing because its use evolves naturally from the belief that writing and thinking are cognate activities that nourish each other. Through journal writing the students can discover information in a deeper way or see the same facts from a different perspective.

As a pedagogical tool the journal can be used in different ways for a variety of purposes. In the technical writing curriculum, I use the journal to encourage critical and creative skills and to increase writing fluency. Journal writing can be used to foster the student's ability to observe, analyze, investigate, clarify, define terms, identify assumptions and formulate questions and arguments. As a means of fostering creativity the journal can be used to encourage experimentation, an openminded attitude to the complexity of a problem, and sensitivity to the opinions of others.

Journal Writing Improves Writing Fluency

One reason for teachers to encourage journal writing by students is simply to increase the amount of writing done. Peter Elbow suggests that the best way to learn to write is simply to write. He encourages students to:

> write a lot and throw a lot away. Start
> writing early so you can have time to
> discard a lot and bubble and percolate.
> If you have three hours for a three page
> thing, write it three times instead of one
> page an hour (Elbow 1973, 15).

Elbow suggests a free writing diary, in which students write, without stopping, for ten minutes each day.

Ann Gere, in Writing and Learning quotes Theodore Roethke's description of the journal as a "greenhouse" where ideas can grow, as a place where students can experiment and take risks by trying to write in new ways. The journal provides a place where students can engage in divergent activities like brainstorming and free writing and where they can practice different writing styles and various approaches to their topic (Gere, 31).

Journal Writing Fosters Higher Level Thinking Skills

In addition to encouraging simple verbal fluency and a medium in which to experiment, the journal can also be used to practice higher level thinking skills because, if a writing assignment is well designed, time spent writing in a journal is also time spent thinking. In fact,

"sustained writing" is now an activity for students in elementary school because "one apparent reason for skill deficiencies is lack of time spent on a task" (Knoblauch and Brannon, 2). Joan Baron in "Evaluating Thinking Skills in the Classroom," suggests that, "as a sustained activity, writing has the potential to develop many of the dispositions associated with the development of thinking skills. Certainly it can foster persistence and precision in both thought and the use of language" (Baron and Sternberg, 232). Journal writing can be especially helpful in improving dialogical thinking and metacognition. According to John Flavell, metacognition "refers to the awareness and control of one's thinking" (Flavell, 88) and the journal certainly provides a place for students to become aware of their thinking, or as Ann Berthoff says "to think about their thinking" (Berthoff 1982, 46)). In their journals students can improve sound ideas, but also they can reflect upon "their misconceptions and errors . . . (to think about how) they might have prevented certain problems and how they would approach similar problems differently in the future" (Baron and Sternberg, 229).

Students Can Tackle Multilogical Problems

Although writing itself may be helpful in providing a means by which students can grapple with ideas, the complexity of the ideas themselves must also be considered. Richard Paul suggests that students should be required to grapple with "multilogical" rather than "monological" problems. Monological problems are

> settled within one frame of reference with
> a definite set of logical moves -- when
> the right set of moves is generated, the
> problem is settled. The answer or
> solution proposed can be shown by
> standards implicit in the frame of
> reference to be the 'right' answer or
> solution (Baron and Sternberg, 128).

Multilogical problems are "nonatomic problems that are inextricably joined to other problems and form clusters, with some conceptual messiness about them and very often important values lurking in the background. When the problems have an empirical dimension, that dimension tends to have a controversial scope. It is often arguable how many facts ought to be considered and interpreted and how their significance ought to be determined. When they have a conceptual dimension, there tend to be arguably different ways to pin the concepts down" (Paul, 129).

Paul suggests that because more than one frame of reference is contending for construal and settlement, one way to approach the problem is to "test" the frames of

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reference themselves. According to Paul, this oppositional exercise not only encourages critical thinking skills but requires the students to engage in empathy and reciprocity "which is essential to the development of the rational mind. Only such activity forces us outside our own frame of reference, which, given the primary nature of the human mind, tends to become an inflexible mind set. Unless we counter this tendency early on, it begins a process that becomes progressively harder to reverse" (Baron and Sternberg, 129).

Joan Baron notes that the students' writing should be shared with the teacher and the other students in order to help the students face "questions of clarification, elaboration and justification. Through this process, [students] begin to generate, apply, and internalize criteria of good thinking. They learn to focus and organize. And because they have an audience, they apply principles of appropriateness, credibility, and relevance" (Baron and Sternberg, 232).

In reminding us that people have a primary nature that is "spontaneous, egocentric, and strongly prone to irrational belief formation", Richard Paul makes the following points:

> People need no training to believe what
> they want to believe, what serves their
> immediate interests, what preserves their

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sense of personal comfort and
righteousness, what minimizes their sense
of inconsistency, and what presupposes
their own correctness. People need no
special training to believe what those
around them believe, what their parents
and friends believe, what is taught to
them by religious and school authorities,
what is often repeated by the media, and
what is commonly believed in the nation in
which they are raised. On the other hand,
people need extensive and systematic
practice to develop their secondary
nature, their implicit capacity to
function as rational persons. They need
extensive and systematic practice to
recognize the tendencies they have to form
irrational beliefs. They need extensive
practice to develop a dislike of
inconsistency, a love of clarity, a
passion to seek reasons and evidence and
to be fair to points of view other than
their own. People need extensive practice
to recognize that they indeed have a point
of view, that they live inferentially,
that they do not have a direct pipeline to
reality, that it is perfectly possible to
have an overwhelming sense of the
correctness of one's views and still be
wrong. Unfortunately, the rule rather
than the exception in schooling today is
that students are in countless ways
encouraged to believe that there are more
or less authoritative answers readily
available for most of the important
questions and decisions we face, or at
least, authoritative frames of reference
through which such answers can be pursued.
Students are led to believe that they are
surrounded by experts whose command of
technical and nontechnical knowledge
enable them to settle definitively the
important issues they face socially and
personally. students tend to ego-identify
with the monological answers of their
parents, teachers, or peers. They have no
real experience with dialogical thinking "
(Baron and Sternberg, 130-131).

Students Can Work at Their Own Pace

Journal writing provides the opportunity for students
to dialogue with ideas at their own pace. It allows
reflective thinking about all aspects of a problem.
Journal writing was especially helpful in this regard when
students were wrestling with the different points of view
about AIDS. It allows the student to reflect carefully
and to decide which facts are most important, which should
be made central, and which details are peripheral or even
irrelevant.

Journal Writing in the Technical Writing Classroom

I require each of my technical writing students to
maintain a journal that includes a section for personal
reflection, but that also serves as a practical organizer
for course materials -- class handouts, class notes,
instructions for the word processor, and research notes
for assignments. In addition to the final draft of each
assignment, the student is required to retain all
preliminary work. This includes initial and intermediate
drafts, as well as heuristic exercises they have used in
developing material including brainstorming lists,
exercises in opposing ideas and glosses of earlier drafts.
This historical record allows the student to see his or
her progress through the semester. Review of the material
reveals recurring problems with spelling and mechanical

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skills which can then be "owned" and improved. I tell the
students on the first day of class that it will do them no
good if they leave class at the end of fourteen weeks and
I, alone, know what their strengths and weakness are. The
journal assignment is intended to help them document and
analyze their writing ability. At the same time, they are
building a personal notebook to enable them to reference
the new writing tools they are learning.

How Well-Known Creative People Have Used the Journal

Before they begin writing in their journals, I
provide handouts to show how famous writers, artists,
musicians and scientists have used journals to record and
explore ideas. Leonardo da Vinci's journals, for example,
provide a wonderful example for engineering students,
because his journals are practical as well as creative,
scientific as well as artistic. He explores technological
ideas that he hopes to produce, and architectural works
that he hopes to build, side-by-side with artistic
sketches and anatomical studies. Like the Renaissance
itself, he did not recognize a separation between the
critical and creative parts of his work and his life.

In An Anatomy of Inspiration, Harding describes the
many ways in which creative people have used the journal.
Rosetti had pockets in his painting coat large enough to

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hold a good-sized memorandum-book so that he could note down his thoughts for poetry or painting. Rimsky-Korsakoff, when he began his opera Snyegoorochka (Snow-maiden), bought a large music-book and wrote down in this the themes and motives as they came into his mind. Rather than run the risk of losing some new aspect of character or development of plot, Thackerey sometimes kept his carriage standing at the door for two hours. Palgrave, speaking of Tennyson, said that if a lyric occurred to Tennyson and 'he did not write it down on the spot, the lyric fled from him irrevocably'. Poets have even left their beds in the middle of the night, as Swinburne did, rather than allow some vivid impression to fade away" (Harding, 32).

Having been inspired to record their thoughts, students needed explicit guidance on how to get started. Susan Horton provides a map for this unknown territory by suggesting topics and uses for the journal:

> In this log, you should keep track of how
> much time you spend in each phase of each
> writing exercise. How long (and where)
> did you do your best thinking, reading and
> idea gathering? . . . What did you
> learn that works best for you? What place
> is best for you to write in? . . .
> What really got you writing best: Sheer
> grit? Deadlines? . . .(Horton, 8).

With guidance from Horton, Elbow, Berthoff, and myself, the students began to keep journals. I rely on Horton for information about how to get started. Elbow is most helpful in discussing fluency exercises. Berthoff, however, encourages writers to use the journal, not only to acquire fluency or to better understand their own writing process, but also as a means to dialogue with their emerging ideas. My task is to keep the students working on their writing and their journals.

Using the Journal to Brainstorm, Oppose, and Gloss Ideas

By the time the students actually begin serious journal writing, they are already familiar with how to brainstorm. While reading Horton and Elbow and organizing the notebook itself, they have also been practicing ways to brainstorm ideas and how to group and organize the ideas for further elaboration.

I begin my lecture on brainstorming by discussing the theory of left/right brain dominance. However, I admit that the concept of brain dominance, which I will present, is oversimplified and brief. However, in a writing class, it helps to visualize how the brain controls the writing process in an oversimplified way because it is helpful, in a practical way, to picture using one side of the brain to be creative and the other side to analyze and criticize.

In instructing the students in brainstorming and free-writing, I urge the students to "turn off the critical part of your minds and do not try to <u>correct</u> a sentence at the same time that you are trying to <u>compose</u> it." I explain that, "during this brainstorming exercise you are going to work only with the right side of the brain, the generative part of your brain; concern yourself only with getting your ideas on paper. Don't think about whether spelling or grammar or punctuation are correct--just list ideas. Later you can go back and critique and prioritize your thoughts, but for now just let your thoughts flow".

These brainstorming exercises help the students increase their fluency as well as their ease in writing. Often students see an immediate change in their ability to get ideas on paper. One student related in a class discussion that writing had always been a very frustrating experience for him because he would interrupt the writing process "every few words" to refer to the dictionary for the correct spelling of a word. He had been taught to do this in elementary and high school and had been dutifully following that routine for years. He said that his writing had improved dramatically since he had learned to defer editing his writing until after he had focused on the meaning he was trying to convey to his audience.

At this point, I introduce two of Ann Berthoff's
exercises, opposing ideas and glossing. Glossing is a
kind of paraphrase or summary statement by which the
reader gleans the essential idea of each paragraph of the
text by summarizing it into a single sentence. Glossing
is a tool that can be used in two different ways; first as
a way to understand another's written ideas and second as
a way to review one's own initial drafts. Glossing one's
own writing can provide an improved restatement of the
paragraph, clarification of the original idea, or an
awareness of missing information or a new point to be
added to the paragraph.

Although the students enjoyed brainstorming and
adopted that technique very quickly, glossing is more
tedious and it was accepted more reluctantly. Because
glossing requires some of the same organizational skills
that students use to categorize their "brainstormed"
ideas, students began to refer to them as two different
parts of the same writing project. The similarity and
relationship is reflected in these journal excerpts:

> I've learned to formulate ideas [by
> brainstorming]. These thoughts/words can
> be grouped into similarities which help
> formulate paragraphs. . . This helps me
> see the body of the letter without writing
> my sentences. Once the letter is written
> I can gloss it which takes a second look
> at what I've written and reduces any
> redundancy which may be in the letter.
> This class showed me various methods for

achieving a professional report. I can
now use tools, such as glossing and
brainstorming, to reach my goal. By
brainstorming, I am able to list many
ideas, some good and some bad, and use the
good ideas in a sensible form. By
glossing, I can later go over the report
and bring out the main ideas and make sure
they are in sensible order (O'Keefe).

Other students compared the tool of glossing to the

ancient rhetorical approach of outlining before writing:

Glossing is another effective technique
that I had never utilized until this
technical writing class. I like to think
of glossing as backwards outlining. . .
. you paraphrase each paragraph with a
sentence, when glossing is completed you
can review the sentences to see if your
ideas are presented in a clear and logical
manner (Morey).

Another student compared glossing to:

..backwards flow-charting, which has
become helpful in ensuring that each
paragraph makes a statement and that each
paragraph flows into the next nicely
(Perry).

Ironically, glossing seems to achieve what the

conservative writing instructors want--good organization

and content logically placed within an appropriate format.

One student implied this,

After I have finished my first draft I
will often utilize the tool of glossing.
Taking each paragraph, I write down the
main idea in a sentence. This allows me
to see if my ideas are arranged most

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> effectively to achieve my purpose for the
> audience. It allows me to see if the
> details I have supplied support my ideas.
> It also allows me to see if I am
> connecting one idea to another. After
> glossing I will then generate my second
> draft (Brussiere).

Glossing is the best tool I have found to help students to check the logic and the order of their argument because it requires them to critique their own statements by restating them succinctly.

Opposing ideas can be a way of seeing the relationship between ideas because by opposing two ideas we can sometimes see more about each. Berthoff suggests that one way to oppose an idea is to find passages by several different authors on the subject at hand and look at how they define and use terms and how they develop the concept under consideration. Opposing ideas encourages divergent thought and a better understanding of the subject under consideration. It also provides an ideal way to introduce lexical definitions, synonyms, antonyms and ways to derive the meaning of a word by looking at the context in which the word was used. Students used the technique of opposing words, ideas and frames of reference to better understand the terminology and the points of view surrounding the AIDS controversy.

The Journal as a Tool for Organizing Information

Two students built their class projects around their journals. As a result of the class project, each of them had set up a journal at work which they used to keep a running account of errors in software that they were testing. Although their application emphasized the organizational, more than the creative aspect, of the journal, their projects provided some useful insights about writing for the class. The first lesson was that, in some situations, writing less is writing better. By developing an efficient log format to replace a lengthy narrative, the students made it easier to record, organize, access and refer to the information.

Journal Writing by the Teacher

Elbow suggests that teachers combine journal writing with maintenance of a class log. I used the class log to record the success or problems with new projects and class exercises. This provided a helpful record when planning the next semester's work. Keeping track of my own writing process in a journal was a turning point for me because I saw that I had been following composition principles that hindered and defeated me; I had lacked tools to help me find expression for the ideas with which I was grappling. I was stuck in a process that made my original idea and my first written draft a trap rather than a starting point.

Without tools to explore and play with the ideas in the original draft I was forced to merely polish language.

Berthoff's exercises afforded me another way to focus on process and feel less preoccupied by the final product. Glossing a work-in-progress allows me to see where I am going and has proven especially helpful in writing lengthy papers. For example, in the first draft of the chapter on software, I had written six pages summarizing the grammar-through-writing analysis software-curriculum that I was developing and I had voluminous material to include. I glossed the six pages, and then proceeded through the to-be-added material one page at at time, finding in the gloss-outline exactly where that piece of information best could be added. In a very short and painless time the six pages had increased to twenty-five well-organized pages. By glossing my original six pages I created a structure within which to include the pages of information still to be inserted. Instead of feeling overwhelmed by the volume of material that needed to be integrated and organized, the gloss provided a framework which made the task easy.

Students strongly resisted journal writing at the beginning of the semester but by the end of the course more than half of the class stated in course evaluations that they would continue to use a journal both in future writing projects and in work projects that require organization of information. The journal, especially in

combination with Berthoff's method as a guide, is a very

helpful tool for personal writing and for the teaching of

writing. One student summed it up, for me, when he wrote,

> When I began this course I said to myself,
> "This is just another Humanities Course,
> which I as an Engineering student have no
> need for." But as I began class [filling
> out the questionnaire about writing
> skills] I realized that I had very little
> knowledge of my writing skills. This
> course allowed me to take an evaluation of
> my writing skills. This evaluation showed
> me my weaknesses as well as my strengths.
> The course also gave me the flexibility of
> having access to and working with several
> tools [brainstorming, glossing, peer
> evaluation and software editing tools] to
> improve my writing. Having worked with
> these tools I was able to determine how
> each one could work for me. . . .
> After I have exhausted every one of these
> tools I am then able to sit down and write
> the final draft which in most cases turns
> out to be fairly good. Obviously I was
> wrong about this class being just another
> Humanities course because I have benefited
> greatly from and have enjoyed this course.
> I can say with confidence my writing has
> improved, I am now able to write a good
> paper, you can judge from this paper, I am
> now able to write an effective resume and
> cover letter and more effective memos at
> work (Cummins).

CHAPTER III

AN INFUSION MODEL FOR TEACHING CRITICAL THINKING:

A CURRICULUM PROJECT ON THE STUDY

OF AIDS IN THE WORKPLACE

Using A Controversial Topic to Challenge Students' Thinking

This chapter describes a unit in the technical writing curriculum which encourages students to practice critical thinking skills by challenging them to think in an analytical way about a topic which is complex and difficult, not in its technical aspects, but in the human, ethical, legal questions it raises about how social issues are addressed in the workplace.

Although AIDS is a controversial topic, this assignment did not interfere with the usual skills taught in the technical writing curriculum. All the required units within the writing curriculum were still taught within this assignment, and in some cases more effectively, because students were applying their writing skills to a topic through which they could apply and practice both thinking and writing skills.

Infusing Critical Thinking Skills. There are two
ways to teach thinking skills -- as as part of an existing
subject of study, such as English, Math or Science or as
an individual subject itself. The "infusion" method is
so-called because the teaching of thinking skills is
infused into the existing subject matter. However, in
this project critical thinking skills were not
superficially imposed on the technical writing curriculum
but were emphasized where they naturally occurred as
students worked on the AIDS assignment. Teaching by the
"infusion" method is quite different from the more
traditional approach which teaches discrete critical
thinking skills in isolation. Bob Swartz, in "Teaching
for Thinking" states that

> The conceptual-infusion approach to
> bringing critical thinking into classroom
> activities involves teachers in two sorts
> of conceptual activities that are usually
> not present in traditional approaches. .
> . .First, teachers are involved in
> developing a deep conceptual understanding
> of specific attitudes and skills, and
> second, the relation between these and
> other ingredients we want to include in a
> comprehensive attempt to infuse thinking
> skills into the curriculum is also
> considered. Infusion occurs when lessons
> and units are developed based on these
> activities (Baron and Sternberg, 117).

Writing about a Relevant Topic. I did not originally
plan this project as a long report assignment or as as an
extensive unit; it evolved from what was intended to be a

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short assignment designed to educate the students about how to protect themselves against AIDS. I will describe the project in chronological order, dealing with the issues it raised in both writing and critical thinking, as I proceed.

In the Fall of 1985, at the urging of a friend in the gay community whose knowledge about AIDS was months ahead of what I was reading in the newspaper, I was trying to educate my own sons about how to take precautions against AIDS. In January of 1986, facing a class of thirty young men and women, I decided to use a homework assignment that would require them to do enough research to provide themselves with information about the prevention of AIDS. By focusing the topic on testing for AIDS in the workplace, I made the assignment relevant to my students as future employees and managers. This was the first assignment:

> You are one of eleven employees in a small
> software company. You get along well with
> everyone and have become friends with your
> boss and a couple of other employees.
> It's an informal, but hard-working
> environment. Job descriptions don't exist
> because everyone pitches in where needed.
> The company was purchased by a major
> corporation two weeks ago. Your boss has
> just returned from a visit to the parent
> company in California; she confides in you
> that the parent company is considering
> mandatory testing for AIDS. She is
> leaving tomorrow on a three week vacation
> and requests that you prepare a memo,
> ready upon her return, that provides her

with information about AIDS and whether it
is advisable to test in the workplace.
Write the memo.

Most of the students in the class were unable to
complete the assignment as defined. Their memos were
strictly historical accounts about the disease with a
concluding sentence tacked on to the end stating that
there should or should not be testing. They never tackled
the question of how AIDS is--and is not--transmitted; and
therefore, what arguments can be made for and against
testing in the workplace. When I realized that most of
the students were unable to address the many issues raised
by this problem, I recognized that this assignment could
provide us with the opportunity to write about a topic
that was relevant, meaningful and useful -- while at the
same time providing a vehicle by which to teach critical
thinking skills and writing skills.

Exploring Cognitive Dissonance. Because so many
students had been unable to tackle the assignment head-on,
we began by discussing the possible psychological block
involved -- cognitive dissonance. Peter Elbow, in
Embracing Contraries, describes cognitive dissonance as
"contradictions between various elements of what he or she
knows or perceives", and he argues that the teacher's
function is essentially to heighten the student's

awareness of these dissonances--"to overcome the human tendency to let sleeping contradictions lie" (Elbow 1986, 95). If the teacher can do this, he or she is acting as a "facilitator", forcing the students to learn things that heighten dissatisfaction. Elbow calls Socrates the paradigmatic "teacher as facilitator" because "he kept asking people questions till he uncovered the fact that the person believed two or more things that didn't make sense together; then he left the person to his own itch" (Elbow, 95).

Peter Elbow believes that "at a traditionally structured institution the primary need seems to be to clear a space so that the student can make some real choices. . . In such a situation teaching by "facilitation" of cognitive dissonance - getting the student to teach himself - seems the best answer" (Elbow ,98)

Using Writing To Improve Thinking

As part of the writing curriculum it is important for students to understand how to develop sound arguments and to present them in a logical order that is understandable to their readers. Ann Berthoff in *Forming, Thinking, Writing* argues that the same acts of mind are involved in both critical thinking and composing; that writing and

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thinking are both concerned with seeing and making relationships; that "how we construe is how we construct". Moreover, she does not separate critical and creative writing in preparing writing exercises for students since different kinds of writing still share many similarities and since both critical and creative writing "exercise the forming power of the active mind".

Linking Writing to Making Meaning. Berthoff emphasizes that in both writing and reading the purpose is "making meaning. "One of the reasons that today's students are having such difficulty in writing and in analytic thinking is that they probably studied composition in elementary and high schools in which correctness and proper prose decorum were emphasized more than the clarification of meaning. In most of these traditional classes, students write toward an artificial audience (the examining adult) about contrived and often irrelevant topics and their compositions are evaluated by standards based more on correct usage and grammar than on logical argument or creative expression. Those who urge a return to "basics" usually want more emphasis on usage, punctuation and spelling even though traditional school curricula have long focused on these mechanics with poor results. Others, like Berthoff, abhor a system that may force students to memorize rules without ever

understanding the principles that inform them and that
enable skilled writers to use them—or ignore them—to
advantage.

Berthoff suggests that if students are engaged in a
meaningful writing process, the rules of syntax are easier
to teach as tools that assist and support meaning than as
unrelated rules that dominate the writing process. Janet
Emig, in The Web of Meaning, argues that it is the act of
shaping thought in writing that makes possible the
elaboration of ideas, the establishing of relationships
among these ideas, and the consequent manipulations of
these relationships that we associate with complex
thought.

Learning New Skills/Unlearning Poor Skills. Unlike
work in their technology classes in which the students are
being introduced to "new" technical information, work in
their writing class involves skills and information that
students have been using for years. Unfortunately, years
of practice have sometimes resulted in poor writing
skills, little understanding of the process involved, and
low self-confidence about the ability to improve writing
skills. When asked what he hoped to gain from the course,
one student said that he wanted to be able to write like
others "who had already taken technical writing". This

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student viewed the course as a magical rite of passage that would transform him in fourteen weeks from someone with poor organizational skills and poor mastery of grammar and usage into a competent writer.

Understanding Persuasion. To foster thinking as part of the writing curriculum, I had already tried to avoid textbook problems, contrived toward neat, orderly solutions. The AIDS assignment provided a real-world problem about which there is incomplete, rapidly changing, sometimes conflicting information which the students must evaluate before making decisions and writing. By arguing for or against testing for AIDS in the workplace, students learned a double-edged lesson in persuasion:learning to persuade others is one way to appreciate the fact that we are the audience who is usually being persuaded. Gaining familiarity with how to present information to an audience helps one to read more critically. By planning persuasive strategies, students become better able to recognize strategies of persuasion and to separate logical from illogical arguments.

Advantages of Using a Controversial Topic

for Writing Assignments

The advantages that I have discussed range from theoretical to practical. The AIDS assignment balances an otherwise "dry", industry-oriented, technical curriculum that includes writing instructions, procedures, progress reports, equipment evaluations and hardware/software documentation.

Working as Colleagues. Because the AIDS study was spontaneous and because the facts about AIDS were difficult to establish and contain, I had little more information available to me than other members of the class. My lack of knowledge about the problem, in fact, everyone's lack of knowledge leveled the class discussions in a way that was vitalizing. In the way that I approached the project, there was no authority figure; as the teacher, I was not standing in the wings with the "right" answer and there was no book in the library that provided the solutions. Students had to rely on their own ability to think, evaluate, make decisions on the information at hand, and take a position in writing. The students struggled with the writing problem through class discussions. One student worked in a hospital setting; as an employee who handled blood samples, he was the only

member of the class who had received any education about how AIDS is transmitted. Other students were Haitian; they related their personal experience of having been discriminated against because the media had labeled Haitians, along with gays, as major transmitters of the disease.

Working on One Topic. One very practical advantage of this project was that the entire class worked on the same topic, rather than many individual topics, for their "long report". With thirty students, this made class discussions about approach and strategy much easier because everyone was familiar with the subject matter and all could benefit from discussion of any student's paper.

Because they were working on the same topic, students were able to give each other informed feedback and to use role playing as a technique to explore various points of view with each other. Students often worked in pairs, role-playing first one point of view and then another. This enabled students to anticipate criticism and consequences to the policy statements that they were planning to write. It raised their awareness that written policy affects people and that their writing will be judged, not only now when information is so limited, but in the future when hindsight affords accurate understanding of the disease.

<u>Using Journal Writing to Explore a Controversial Topic</u>

As part of the AIDS assignment, students were able to use journal writing in many ways -- to file research information, explore ideas, mastering and try different styles, approaches and strategies for their final report. Through journal writing the students were able to experience for themselves the link between writing and thinking. Having written in their journals, having discussed and role-played several points of view, the students were more ready to take a written position about company policy on testing for AIDS. After we discussed the original memo assignment, I changed the audience for the memo several times to help students see how purpose and audience influence voice. This strategy developed cognitive flexibility and focused students on writing arguments. First, I told the students to assume that the audience for their statement would be a group of gay lawyers. Having written that, I changed the audience to a group of Southern fundamentalist congress people. Through this dramatic change of audience the students had to struggle with defending the integrity of their policy before audiences who might criticize it in very different ways.

Discovering Language through a Controversial Topic

Reading and writing about AIDS allowed the students to look at language in a new way. AIDS, as a newly discovered disease, provided a timely example of how words are created to define a new subject. The new words, created to explain the new concept, then affect our understanding of the concept itself. Early discussion of AIDS as "gay cancer" or a "gay disease" stamped it with an association that medical officials and the gay community were, at the time of this project, still struggling to overcome.

By approaching the teaching of writing within the framework of a controversial topic, I hope to help students become more realistic about the skills and attitudes entailed in writing. I believe that a change in attitude and approach to writing is more helpful to students than another crash course in mechanical skills.

As future employees students may not have to set company policy on AIDS but they may have to contribute to such decisions or deal with similarly demanding tasks in writing. Writing assignments about relevant, difficult topics invite students to accept responsibility for their writing, and without that "ownership" of the writing process, little progress can be made. In the technical

writing curriculum, students are expected to be able to write professional memos and reports at the end of fourteen weeks. To meet that requirement, it is tempting to assign monologic problems from the textbook. However, being able to write simple memos about simple problems denies students the full experience of writing business documents about multilogic problems. Writing a policy memo on AIDS affords them writing experience that will be helpful in the workplace.

C H A P T E R   IV

AUTOMATED WRITING TOOLS: THEIR VALUE AND LIMITATION

Using Writing Tools to Motivate Interest

in the Composing Process

This chapter describes a unit in the Technical Writing curriculum in which I ask students to use three software programs to analyze their writing for style and correctness. My purpose in assigning the use of software editors is twofold: first, it enables me to introduce students to automated writing tools which will be more aggressively marketed to them in the future; second, it encourages student interest in the writing process. Without an understanding of the composing process students will have no context through which to develop and apply criteria for critically evaluating writing software. By using the automated writing analyzers to engage the student's interest in the composing process itself, software evaluation becomes a vehicle for deepening the students' understanding of language and usage.

As engineering students, half of whom are Computer Science majors, their interest is initially upon evaluating the software programs. My goal, which is to help students more fully understand and master the

composing process, is carried forward by the student's interest in the software evaluation component of the project. As software evaluators, the students must understand what the software is designed to do before they can evaluate whether it is successful and efficient. Automated writing analyzers are expert systems; expert systems are based on rules and the rules on which software writing analyzers are based are the rules of grammar. To judge whether the rules are being properly and efficiently applied, the students need to know not only the grammar rules involved, but also the context in which they are being applied -- in this case, the context of the composing process. Understanding grammar in order to evaluate the software thus becomes a means to an end. By studying grammar in this way, I hope to help them see that grammar rules are not useless rules designed to frustrate them, but a way to further the meaning they are trying to create for and convey to their audience.

Developing Criteria by which to Measure "Good" Writing

The software evaluation project grew out of several class discussions intended to help the students develop conscious, well-defined criteria for writing. I realized earlier in my teaching that many engineering students who enrolled in Technical Writing were unable to describe the skills that go into good writing, so I began to have them

fill out, on the first day of class, a questionnaire that includes queries such as: "Are you a good writer?", "What skills does a good writer have?", What skills do you hope to improve in this class?" By considering these questions the students are recalling, organizing and making explicit what they already know about writing. This recollection and synthesis constitutes cognitive preparation for further study of the composing process. Through this prompted recall, they begin the semester with an awareness that they already know something about writing. They begin to see that they already possess experience, knowledge and skills on which they can base their writing improvement.

To better understand what skills constitute good writing, the students begin by looking at some experts' definitions of good writing. For example, Susan Horton says, "Good writing has to do with putting together what is there in a plausible, interesting and persuasive way". Some California educators use a Writing Proficiency Exam to evaluate whether students are "writing to the point (answering the question), writing with an obvious plan, using paragraphs correctly, and writing in clear and correct English." Ann Berthoff describes composition as a "bundle of parts. . . . What makes [composing] hard is that you have to do two things at once: you have to bundle the parts as if you knew what the whole was going

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to be, and you have to figure out the whole in order to decide which parts are going to fit and which are not" (Berthoff 1982, 47).

Composing and Correcting

After they have started to think about what constitutes good writing, I give students tools that will increase their writing fluency. The tools from which students have benefited most are brainstorming and journal writing.

Only after students have gained fluency and experienced some success with writing, do I turn their attention to proofreading and editing. This attention to correctness is a delicate transition, because most students have become enthusiastic about their ability to generate and organize ideas, and I do not want to hamper their progress or enthusiasm by introducing rigid grammar books. Instead I have chosen to match one new approach with another and have them self-correct their writing with software editing tools.

Using software editors rather than grammar books keeps us in the experimental mode that has been established with the fluency exercises. The software engages student interest because it is a medium which they understand and with which they have been successful. This

familiarity lends a sense of control and confidence that students often lack when using grammar texts. However, I do not introduce these tools in the same positive manner with which I introduce the tools of brainstorming and journal writing. Instead, I take a more neutral, cautious tone and ask the students to help me evaluate whether these programs can actually analyze writing for correctness and style. The software evaluation is, therefore, given as a problem solving task.

In introducing the software, I begin with the question, "Is it possible to check your writing with a computer program? Can you replace a human editor with an inexpensive computer program that will accurately check your prose for readability, grammar and style"? As a way to clarify this general statement, I ask them, "If you were to buy a computer program to check your documents, what features would you look for in the program?" The class used a short brainstorming session to consider which writing skills a computer program might be able to check. They decided that a computer program could definitely check spelling and proper spacing after punctuation, that perhaps the program could check noun-verb agreement and some capitalization. They were divided about whether the computer software could find homonym errors because the computer program would encounter a correctly spelled word. In this way, the students developed a hypothesis about the software that they could test.

Three Software Programs that Analyze Writing

Having discussed criteria for good writing and for
good editing software, the students were ready to submit a
writing sample to the electronic editor. The library
assisted the project by purchasing two write-check
programs for the students, Right Writer and Writer's
Helper. Both of these programs are designed to run on
microcomputers. The third software package is Writer's
Workbench, a program developed by Bell Laboratories to run
on a mainframe computer. Because it runs on a larger
computer, Writer's Workbench is more powerful and suggests
the optimum that is available in computer tools that
analyze writing.

Rather than take a deductive approach with the
students, explaining to them the philosophy and goals of
each software package before they use it, I chose to let
the students discover for themselves what the software
packages are analyzing and why. As the students looked at
what the programs do, they began to identify the
underlying goals, assumptions and philosophy of each
package, thereby using and developing critical thinking
skills.

Right Writer. Right Writer is marketed as an "automatic document proofreader and writing style analyzer" -- "a writing aid to help you create strong, clear documents." Essentially, the author of Right Writer rewards short sentences, active verbs and common words. The program is based on the underlying assumption that "even highly technical information is best presented using a simple sentence structure and as many common words as possible." Right Writer is programmed to consider readability level to be ideal when it falls between grade six and grade ten.

We started with a a short paragraph called "test" from the Right Writer program:

> In the opinion of the writer, we should explicitly prohibit sales people from crossing set boundaries. At present, their are no penalties for illicit selling outside of one's own territory. In fact, this may cause erroneous and inaccessible data concerning sales. In view of the fact that such data is critical and essential to the continued well being of the company, and of the sales force, any such travesties of good selling practice must be prevented.

Right Writer evaluated this paragraph, assigning it a readability level of 11.38, a poor rating for strength, and a warning that some jargon is present in the text. In addition to this short critique, Right Writer creates a file in which it "comments" on the text; students can

access the commented text by typing the file "test.out". The marked-up file suggests that "in the opinion of the writer" is weak, "their are" should be replaced by "there are", "no penalties" is negative and might be rephrased, and "in view of the fact that" should be replaced with "since". The last sentence is flagged as being long (35 words), complex, and containing a verb in the passive voice (be prevented). The corrected output also repeats the readability, strength, descriptive and jargon indexes and prints a list of the uncommon words used. Uncommon words in the "test" paragraph include: erroneous, explicitly, illicit, inaccessible, territory, and travesties.

This is a typical critique by *Right Writer*. In keeping with its philosophy to reward short sentences, active verbs and common words the author of *Right Writer* presents a corrected version of the paragraph that looks like this:

> Sales people must be prohibited from
> selling outside of their own territories.
> This practice is badly distorting our
> sales data. This data is used to plan
> staffing, shopping and advertising. The
> wrong data can result in very expensive
> mistakes. At present, there is no
> motivation for our sales staff to keep
> within their territories. I recommend we
> review sales records and reprimand
> boundary violators.

In submitting this revision to Right Writer we find that because sentences have been shortened the readability level has "improved" by dropping from 11.38 to 8.67, but the writer is still being chided for continued use of passive voice and jargon. The manual includes a second revision which, according to the Right Writer program, eliminates these. The rewritten draft is:

> We cannot afford to let sales people sell outside of their assigned region. This practice is badly distorting our sales data. This data is used to plan staffing, shopping and advertising. The wrong data can result in very expensive mistakes. At present, there is no motivation for our sales staff to keep within their territories. We must set definite boundaries and punish violators.

When this paragraph is submitted to Right Writer the text is returned without negative comment, readability is again lower (and therefore better), and jargon has been eliminated.

In using Right Writer students were very enthusiastic because of the interactive nature of the program and the fact that the computer program made very specific and predictable responses to the writing samples. Although the computer program could not check all aspects of writing its predictability of task helped the students to appreciate that writing consists of some discernible and quantifiable skills. This is pleasing to many students

because it makes the editing task very well defined, and writing skills separable and discrete.

Using computer editing tools is motivating to students. Right Writer takes the writer's text and marks it up just as a teacher might. However, it's pencil is not red, nor is it human. Perhaps because of this, students accept the programmed comments as objective, credible and helpful. The serious attention students give to the feedback is a starting place for exploring what writing and revision are really about. However, the authority the students are willing to accord the software is vulnerable to challenge by contrasting its advice with that of the other programs.

Writer's Helper. Having become familiar with Right Writer, the class then experimented with Writer's Helper to see if there was any difference in approach or performance. Writer's Helper is divided into two parts -- eleven modules in which the students "find and organize a subject" and ten modules in which the students "evaluate a writing project" (Right Writer manual. William Wresch, the author of Writer's Helper, is more realistic in his claims for the program's analyzing abilities. He asserts that the "evaluation" modules of the program "are intended to give students some initial reactions to their writing.

He admits that the programs cannot tell students whether their writing is good or even if it's grammatically correct, but Wresch claims that the software can help students think about their writing in an organized way and help them find errors."

Comparison between Right Writer and Writer's Helper. Right Writer and Writer's Helper work on similar counting and matching algorithms but inform the reader using different formats. For example, while Right Writer comments on the text with a note about "long sentence", Writer's Helper presents a sentence graph to show the reader how sentence length varies within the text, each dot stands for a word:

Sentence graph

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Sentence 1:   ............................29
Sentence 2:   ...............15
Sentence 3:   .....................21
Sentence 4:   ..........11
Sentence 5:   ...........11
Sentence 6:   .......7
Sentence 7:   .........................26
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This format is less critical and more in keeping with current composition theory which suggests that writers vary sentence length for emphasis and for more interesting

readability. However, it pays no attention to the content of the sentences! For example, the student has to refer back to the original text to see if sentence six is short because the writer was trying to emphasize a point or simply because the writer was sloppy.

Like Right Writer, Writer's Helper computes a readability score. However, it checks the readability level against an audience level that the writer must supply before submitting the document for proofing. This is also a less critical, less rigid approach than that of Right Writer because it allows more power and sense of choice for the writer.

Writer's Helper breaks paragraphs into sentences and prints them as a list. This could be a very helpful feature in proofreading if it gave the user the option to double or triple space between the sentences. This would provide the writer with a printout of the document ideally suited to revision; because it doesn't add these extra lines it is of less help to the writer.

Rather than "uncommon" words, Writer's Helper lists all words in the text and indicates the number of times used. This can be helpful in avoiding repetitious use of the same word, as we will see in a later example. In the "word analysis" module, Writer's Helper also checks for certain homonyms and even gives the reader the opportunity

to add additional homonyms to the program. It checks for sexist language by searching for gender-biased words.

Having experimented with both Writer's Helper and Right Writer the class and I submitted a writing sample from our text book, Technically Write by Ron Blicq. Blicq's book is excellent in many ways but contains this "model letter" which I could see, at a glance, would not be able to jump the hurdles of Right Writer:

Dear Ms. Mactiere:

Results of Pilot Report Writing Course

The report writing course we conducted for members of your engineering staff was completed successfully by 14 of the 16 participants. The average mark obtained was 63%.

This was a pilot course set up in response to an August 13, 19xx inquiry from Mr. F. Stokes. At his request, emphasis was placed on giving participants practical experience in writing business letters and technical reports. Attendance was voluntary, the 16 participants being selected at random from 29 applicants.

Best results were achieved by participants who recognized their writing problems before they started the course, and willingly became actively involved in the practical work. A few presumably had expected it to be an "information" type of course, and hence were less willing to take part in the heavy writing program. Our comments on the work done by individual participants are attached.

Course critiques completed by participants indicate that the course met their needs from a letter and report writing viewpoint, but that they felt more emphasis could have been placed on technical proposals and oral reporting. Perhaps such topics could be covered in a short follow-up course.

We enjoyed developing and teaching this pilot course for your staff, and particularly appreciated their enthusiastic participation.

Sincerely,

Stanley G. Roning President

According to the Right Writer messages, Blicq used the passive voice four times, had three long sentences, one complex sentence and some weak phrases. The readability level was higher (12.72) than preferred, writing style was judged as weak and the passive voice was "heavily used". Writer's Helper, of course, evaluated Blicq's letter using similar criteria to Right Writer, but displayed the information in a different format. Writer's Helper printed a graph of paragraph and sentence lengths, flagged "to be" verbs and computed the readability level. It outlined the document by printing the first sentence in each paragraph but this was of limited help as none of the five paragraphs contained more than three sentences and two of the paragraphs were only one sentence in length. The word frequency count was very helpful, however, as it recorded the fact that the word "course" was used nine times in Blicq's short letter. Ironically, no one had noticed its frequent appearance, so we were unsure whether it would be distracting to "the reader" and therefore needed to be replaced or omitted in some cases.

Writer's Workbench. Finally, we submitted Blicq's letter (by way of an ATandT employee) to Writer's Workbench. Writer's Workbench is actually a collection of many programs, each created to gauge a single feature of a writer's work. These modules check spelling, punctuation

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and "to be" verbs in a similar way to the other two programs. However, as a more powerful program, I knew that it would be able to do more than the microcomputer programs to which I compare it. Because my primary purpose is not software evaluation, but the teaching of composition skills, this lopsided evaluation suited my purpose. Writer's Workbench encouraged Blicq to increase the number of complex sentences to prevent "monotony" and to save shorter sentences to emphasize important points within the text. This is in direct contrast with Right Writer which suggested that Blicq shorten his long sentences and replace complex sentences with simple sentences. Unlike Right Writer and Writer's Helper, Writer's Workbench, tutors the writer by suggesting how to combine short sentences and why one would want to do so. For student writers this is an important difference from a program that merely states "long sentence".

The first time that we submitted Blicq's letter to Writer's Workbench, we noticed that the readability was fourteenth grade level. Since we knew that it should agree with the other two programs that had computed the readability level at Grade 12, we looked again at our text and found a missing period. That mistake had gained (or lost) us two years in readability level. It also gained us a helpful suggestion to reformat the run-on sentence (50 words) into a list format. The program suggested that

very often sentences that are this long contain "lists" of information that can be differently formatted for easier readability.

Developing Critical Thinking through Software Evaluation

Before the students knew that we would be submitting Blicq's letter for automated editing, I had asked them to evaluate it and make a list of possible revisions; they were almost unanimous in agreeing that it was a well written letter that did not require revision. Several "hidden" factors seemed to influence their evaluation. First, it is a document written by an expert; secondly it is professionally printed, and third it is part of a book on how to write well. These factors lend credibility so that students assumed that the letter would be "good". Seeing the expert criticized by Right Writer eased the students sense of embarrassment about their own writing samples which had been similarly commented upon.

Evaluating Model Texts. By evaluating Blicq's letter I hope that the students recognize that experts can differ. This implies that one expert can be judged as "incorrect" according to another's standards. By using three software packages I show specific examples of disagreement between experts. This loss of absolute

authority encourages the student to be more active in the decison-making process about what is "correct" writing. By including software that tutors students about why a certain grammar rule should be followed, I emphasize that grammar rules exist for a purpose and that usage is meant to further the writer's ability to communicate clearly to an audience. By submitting Blicq's letter for evaluation and by using three different programs, I enable the students to see that there is disagreement among writing experts. With this knowledge, they realize that the writer must be prepared to make decisions about the use of grammar, usage and punctuation within the context of an individual document to carry forward the meaning and intention in that individual document. I want the students to understand that there is no hard and fast rule about sentence length or voice tense. If one program suggests that the sentences in a document should be short and simple, and another program asserts that the same document contains too many simple sentences, the student must evaluate the purpose of the sentence within the document before making a judgment about correct sentence structure and length. This puts the student in the position of being a decision-maker about, not only content, but also about preferred writing style.

Submitting Blicq's letter for analysis also taught students that the professional appearance of a letter adds credibility to the document. This is an important point for teachers who are struggling with students who regard time spent on typing and producing a professional looking final "product" as a waste of time. Just as students learned from the AIDS research that we are exposed to strongly persuasive writing and advertising, likewise, they realized through this lesson that professional presentation of their writing adds to its credibility. Although polished appearance does not insure "correctness", a letter that appears professional is more likely to be viewed as acceptable. The students began to realize that critical reading is necessary even with experts, even in textbooks. They also saw that without formal criteria they were more accepting of Blicq's letter. Armed with the criteria of the software writing analyzers, they looked more closely.

Assessing Writing Tools. As their final assignment, the students were required to evaluate how well the automated writing analyzers could check specific writing skills. Having researched criteria for good writing skills, they know that writing experts like Emig and Elbow are concerned with making meaning, rather than correctness. By now they see that the computer can be of

no help in checking whether the writer has organized material in the best possible way. It can not recognize whether the student is "writing to the point, writing with an obvious plan, or using paragraphs correctly" (Friday, 114).

The computer performs the task that it knows how to do -- count and match. For example, readability level is determined by counting the words in a sentence and doing other similar counting and matching equations. Right Writer's assessment of the "strength" of a document is largely determined by the length of the sentence -- more counting. Active and passive verbs are matched against lists, uncommon words are matched against lists, jargon is matched against lists. The problem with this approach is that the critical writer must ask, "Are these writing formulas the ones that I need advice about?" Is it important to know the readability level of a document, or is this extraneous, even distracting information?

At the end of the semester we returned to the list the students had developed about the features a writing analyzer would probably contain. In assessing it, we found that none of the writing analyzers were able to accomplish what we had thought possible. Even in assuming that a computer program could check for simple punctuation, we had overestimated its ability and

flexibility. The class decided that the computer program could do one thing perfectly: check sentence length. It also could check each occasion of the verb "to be" but students felt that that was more time consuming than helpful. The program was also able to check for each occasion of passive voice, but couldn't tell whether its use was preferable or even grammatically correct. Students were surprised to realize that computer software was almost entirely unable to correct grammar in a text, nor could it check for clarity, logic of the argument, organization or most of the truly important aspects of what they had defined as good writing.

Having researched, thought about, and discussed the appropriate use of sentence length and active verb the students no longer believed that the short sentences recommended by Right Writer were well written. Ann Berthoff describes such a plethora of short sentences as "boxcar" sentences. Her image describes well these equally short sentences. In such a short paragraph they may be "strong" and "clear" as Right Writer intended but, as Writer's Workbench cautions, those short sentences can become very monotonous in a longer text.

Advantages of Using Automated Writing Tools

Students developed a deeper understanding of the criteria of effective writing and the influence of an "expert's" frame of reference by evaluating computerized editors. To fully evaluate the effectiveness of an automated editor, the students judged not just what the computer did but what it did not do. However, through discussion of the computer's ability to critique certain features of writing, the teacher is able to elicit, in a non-threatening way, the writing skills about which the students feel most uncertain. Finally, studying the features of computerized editing programs enabled the students to further demystify the writing process and realize that writing, like any other subject consists of skills that are quantifiable.

Students learned that a program that purports to "check writing" can be used very successfully to correct some mechanical problems, especially spelling. It can verify other factors, like readability level, but this information may not be helpful to the student writer. However, if by understanding the limitations of the computerized editor, the student can use it to supplement, but not substitute for a teacher, editor or peer reader. The danger this project protected against was the students' desire to accept one expert system as expert and not move beyond it. It allows students to see grammar rules in a new light and to test the rules, perhaps for

the first time. Overall the students seemed to gain from this project a sense of empowerment over their writing. They left the class able to use a word-processor and a spell-checker. Those tools alone, combined with the deeper understanding of writing as a process and as a set of skills, mark an enormous improvement in the professional appearance as well as the quality of the students writing.

From the teacher's point of view, the automated editor may be very limited as a writing tool but it proved an excellent instructional and motivational tool. Although software writing analyzers address the most mechanical aspects of writing, by analyzing those aspects, the students begin to ask deeper questions about the composing process and to discover the important principles of composition which no computer can yet begin to evaluate. By questioning the philosophy and assumptions upon which the programs are designed the students realize that experts often disagree about what is preferred or even acceptable. For example, Right Writer and Writer's Workbench often made contradictory comments on identical text. Because the experts disagree about appropriate sentence length and use of verb voice the students must make a personal decision for their own writing style. This entails research which puts them in touch with authors who possess true elegance and style. The most

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helpful resource in our class pursuit of correct usage was Wilson Follett's Modern American Usage. For example, the students were attentive to Follett's lengthy discussion on appropriate use of active and passive verbs because of the significant difference of opinion between the software programs. Follett's text is illuminating because his discussion of syntax is framed around the writer's intention to make meaning. In explaining active and passive verbs he uses an example to show that usage is determined by the meaning the writer is trying to convey. In a sentence about the Niagara Falls bridge, Follett states that if one is discussing bridges, the passive voice is more correct so that the sentence will read "The Niagara Falls Suspension Bridge was designed and build by the elder Roebling", but if one is discussing builders, it is more appropriate to use the active voice, "The elder Roebling designed and built the Niagara Falls Suspension Bridge."

Follet does not caution, like Right Writer, that the active voice is always better because it is stronger; he links its use to easier readability for the reader. His definition of readability is not computed by grade level; it refers to the reader's ability to understand the writer's intention.

For some students this project provided an
opportunity, for the first time, to study grammar and
usage, not as tyrants that posed as bewildering obstacles
to their writing success, but as tools to further meaning.
Looking at grammar and usage initially with the question
"why" -- "Why does this program check for passive voice?
Why is this program concerned with sentence length?"
brings an objectivity and sense of distance not as easily
encouraged by a teacher's red pencil markings. Submitting
Blicq's letter from their textbook furthered this sense of
objectivity. The students realized that experts, even
textbook authors, aren't perfect writers, by all
standards!

Through this assignment I understood more clearly
Knoblauch and Brannon's admonition that the first question
teachers must ask about "correcting" student writing must
be, as Ann Berthoff says, "what are we evaluating and
why?" Berthoff cautions, "Measurement is appropriate to
what can be measured. Apples and eggs are graded
according to their dimensions, freshness and soundness
being presupposed. Compositions can be factored and
judged in terms analogous to those used in judging apples
and eggs, but the price is too high: we begin to attend
to the factors and not to the process" (Berthoff 1982, 46).
This project, by attending closely to the factors,
illuminates the process.

C H A P T E R   V

TWO APPROACHES TO WRITING:
ANCIENT AND MODERN

Conceptions of Knowledge

The previous three chapters illustrate how thinking skills can be taught within the technical writing curriculum. This chapter explores how the educational philosophy that underlies the teaching of writing determines how writing is taught and how success in writing is measured.

The major difference between the Ancient Rhetorical approach to writing and the Modern Rhetorical approach to writing is the way that each approach views knowledge.

The Ancient Rhetorical Approach Views Knowledge as Static

Knoblauch and Brannon, in Rhetorical Traditions and the Teaching of Writing, remind us that, unlike twentieth century citizens of the world who expect discovery and expansion of knowledge, the Greeks and Romans thought that the truths of the world had already been discovered. "Human knowledge – in the sense of conscious, reasoned judgments about experience – was regarded as essentially complete and stable, a mirror of the way things 'really

are,' a system of revered truths and connections among truths which manifested the harmony implicit in a universe created and governed according to rational plan. The world's harmony existed prior to and independent of human perception, a fact of Nature" (Knoblauch and Brannon, 23).

When knowledge is considered to be complete, fixed, and static, teaching and learning occur under very different assumptions than when knowledge is considered to be evolving and open-ended. If knowledge is fixed, the teacher can "own" it and pass it on to students. Within this context, thought is seen as something that precedes writing; in this tradition there is no concept of thinking and writing as interactive.

In Ancient Times Occasion Dictated Writing Style. In Greek and Roman times the writing style used to present ideas was dictated by the occasion involved. Therefore, different modes of oratory and writing were developed to correspond to different occasions such as political assemblies, law courts, marriages, funerals and testimonials. Aristotle divided these occasions into three types: deliberative (political), forensic (legal), and epideictic (ceremonial). The different types of discourse used for each type of occasion were philosophically different, used different kinds of

reasoning and took different attitudes toward appropriate language. Depending upon the occasion, there was a specific mode of discourse expected and within each category of discourse there were specific parts to be included and a particular order in which they were to occur.

The purpose of each type of discourse was also clearly defined: deliberative oratory was intended to advocate or dissuade from a course of action, forensic oratory to accuse or defend and epideictic oratory to praise or blame. "The concern was to outline ideal intentions as prelude to an equally abstract – and absolute – differentiation of genres (scientific, political, legal, poetic and so on), stipulating for each the kinds of performances suited to the occasions for which discourses in that genre were prepared. Often, for example, the public oration resembled a gymnastic event, where judges know the range of acceptable behavior (say the routines of the parallel bars) and evaluate, not chiefly what is done, but how well a performer does what is supposed to be done" (Knoblauch and Brannon, 25).

These forms of discourse, although slightly modified still exist today; they constitute the "deepest, earliest underpinnings of conservative writing instruction" (Knoblauch and Brannon, 23).

Problems with the Ancient Rhetorical Approach. There
are a number of reasons why the Ancient Rhetorical
approach is faulty. First, it is based on a theory of
knowledge that is outdated and incorrect. Second, the
types of discourse are based on occasions. This can
result in forcing all discourse to fit into a "type" which
is inappropriate. In addition, the ability to categorize
a finished piece of writing as expository or persuasive
does not necessarily prove helpful for instruction in that
type of discourse. Categoriztion does not help a student
know how to get started, or how to get started again when
stuck.

Meaning Is Subordinate to Form. Another problem with
the traditional approach to teaching writing is that it
focuses on form to the extent that it subordinates content
and and the careful framing of ideas. Knoblauch and
Brannon cite an example of student writing to show that in
the traditional approach the teacher's comments suggest
that the most important matter is prose decorum.

An interesting question is, how much 'better' would
this writing be if all the local problems that bothered
the teacher were removed? It seems to us that it would

still be intellectually shallow and rhetorically immature, even if its newly polished surface covered the shallowness and immaturity with a somewhat more pleasing veneer. But the teacher's concern for a salvageable product rather than the writer's evolving meaning accounts for the directive preoccupation with veneer" (Knoblauch and Brannon, 126).

Because a teacher's comments within the modern rhetorical approach would be more concerned with the student's attempt to make meaning, the comments would pose a more "facilitative response, the purpose of which is to create motivation for immediate and substantive revision by describing a careful reader's uncertainties about what a writer intends to say" (Knoblauch and Brannon, 126). In the first draft of a paper, concern for meaning would take precedence over correct form. Correctness of form would be stressed after the student had been helped to clarify the ideas implicit in the writing.

The Modern Rhetorical Approach Views Knowledge as Dynamic

Knoblauch and Brannon trace the evolution of modern rhetoric from its beginnings in the seventeenth century through "diverse, often conflicting schools of thought, French rationalism, British empiricism, Scottish

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common-sense philosophy, French and British romanticism, German idealism, and European phenomenology and structuralism, among others" (Knoblauch and Brannon, 51).

Descartes Challenged the Undynamic Character of Ancient Rhetoric. The beginning of modern rhetoric, according to Knoblauch and Brannon, was Descartes' Discourse on Method in which he challenges "the undynamic and restrictive character of ancient thought" and argues that "knowledge is not a gift from the gods, or a fully achieved inheritance from the past, but a gradual accumulation of insight from a search continuously in progress" (Knoblauch and Brannon, 55). Moving away from reliance on written texts, he stresses the importance of experience and observation as a means to knowledge.

Locke Saw the Relationship between Ideas and Words. John Locke, a British empiricist, writing fifty years after Descartes, "nonetheless asserts many of the same opinions as Descartes about the limits of ancient epistemology, the new scientific method, and the active character of mind in interpreting experience." Locke's contribution was his emphasis upon the importance of language and the underlying connection between words and ideas. To Locke "there is so close a connection between

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ideas and WORDS . . . that it is impossible to speak clearly and distinctly of our knowledge, which all consists in propositions, without considering, first, the nature, use, and signification of Language" (Knoblauch and Brannon, 55).

By the eighteenth century language theorists realized that language is not only closely related to ideas, but more essentially, that it is innate to human beings. Having realized that children learn the grammatical rules of their native language without formal instruction, eighteenth century theorists evolved a more organic view of language which resulted in a "loosening of classical rules of style and a subtler awareness that style is the mark, the expressive signature, of the individual creative intelligence" (Knoblauch and Brannon, 57). This movement away from a rigid, ritualized conception of language to a more free, creative, human, individual conception of language resulted in a view of language "as a verbal intermingling of feeling and perception, or a fusion of 'mind' and 'nature' in expressive acts" (Knoblauch and Brannon, 58).

Kant Viewed the Mind as Formative. Kant introduced the idea that language is mediating, that discourse is not a window through which we view the world but "a mediating

— an enveloping reality in itself, where 'sensation' and the forming capacity of mind coalesce in representation." Kant's theory challenged the empirical view of objectivity which overlooks the fact that human beings writing about material reality are part of that material reality about which they, as writers, are attempting to be objective. The empiricists see a sharp dichotomy between inner and outer: knowledge is considered to be external sensory data which the mind receives and then organizes into ideas. "The mind is, then, initially a receiver and only subsequently an active agency; it is reactive rather than formative or creative" (Knoblauch and Brannon, 59). If the mind is formative in shaping external stimuli, this implies that we bring our own experience to perception and that our personal, social and cultural experience influences what we see and how we interpret what we see.

Without the concept of the forming power of composing, writing is still relegated to a fact-finding, reporting activity. Like the ancient Greeks and Romans, the empiricists see ideas as preceding and separate from discourse. This approach separates not only ideas from writing, it also, like the ancient Greeks and Romans, separates types of writing. Within this context, factual, scientific writing is considered different from and superior to creative writing. Scientific writing is considered to be superior because it addresses knowledge

that can be tested and "proven", whereas expressive writing addresses feelings and ideas which cannot be substantiated by hard facts. Such "soft" data are often ignored or considered less important than "hard" data that can be quantified. Kant reached beyond this limited view to include experience, "the first product which our understanding brings forth" (Knoblauch and Brannon, 58).

Another result of Kant's theoretical framework was that meaning became dependent, not upon the strict interpretation of the words alone, but also upon context. "Hence, the truth of a statement in one discourse — say, 'men can be fathers of children' — does not deny the meaningfulness of an opposite statement which occurs in an alternative discourse: 'the child is the father of the man'" (Knoblauch and Brannon, 58).

Coleridge Recognized that Knowing Can Be Reconstitutive. Coleridge suggested that "there are two sorts of knowledge available from composing. . . . The more typical new knowledge is corroborative. . . . the rarer and more valuable kind of knowledge entails an imaginative reconstruction of the very terms of connection-making within some developing discourse. . . [for example] Einstein's assertion is not essentially corroborative but is, let us say, 'reconstitutive'. It

promises fundamentally altered directions of inquiry; it
is powerfully generative, where the preceding discourse -
Newtonian physics - had begun to lose its creative energy"
(Knoblauch and Brannon, 58). To accept the notion that in
thinking about something we change or reconstitute it, is
to recognize the power of the formative mind and the
dynamic relationship between the knower and knowledge.
Cassirer, Whitehead, I.A. Richards and Susanne Langer
built on this foundation to further explore language and
its effect on the way that we understand what we think
about. From their work, teachers like Ann Berthoff and
Peter Elbow have developed a method of teaching writing
that incorporates the ideas that have evolved from
Descartes through the present. For teachers of writing,
it is not necessary to understand fully the philosophical
evolution from ancient rhetorical beliefs to those of
modern rhetoric. The essential component for teachers to
understand is that there can be a relationship between
thinking and writing and that language can facilitate that
relationship.

The Model of the Garment/The Model of the Melody

Max Black, in The Labyrinth of Language, addressed
the essential difference, in approach to language, between
the old and new rhetoric and framed an image that portrays
each:

Two extreme positions, both much alive, in
spite of their paradoxical flavor, will
define the range of our own choice. The
first is, approximately, an assertion of
the complete separability of thought and
its linguistic expression. A potential
speaker can have a thought, it is claimed,
before there is any question of how it is
to be expressed: the relation between a
thought and its outward manifestation is,
in this respect, like the relation between
a human body and its clothes. A body is
what it is, quite independently of any
suit that may cover it; and a thought is
what it is, quite independently of its
verbal dress. we may call this the model
of the garment.

The second view flatly rejects this
conception: to think of a 'thought' as
separable from its linguistic
manifestation is as absurd as to imagine a
human being without his body. Talk about
a thought is just talk, from another
perspective, about a certain kind of
verbal complex. The relation between a
thought and its verbal expression is like
that between a melody and its embodiment
in actual sounds: the same melody,
transported into different keys or played
on different instruments, still retains
its identity, but the idea of a melody
separate from any acoustic representation
is an absurdity. This might be called the
model of the melody (75).

The ancient rhetorical tradition, presented as the model

of the garment, holds that thinking precedes writing.

Ideas are merely dressed in different garments for

different occasions. Modern rhetoric, presented as the

model of the melody, views thinking and writing as almost

inextricably connected. Depending upon which philosophy

one holds, the teaching of writing will be done quite

differently.

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C H A P T E R   VI

HOW PEOPLE WRITE

Current Curricula often Follow the Ancient
Rhetorical Tradition

Although over two hundred years have passed since
Descartes argued for a dynamic rather than a static view
of knowledge and since Locke argued that there is a close
relationship between words and ideas, one must question
whether this knowledge has been assimilated into writing
curricula. According to Knoblauch and Brannon it has not,
and writing is still taught "as though it were a
mechanical act of selecting prefabricated forms for
preconceived content" . . . [and that] "many writing
teachers still believe, or at least appear from their
practice to believe, that ideas exist prior to language,
that the content of a discourse is wholly independent of
its form, that knowledge is fixed and stable, the
possession of a master who passes it on to students, and
that writing is largely a ceremonial activity." These
teachers are teaching in a way that reflects ancient
beliefs that knowledge (in the sense of conscious,
connected thinking) is separable from as well as prior to
discourse (some means of expression), that a privileged
class possesses, safeguards, and conveys the truth, and

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that writing is merely a vehicle for transmitting the
known to those who don't yet know"(Knoblauch and Brannon,
24).

Writing Is Viewed as Transcription. According to the
Ancient Rhetorical school of thought, the writer first
thinks about the topic, then outlines the well-thought and
clearly-defined ideas and finally, writes them out.
Writing, when it happens this way, might be described as
transcription of thought. For some people, perhaps, this
is the way that writing and thinking naturally occur; they
begin to write only when they are sure of exactly what
they will say--their topic and approach are outlined,
either mentally or on paper before they begin to write,
and the organization and focus of the ideas do not
substantially change as they write them down. They assume
the ancient rhetorical mode because it is their natural
style or because it has become a comfortable habit. For
these writers the separation between writing and thinking
does not seem to impede either function. Perhaps their
style is simply not to think on paper. Many of us are
able to write easily or in a transcription mode when the
writing at hand is either short or simple or both.
Difficulty arises, however, when the document is longer
and therefore requires more thoughtful organization; when
the subject is unfamiliar or complex; or when the writer
must address a skeptical or hostile audience.

When writing "stops", however, the writer doesn't question the way that he or she has been taught to write or the philosophy which underlies that method. The writer more often has a strong sense that something isn't working, something is wrong, and that what is wrong is "me", my technique, my approach, my skills, my ability to write. Most writing books, if consulted during such a frustrating episode, would caution that perhaps not enough thinking or outlining has been done before writing. This may be true in some situations. The question that does not get addressed, however, is how to diagnose the kind of "stuckness" being experienced at the moment, what kind of writing, or what part of the writing process is giving the writer trouble.

Even professional writers and teachers of writing have related their experience with writer's block and other problems. In *Writing Without Teachers*, Peter Elbow talks about his own "long-standing difficulty in writing" and says:

> It has always seemed to me as though
> people who wrote without turmoil and
> torture were in a completely different
> universe. And yet advice about writing
> always seemed to come from them and
> therefore to bear no relation to those of
> us who struggled and usually failed to
> write (1973, 95).

Composition Is Considered To Have Three Stages.

Warriner's Handbook contains a classic example of the kind

of "advice" that writing books often offer:

> In practice, as you know from your own
> experience, a writer begins with a general
> plan and ends with details of wording,
> sentence structure, and grammar. First he
> chooses the subject of his composition.
> Second, he tackles the preparation of his
> material, from rough ideas to final
> outline. Third, he undertakes the writing
> itself, once again beginning with a rough
> form (the first draft) and ending with a
> finished form (the final draft) that is as
> nearly perfect as he can make it. These
> three basic stages of composition are
> almost always the same for any form of
> writing. Each of the three stages
> proceeds according to certain definite
> steps, listed below in order.

> 1. Subject:
>   a. Choosing and limiting the subject
> 2. Preparation
>   b. Assembling materials
>   c. Organizing materials
>   d. Outlining
> 3. Writing
>   e. Writing the first draft
>   f. Revising
>   g. Writing the final draft

Elbow says that for many years he hung the following

quotation over his desk because he saw it as "something

admirable. .   .   . It was an important day when I

finally recognized it as the enemy".

> In order to form a good style, the primary
> rule and condition is, not to attempt to

> express ourselves in language before we
> thoroughly know our meaning; when a man
> perfectly understands himself, appropriate
> diction will generally be at his command
> either in writing or speaking (1973,14).

Both of these quotes show that advice from current
and popular writing textbooks is still often based on the
ancient rhetorical tradition. Thinking is expected to be
done first, before writing; language is still seen as
separate from ideas; writing is still presented as a
progression of stages which are quite distinct from each
other. The ancient rhetorical tradition allows no place
for the reality of the pain and the mystery that
accompanies the writing process for many. Textbook advice
like this often leads us backwards, away from meaning,
away from the discursive power of language that can assist
us in finding the words to say what we mean, away from the
connection between writing and thinking.

Modern Rhetorical Approach Is Based on the Philosophy that Thinking and Writing Are Related

In recent years, Berthoff, Elbow, and other writers
and teachers have begun to acknowledge that the act of
writing may be the vehicle that enables the writer to
determine what the subject, scope and direction of the
finished product will be. Their approach is based on the
ideas that started with Descartes and Locke, that language

not only expresses thought but also makes it possible; that writing is essentially related to learning and to the individual's personal search for coherence in experience; that writing is a manifestation of human symbolic capacities and that the ability to compose is a natural endowment, not a technical skill that must be learned. Modern rhetoric embraces the idea that writing and thinking are related and interdependent upon each other.

> In "Losing One's Mind", Barnett Mandel says, Many misconceptions surround the simple experience of writing. I would like to begin by looking at one of them. It is that writing is or should be the result of what we normally call thinking. In this almost universally-accepted fiction, the story goes that first we think (logically, rationally, even "imaginatively") and then write. The teacher says "Think before you write." "Organize in advance." "Do an outline". An elaborate pedagogy is built on this misconception. We teach students elements of logic, comparison and contrast, five-part essay structures. We spend valuable classroom time discussing essays and short fiction in the belief that this action will connect in some causative way to the students' own writing processes. We use textbooks based on the false assumption (as Moffett tells us in Teaching the Universe of Discourse) that "output of writing must be preceded and accompanied by pedagogical input" (201). All of these activities are predicated on the notion that the writer's conscious thoughts cause the writing to occur (364).

Composing *Is* a *Natural* Human *Activity*. Ann Berthoff not only argues that writing and thinking are interdependent, but that this realization will naturally

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occur if writing instruction does not artificially
separate the two. She says that the process of composing
helps the writer to find meaning because composing is a
natural human activity that we have used long before we
begin writing:

> To observe carefully, to think cogently,
> to write coherently: these are all
> forming activities. If you consider the
> composing process as a continuum of
> forming then you can take advantage of the
> fact that you are a born composer"
> (Berthoff 1982, 46)

"Discovering what you wish to say" could have been
the subtitle of Elbow's <u>Writing without Teachers</u>. In his
book, he discusses "choosing and limiting the subject",
the step that the old school teaches students to do <u>before</u>
writing. Elbow contends that it is a part of the writing
process that cannot be completed before writing has
started:

> Instead of a two-step transaction of
> meaning-into-language, think of writing as
> an organic, developmental process in which
> you start writing at the very
> beginning--before you know your meaning at
> all-and encourage your words gradually to
> change and evolve. Only at the end will
> you know what you want to say or the words
> you want to say it with. You should
> expect yourself to end up somewhere
> different from where you started. Meaning
> is not what you start out with but what
> you end up with. Control, coherence, and
> knowing your mind are not what you start
> out with but what you end up with. Think
> of writing then not as a way to transmit a
> message but as a way to grow and cook a

message. Writing is a way to end up
thinking something you couldn't have
started out thinking. Writing is, in
fact, a transaction with words whereby you
free yourself from what you presently
think, feel, and perceive. You make
available to yourself something better
than what you'd be stuck with if you'd
actually succeeded in making your meaning
clear at the start. What looks
inefficient--a rambling process with lots
of writing and lots of throwing away--is
really efficient since it's the best way
you can work up to what you really want to
say and how to say it. The real
inefficiency is to beat your head against
the brick wall of trying to say what you
mean or trying to say it well before you
are ready (1973, 15).

In the modern rhetorical approach, writing itself is
one of the vehicles that helps the writer to determine
what the subject, scope and direction of the finished
product will be. If writing is a way of working with the
subject under consideration, one might ask if students are
doing enough writing.

Engineering Students Fall Behind in Writing Skills

Chet Friday, in an article in Engineering Education
suggested that engineering students are not doing enough
writing and are falling behind in their writing skills, as
a result:

the evidence indicates that engineering
students and their peers had comparable
skills necessary for writing prior to
entering college. By the last stages of
their undergraduate programs, however,

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> engineering students were less proficient
> at writing than their non-engineering
> peers. It would appear that the
> engineering curriculum is responsible for
> the poorer writing performance exhibited
> by the engineering students. There are
> two major contributing factors. First,
> engineering students do not get the
> practice and instruction in writing that
> many non-engineering students receive as
> undergraduates. Second, as a result of
> their undergraduate engineering
> experience, many engineering students
> believe that problems that do not lend
> themselves to analytical solutions are not
> worth serious consideration.

As Friday sees it there are two major problems. First, that students are not getting enough writing instruction and practice in the curriculum itself and second that students do not take most writing assignments seriously. Friday's hypothesis that students receive inadequate instruction in writing may be borne out by the fact that the technical writing curriculum that now exists at Wentworth Institute was begun because employers of Wentworth graduates and co-op students complained about their inability to write work-connected documents. Providing lots of writing practice is one of the major reasons that I require journal writing as part of the curriculum.

I would take Friday's implication, that students do not give serious attention to the topics about which they are asked to write, one step further. I suggest that engineering students are not only reticent to discuss

problems that "do not lend themselves to analytical solutions", but more importantly do not take seriously those problems that do not lend themselves to technical solutions. This concern is one reason that I began to include a non-technical, human problem in my technical writing curriculum. MIT, later in the same year that I was using AIDS as a report assignment, decided to make basic changes in undergraduate education by placing more emphasis on the social consequences of science and technology. Improvements at MIT included colloquia on issues like AIDS.

Even Top-Level Students Lack Higher Level Thinking Skills in Their Writing. Although engineering students may be hampered by the writing curriculum itself, the problem of poor writing is not limited to engineering students. SUNY, Buffalo which attracts high caliber English majors found that their freshmen "wrote correctly but with a "banality, superficiality, and triviality suggestive of fundamental inabilities to think analytically about complex phenomena."

Writing Is a Way to Teach Critical Thinking

One of the strategies that I employ in each of the three projects is complexity of task. Journal writing encourages students to dialogue with ideas to reach beyond superficiality for thoughtful solutions to a complex problem like AIDS or a seemingly thoughtless solution like relying upon software to do some of the work for us. By wrestling with complex problems, journal writing becomes not just writing practice but writing that includes critical and creative thinking skills.

Ron Brandt, Associate Director of the Association for Supervision and Curriculum Development, recently suggested that "educators, as they consider the critical-thinking-skills issue, be aware of what is perhaps the most important question - how to teach thinking skills in the classroom while ensuring that students are able to use those skills in real life."

Writing across the Curriculum Can Replace "Made-Up" Topics. Writing across the curriculum would be one solution to the problem of finding interesting analytical problems about which to write. By keeping journals and writing about technical problems and technology projects, students would be using writing skills about topics that truly engage them. Without such cross-curriculum

opportunities, however, writing teachers are required to
continue with "made up" problems.

The Modern Rhetorical Approach Naturally Includes
Thinking Skills

Teachers who follow the philosophy of modern rhetoric
are more likely to achieve that integration: to include
relevant topics that require thinking about real problems
and not just searching for the "right" answer from a
textbook; to teach writing skills within the context of
meaning rather than as separate isolated tasks. If
teaching is done this way, teacher's comments are more
likely to to be aimed at helping students clarify the
ideas that they are trying to express than to state what
they "should" have said and how they should have expressed
it. The purpose of student revisions within the modern
rhetorical approach is not only to correct writing
mechanics but to better express the writer's intention.
Correctness of spelling, usage and grammar would be
considered a final step rather than a part of the revising
process which is more concerned with rethinking ideas and
reworking approach. Within this setting the teacher
creates an environment for writing and learning by asking
questions rather than "giving" knowledge.

In "Tolstoy, Vygotsky and the Making of Meaning",
Berthoff emphasizes the importance of attitude and
environment on the learning process. In discussing the
teaching of Tolstoy, Montessori and Ashton-Warner,
Berthoff argues that it is essential to teach in a way
that is compatible with how people learn, that if
composition is a natural activity to humans then teachers
must respect that ability and create an environment in
which it will occur. Unfortunately, this philosophy is
not the one that drives most writing curriculum. Writing
curriculum still tend to follow the "model of the garment"
rather than the "model of the melody".

CHAPTER   VII

CONCLUSIONS

I have tried to demonstrate how the teacher of writing can incorporate instruction for critical thinking skills into the technical writing curriculum. The critical thinking philosophy that I adopted, in designing classroom projects, is that of Ennis and Passmore; I include attention to attitude and problem solving skills within the scope of my working definition of critical thinking.

I have described three writing projects that I used for my technical writing classes at Wentworth Institute of Technology. The assignments that I designed for my students are intended to encourage them to use writing not only to summarize and paraphrase what they are learning, but also to clarify and sharpen the ideas that they are considering. By giving specific examples of projects I have used in the technical writing classroom with engineering and computer science students, I have tried to show how the instruction of thinking skills can be achieved through different kinds of writing projects.

The first project I introduced was journal writing, which is a method I continued to use with other classroom projects. Journal writing allows the students to develop writing fluency while generating and evaluating ideas.

The journal can be used with the activities of brainstorming, interpreting, defining, opposing, and glossing. In these exercises, the students use both convergent and divergent thinking; they develop both ideation and evaluation skills. Brainstorming and free writing exercises help students improve the fluency of their writing; defining, opposing and glossing help them to evaluate their writing. In addition, the students can experiment with voice and style as they work with their ideas in the journal. The journal provides a place where students can reflect upon their ideas, their thinking and their writing in a metacognitive way. As they write, they may be aware not only of the ideas that they are working with, but how they are working with them (in a generative or evaluative way). As they think, they are thinking about their thinking. The writing can be a way to explore ideas or to shape them to present to others. Through the journal, the students can discover and delve deeper into a subject, an opinion or an issue at the pace and in the way that is most comfortable for them.

In the AIDS project, I reinforced the practice of both convergent and divergent thinking skills within the context of a real-world, practical issue. The students learned to research a timely issue and to evaluate their research material for bias, accuracy and completeness. For their written assignment, they were asked to evaluate

the combined research that the class had evaluated on the AIDS disease, and to write a policy position memo on testing for AIDS. In addition, they were required to be prepared to defend their position to others who had decided differently. To help students explore all points of view, the class used role playing exercises. This was helpful because AIDS is a subject about which there is incomplete information and about which the experts disagree. Because of the ambiguity caused by incomplete information and the lack of agreement by experts, it was more difficult for students to make a decision with which they could feel comfortable. Prediction was an important factor in this regard -- by looking forward five years and changing the "outcome" of the AIDS epidemic, the students were able to appreciate how their decision would be viewed by others who had information and perspective that was not available to the students at the time that they were writing their policy memorandum. This project, more than the others which I discussed, helped students to understand the need for combining ideation, research and evaluation skills with the dispositions of open-mindedness and empathy.

The software project allowed the students to practice convergent thinking skills in an arena that was more technical and objective, but in which they were evaluating fundamental writing criteria. Unlike the other two

projects, which were directed more toward information gathering and the exploration of ideas, the software project addressed revision and editing skills. Within this context, however, there was discovery about style and grammar. This project also challenged the students as decision makers. Unlike the AIDS project, in which experts disagreed about new, still unfolding information, these experts were disagreeing about style and grammar conventions about which students expected unanimous agreement. Because both of the projects had elements of ambiguity, the students were required to decide "what to believe or do" based on the evidence at hand, their ability to probe and evaluate that evidence and their own values.

With this kind of open problem-solving approach, the students realized that writing, instead of being the final step in which they summarize what they have learned, can be a method of learning and exploring a subject. Ann Berthoff suggests that writing taught in this way might be a meaningful way of using "writing across the curriculum" to teach content and writing skills simultaneously.

However, to be successful, this conjoined teaching of thinking and writing must be harmonious with the pedagogical philosophy already present and compatible with more general aspects of classroom climate. In Chapter

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Five I noted that teachers, by paying attention to underlying philosophy, rather than individual techniques, can determine which particular methods are compatible with subject matter content and student needs and knowledge. Without the understanding of why a method is used, distortion in teaching practice results: "writing-as-learning" becomes recapitulation of what an instructor has lectured about; "writing-as-discovery" becomes practicing with mechanical "invention heuristics" in order to find something to say; "revising" becomes following an instructor's notion about preferable things to say or better ways to say them; and attention to "process" becomes some arbitrary production formula like "prewrite, write, revise" (Knoblauch and Brannon, 5).

In sum, I have attempted to demonstrate that, by including diverse assignments within a philosophically compatible approach to the teaching of writing, critical and creative thinking skills can be developed along with content knowledge and effective written expression.

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