

USING WRITING-TO-LEARN STRATEGIES:
PROMOTING PEER COLLABORATION AMONG HIGH SCHOOL
SCIENCE TEACHERS

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Dissertation submitted to the Faculty of Virginia Polytechnic Institute and State
University in partial fulfillment of the requirements for the degree of

Doctor of Education
In
Curriculum and Instruction

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April 1, 1999
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Keywords: Collaboration, Professional Development, Science Education,
Writing-to-learn Strategies

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Abstract

Writing-to-learn strategies have been well documented in the promotion of student learning (Poirrier, 1997c). Less is known about how teachers come to use these strategies in every day instruction. This study is a description of the experiences of one science teacher at a large suburban high school who shared writing-to-learn strategies with his department to promote the use of these strategies in daily instruction of his colleagues. The strategies involved 1) improving reading comprehension using paraphrasing, 2) activating prior knowledge using generic questions: who, what, where, when, why, & how, and 3) writing before and after other classroom activities to activate prior knowledge and then better integrate new information. The strategies were shared during informal meetings at lunch. Participation was voluntary. Of the eighteen faculty members, four chose to implement the strategies on a longer-term basis. Follow-up analysis in subsequent years, showed that the strategies were still in use and that the colleagues who used the strategies had passed them on to newly inducted members of the department. Results were discussed with regards to how teachers acquire or decline the incorporation of new teaching ideas in the normal course of their work in collegial settings.

DEDICATION

To my mother Martha Fulford Lawwill and my father, Stanley Joseph Lawwill,
Who asked a thousand times, “How’s the dissertation?”

To my aunt Dr. Margaret Fulford,
One of the first botanists
To identify and catalogue plants in the Amazon basin,

To my uncle Dr. Robert Fulford, Bob Plybon, and Jerry Boling,
Three friends who passed on while this was in progress.
I am sure you’re pleased I finished.

ACKNOWLEDGEMENTS

Apologies to everyone I should have included. Thanks to the many wonderful teachers and thousands of students and parents who have provided so much value to my life. Thanks specifically to administrators and friends Steve Wareham, Dale Rumberger, John Murphey, Lee Cox, and Pat McClure who supported my notion of sharing within my department. John Wittmann, Jr. listened and provided valuable insight in addition to allowing me to grow as an educator. Thanks these past three years to Don Redrup and Tom Kelleher who have listened so well. Of course my anonymous department members deserve great praise for taking the time to listen and consider.

I am afraid that I have forgotten the names and even some of the faces of the graduate students with whom I worked while in Blacksburg. However, some will always be kindred spirits. These would include, but are not limited to, Shirley, Terri, Becky, Susan, Mel, Herman, Steve, Mark, Hal, Mike, Fred, and Bob. I also want to thank those I had the opportunity to work with while they were developing their teaching skills. Thanks Susanne, Andy, Mike, and a dozen others!

None of this would have been possible without the unending support and love of the Morris household: Bev and Casey, I apologize for, and bless you for all the hours I monopolized Butch! You have always welcomed me into your home and I hope our friendship can grow even more now that I will have a bit more free time.

Thanks to all of the wonderful faculty members who were not on my committee who were supportive and informative and good friends. John Burton and Jim Garrison were always ready to have me reconsider every thought. Mike Moore was always there to explain what the next step should have been. Thanks to Tom Sherman who assisted tremendously in arranging my defense. George Glasson always had insightful comments when we discussed my project or when I presented at conferences. Bob Smith was an example of being positive and pleasant and making time to listen and being ever encouraging. Rosary Lalik always had compliments and encouragement. Melanie Biermann was always interested with what was happening and provided the writing survey I used. Jan Nespor taught many of us how to read multiple interpretations from a single passage and provided several suggestions in the literature. Joshia Tlou increased my understanding of the world by at least two continents and also increased my understanding of myself. Darrel Clowes always encouraged me with two words, "Finish it!" A very special thanks to Terry Wildman whose Cognitive Processes course focused my interest in strategies and scaffolding, and who always with the wisdom of a patient older brother would take the time and explain the ways of the academic world.

A better committee, no student could possibly be privileged with which to work. The summer program for Physics teachers coordinated by Dale Long and Tom Teates will always be a highlight of my professional career. Dale Long has a capacity to make the difficult manageable and to clarify the abstract. Thank you for your repeated guidance and particularly for your directions the afternoon prior to my defense. Thanks to Dale I gained so much more from this experience.

Mike Bentley has been an audience member so many times when I have presented that I can imagine he anticipates my every word. Mike has also been the most encouraging person in this process. He's witnessed this develop from a unique perspective: first as an outsider and then as a committee member. I knew that when I needed motivation that Mike's energy would be contagious.

When we first met, Norm Dodl told me that, "I like *how* you think! I am not so sure I like *what* you think!" I knew that I wanted to be as involved as possible with any individual who could separate process from product so clearly. What a unique group comprised that year's Models of Teaching course. Thanks for your wisdom and patience.

Sue Magliaro is an amazing listener. You are also able to envision better ways to approach tasks. You give your all for everyone and inspire individuals to care more about what they attempt. You allow others to accomplish with your ideas and then convince them it was their own idea. Thanks also for allowing a voice of dissension in the Instructional Design course. Imagination and spontaneity are as important as objectives.

When Jerry Niles joined the committee, he never realized what he was getting himself into. Thank you for assisting with the university regulations following Tom's retirement. You are the best practitioner of "win-win" negotiations that I have ever met. Thanks for teaching me to avoid seeing issues only in terms of right versus wrong and instead view differences, as choices for what personally will be most productive. Thanks for your careful readings and suggestions.

There are not words to thank Tom Teates. How many times have you picked me up, got me back on my feet, brushed me off, and pointed me again in the right direction? I should probably offer to pay for your ophthalmology bills for the next few years. In retrospect it has been a good journey, even if it lasted far longer than expected. Finishing this is the best retirement present I believe I could give you. (even though I thought a puppy might be nice.) My professional good fortune this past decade is very much the result of many experiences I have shared with you in Blacksburg and elsewhere: Hawk's Nest, Charlotte, Charleston, the other Charleston, and El Paso. Thanks for your patience and for sharing your world!

THANKS TO YOU ALL !!!

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CHAPTER 1: INTRODUCTION—A JOURNEY BEGINS

Twenty years ago, when I was a student teacher, the students in several of my biology classes wrote compositions entitled, “ My Life as a Phospholipid ”. The assignment was an attempt to try an instructional idea from a journal, and, inadvertently, planted a seed in my mind. The article described a process of having students write while imagining they were the topic of study. The anthropomorphic nature of the assignment facilitated learning. By describing the function and location of the predominate molecule of cell membranes, I hoped the students would better understand cell organelles. Some students really excelled on this assignment, but overall it was a disappointment. Unfortunately, I was looking only at the finished product. I had no conception of how writing and thinking were related. I had no idea how I could have helped them develop and organize ideas. I viewed the assignment simply as a measure of the students’ knowledge of cells. (And if the article referred to the student ownership of material via writing, I missed that point too.) To make matters worse, I was home on break while grading these papers, and I remember sharing with my family examples of the best and the worst. One of my sisters really challenged the general validity of the topic and a huge argument resulted. Perhaps because of the incredibly negative experience with my sibling, I did not attempt this particular strategy again in ten years, though I wanted my students writing more.

My earliest recollections as a student using writing-to-learn are as a freshman in high school. I was enrolled in a world history course that had essay tests and the teacher insisted that we create outlines from which to write the essays. For the first several tests, I wrote the essay first and then prepared my outline. Then, on the next test, while outlining, I realized I had forgotten some important information. I included the ideas in the outline, but there was insufficient time to rewrite the paragraphs. When the teacher was puzzled that my outline contained this extra information, I had to admit I was outlining after writing. When the teacher further inquired, I admitted that I was afraid of having “too messy” of an outline if I made it first. The teacher then informed me that it would be OK to make drafts of the outline and then make an acceptable one just prior to writing. Perhaps some prior teachers made similar suggestions, but I remember this incident as my beginning of writing as a process: first, determining “what” to write, second, deciding upon the sequence of the information, and then third, deciding “how” to say it. I did well in that class and felt a greater sense of long term learning than in other classes that required less writing.

Alas, only much later in high school one quarter only of senior English was devoted to study skills. We were required to “one-sentence-paraphrase” and when I did, my comprehension greatly increased, or at least I did test better. Read a paragraph, write one and only one summary sentence. Yes, it took longer, but the reading was done with a much greater intensity. Rather than just allowing the information to flow past while silently phonetically sounding words in one’s mind, decisions about the “quality” of the information had to be rendered. When I used this technique, I certainly was better prepared for discussions, questions, or quizzes.

As a science major in college, I do not recall much written work. I was apathetic about my grades, and did not pursue learning with much vitality. As a graduate student in biology, one of the first seminar courses required that we write summaries of faculty members’ presentations

describing their research. We had to submit these until the professor agreed that two of our summaries meet his standards. He forewarned us that it would be weeks before our efforts would suffice. Several students approached the task by obtaining copies of the faculty members' most recent publications and used them to guide their writing. They did not realize sometime the latest publication were dated and did not describe the most current research. There were about twenty new graduate students and two of us completed our task after the third week. Our surprised professor asked us to "guide" others who were having difficulty. The graduate students with whom I worked improved rapidly and significantly once they adapted a strategy of first focusing upon content, then sequence, and finally, expression. Sadly, I do not remember employing this writing strategy in my other courses while I completed a Master's in Education and a Master's in Biology. I wrote many papers and may have used the strategy, but I do not recall doing so .

Even though as a high school student, my occasional experiences with "writing-to-learn" had been fairly positive, as a beginning teacher, I was guilty of teaching within the manner the majority of my teachers taught me. After student teaching, I taught seventh grade for two-and-a-half years and my students did very little writing. Nevertheless, I did not rely on multiple choice either. Short answer, fill-in-the-blank, and two-or-three sentence answers were my typical formats. My first two years at high school were similar. Reading assignments, a great deal of lecturing, homework, quizzes and tests designed to sort, etc. I really can not remember what first caused my dissatisfaction with the typical classroom procedures that required the students to process large amounts of information. Students supposedly "learned" the material during the year, but then in June, failed a final exam composed of questions that they had previously answered correctly. Just as I had done as a student during my earlier academic career, my students were only "borrowing" knowledge to pass the quizzes and tests. I later articulated this as "studying for tests rather than learning for life".

One summer, just a few years into my career, I was required to take a Human Relations course. I thought that I did not need the course because I had good rapport with my students. However, the course made a difference. I was introduced to Howard Gardner's Frames of Mind: The Theory of Multiple Intelligences (1983). Additionally, I was exposed to Louis Rubin's Artistry in Teaching (1985). Most importantly, I was reminded of the difference between teaching students and teaching subjects. This idea had been introduced to me by my first principal and my first department chair, who illustrated this philosophy daily in his classroom. The readings for the human relations course described the futility of traditional school experiences. One passage quoted students: "We have to spend a lot of time getting ready for tests. But it's a waste of time because we forget the stuff as soon as the exam is over."(Rubin, 1985, p.17)

To begin to move away from a testing emphasis, I added a personal conclusion to the chemistry lab reports in which students could describe their affective perceptions regarding the laboratory experience. I hoped this would help the students to personalize the knowledge. I additionally added some written assignments, but I did not provide strategies about how to approach them. I was not satisfied with my student's learning and therefore my teaching. I knew I needed to learn more about both subject matter and instruction. I was tired of students passing tests through the year and then failing exams. I was tired of my Chemistry students remembering essentially nothing the following year in Physics. It seemed that as teachers worried about subjects

more than students, the students worried more about grades than knowledge. I wanted to shift emphasis from “studying for quizzes and tests” to “learning for life.” *Within this emphasis on learning for life, strategies for future learning and expression became as important as the contemporary curriculum content.*

For several years I worked in a very diverse, multi-cultural setting. Here I was encouraged to have English-as-a-Second-Language students write to improve their English. I also was fortunate enough to be selected for a summer program. The writing of papers and summaries during this physics program produced my greatest learning results. I was extremely motivated to learn in this program because I wanted to be better prepared with knowledge of content in order to be able to share with my students. It was the first time I really had gone beyond what was required and the first time I approached my courses as opportunities to learn rather than credits for certification. I believed the writing that I did gave me “ownership” of the information. I so “overkilled” the writing assignments that several of my classmates referred to me as “Young Hemingway”. Learning was really fun and I knew I was learning from the writing. Some powerful changes were occurring.

In the fall of 1988, I spent a semester teaching in the Caribbean as part of an exchange program. I contracted a respiratory tract infection and spent the spring and summer recuperating, while taking classes. In the fall of 1989, I returned to the classroom after having my “creative teaching juices revved”. My physics students wrote several papers that year, and I, for once could provide strategies for creative thinking. The process of “Synectics” resulted in several very interesting papers describing the similarity between gravity and love and the similarity of force and money. This initial success led me to seek an even better understand of learning and acquire more instructional strategies.

I returned to graduate school for two years to work with student teachers and pursue further courses. Many, many excellent ideas developed. I again found writing very powerful. I particularly liked the responses to my comments and ideas the faculty provided. A written dialogue existed when time was insufficient for conversation and discussion in class. I was very pleased with the learning that was associated with the writing. I still refer to several of those papers periodically to assess the progress that I am making as a teacher. Those ideas will always be available in their written format. The initial strength of those thoughts are retrieved upon rereading. Thus from my perspective, most recently as a student, writing was extremely powerful. It provided a means for activating prior knowledge, improving reading comprehension and retention of information, organizing my thoughts, personalizing information, addressing questions that were personally relevant, storing information for future reference, and having dialogue with faculty.

During the summer of 1991, I became very interested by the discussion of, and the various definitions that various authors used for “scientific literacy.” Several authors began with the basic definition of literacy: the ability to read, write, listen, and speak. I reflected about the ability levels of the students I had taught with regards to these four skills. I knew that too many of my chemistry students had good quantitative skills of problem solving, and yet, could neither express themselves well nor formulate questions when they were confused. Many of these students were

considered very bright and yet they could not “read” the textbook with comprehension. If I asked some students to read aloud, their articulations of words were excellent. However, when I asked them to describe the significance of what they had just read aloud, most showed the tendency of rehearsal of the initial material and remembering the most recent material. As I recalled my students and their abilities I formulated this opinion: *My students’ inability’s to critically read, write, listen, and speak would be as, if not more, detrimental to their futures than any deficiency of current scientific knowledge.* My concerns that students studied for tests rather than learning for life were verified. Typical high school evaluation was described as “...something to the effect that there are long lists of details so painfully memorized for the test and so painlessly forgotten as soon as the test is finished.” (Hurd, 1990, p.133)

Upon again returning to the public school classroom, I continued to try to have my students write more to learn more. A major controversial news item of that time was the irradiation of meats to prevent spoilage. I assigned my students to read an article that clearly presented both sides of the discussion and then to write a summary and a reaction. Most students described but one perspective. What really struck me were the misconceptions regarding irradiation. Despite a description of the irradiation process both in the article and before the assignment in class, nearly a third of the students perceived the process as injecting the chicken meat with some compound that was radioactive! The power of assessing students’ “real” learning or “real” understanding via their writing was well illustrated. Asking students to summarize or express their opinion or ask their questions was exceedingly insightful.

That school year, 1992-1993, I began to ask the students to engage in activities quite different from their and my prior experiences. I enjoyed teaching more in this fashion because the students generated their questions and “discovered” information that was also new to me. I began to think that maybe a good measure of a successful year as a teacher is how much the teacher learns as a result of the students’ efforts. However, I still hesitated to ask the students their opinion of the techniques “we” tried. Because of the bias to be more interested in grades, I feared the students’ preference would be for the typical short answers and multiple choice. I was hesitant to really know how my students felt.

When I finally mustered the nerve to ask the students about strategies and my manner of teaching, the overwhelming majority of the students responded positively. Listed below are some of the students’ responses when I asked about the strategies and my manner of teaching.

I think you want us to know how to study rather than jamming it in our head(s) and not remembering anything the next year or so.

My impression of what you have tried to teach us is how to improve our study habits. Your goal has not been only to teach us chemistry like all other teachers who only teach their subject. You are the first teacher that really seems to care that the students actually learn not only to make grades. It’s hard to get use to but it is a nice change.

Your not just trying to teach chemistry to us, but you are trying to help us learn better study skills, (which I see now most all of us need), and just to better ourselves as a whole.

Perhaps the kindest statement was a senior's comment in the box next to his picture in the 1994 yearbook was:

...I thank all my teachers I was privileged to have, because they've given me an education. I'd like to thank Ken Lawwill who taught me many ways of learning, and that you can make it fun.

The next year I transferred to my neighborhood's high school and no longer had a long commute. With the extra time, I knew I could greatly increase the use of writing-to-learn strategies. Many of my students thought it odd that I placed so much emphasis upon writing in an Earth Science class. In previous years, many of my students were E.S.L.(English as a Second Language). They lived in a household in which the primary language was not English. I had anticipated that my new students would have much more experience and proficiency with English and with writing. To my surprise, the students did not seem particularly more adept at writing than had my former students. Even more surprising was how vocally they initially objected not only to assignments but also to topics. When I announced we were about to start a "fascinating section of meteorology", that we would be studying hurricanes and tornadoes, a student immediately blurted out, "Oh No! Not Again!" I asked when he had last studied these phenomena and he replied, "Last year." As I was trying to best meet the needs of the students, I decided to determine how much knowledge the student possessed regarding the two types of storms. I asked where was the origin of each. At that point, the student became very upset and stated, "Hey! Why do I have to do this again? I made a "B" on it last year. I repeated my question. He did not know. I asked which had a tropical origin. He did not know. I asked which had higher wind speeds. He responded, "I don't know, but why do I have to study this stuff again? I made a "B" on it last year. I asked if other students were certain of the answers to my questions. Very few hands were raised. I then asked, "How many of you studied these storms last year?" Almost all of the students' hands went up. In hindsight, I wish I had asked to what extent they had written when "studying" these natural phenomena. My guess would be that they had completed the appropriate fill-in-the-blank and multiple choice. They may have studied for grades, but the learning was very limited.

As that first year at my new school progressed, the students accepted or at least tolerated my emphasis on strategies and writing. I was pleased with the outcome of most of the assignments. Perhaps my favorite exercises involved studying seashells. The idea was to notice the beauty and variety of the shells. One student wrote a description of a shell and then peers read it without seeing the shell. When they finished reading, the peers looked the shell and suggested revisions were exchanged and new groups were formed. A third group of students assessed the quality of the revised descriptions by how closely their mental image from reading matched the shell. Some incredible descriptions came from the students' own language. The class will always remember two examples of students' descriptions I believe. One referred to the shell as appearing, when placed upon edge, as the silhouette of the Bald Eagle profile used by the U.S. Postal Service. Another referred to a metallic shimmer and triangular-cone shape as appearing like those on the front of the upper torso of the pop singer Madonna's costume.

Later that year, I delivered my first presentation about writing-to-learn strategies at The Virginia Science Academy Meeting in Harrisonburg. While preparing my materials, I asked my students if they had comments regarding the writing-to-learn strategies and whether they were effective. I was particularly interested because it was the fourth grading period and I had agreed that if the students would use them for the first three quarters, then I would then allow them to choose whether to continue to use them. One of my freshmen surprised me with this comment: “The study techniques really work because my grade was higher the first three quarters when you made us use them. Now that you don’t, I don’t, and my grade has dropped.” At the end of this year I did ask the three seniors that I taught to evaluate my teaching approach. All three recommended that I continue to emphasize strategies.

Also, Mr. Lawwill exposed his students [to] many new ways of learning. Using techniques like “3CNT ” and “IRC ” showed students other ways of remembering information.

Definitely emphasize all of the different strategies that help students learn better study habits. (They helped me out more than you could know—even if I did complain.) If your students can’t appreciate it now, they will in the future. Many times I have been upset about doing the “IRC” or “three column note-taking” because I felt it was a waste of time. I felt I was too old to be checking my work and being so diligent. I was wrong. Those exercises, if nothing else, showed me I still have much to learn.

In my opinion, you should definitely continue to emphasize learning strategies. It seems as if the majority of students in high school today have poor study habits and little knowledge of the various learning techniques. The reason being, [is that] up till now we have only been taught course material. No one has really given helpful hints or suggestions along the way.

I did provide the freshman (n = 117) a survey and their responses were overwhelmingly in favor of continuing to emphasize learning strategies. Thirty-four percent of the students reported using at least one of the strategies from Earth Science “frequently” for another class. An additional forty-four percent said they “sometimes” used one of the strategies for another class. Only twenty-two percent reported never using any of the strategies for their other classes. When asked, “how much emphasis should be given to the strategies”, twenty-nine percent felt all strategies should be used the same amount or more. Only three percent felt that the strategies should not be used at all! This was a stunningly pleasant surprise for me considering how distraught and vocally objecting some students had been earlier in the year. Though initially resistant, my students adopted the strategies I suggested and I in turn received positive feedback from the students, their parents, and administrators. I had confidence that 1) the strategies were assisting the students, and 2) I would have administrative support to continue to pursue such endeavors.

I remember commenting to one of my colleagues from another department how pleased I was with the students’ responses. The colleague’s response was, “You can not put very much faith in that. They were just saying what they thought you wanted to hear.” I have pondered that thought for years hence. (In Chapter Nine, I will address my “conclusion” regarding that comment.)

The next school year, 1994-1995, I worked with quite a few seniors in Physics and some in Consumer Chemistry. One group was certainly college bound; the other might tend to first take classes at the community college. I used “writing-to-learn” strategies with both groups and felt both groups benefited. Though I was primarily concerned about the physics students developing improved literacy skills for college, I was shocked to realize the impact upon the learning of material by less academically oriented students. (I will further describe the successes as the strategies are introduced in Chapter Three.) I was also surprised that my new junior and senior students, two or three years ahead of the freshman I had taught, had so few strategies or techniques for learning.

During that same school year, an opportunity arose to share strategies with my colleagues in the science department. I thought it would be a good research opportunity for my dissertation. In the fall of 1994, the county’s school administration expressed a desire to incorporate more writing in all content areas. I polled our department regarding writing during a December meeting. Many positive benefits of writing were mentioned. According to the department’s faculty, more writing was not utilized because 1) time concerns; 2) lack of confidence regarding grading; and 3) a lack of knowledge regarding writing techniques. Almost all of my colleagues showed interest with respect to what I proposed. Sharing several of the techniques I was using seemed a very straightforward task. This was a topic I had been pursuing for several years and I suggested to my colleagues that I could share some ideas that would meet the county’s demands, be instructionally sound for our students, and improve the rapport between the students and the faculty. I was certain that writing was indeed well documented as a powerful tool for learning and assessment. I believed that writing-to-learn stimulated students thinking and communication skills and I also believed (and still believe) it was the best avenue to encourage students’ questions. I was also “100% certain” that I “knew” that I could successfully share my ideas with my colleagues. I also let it be known that such a sharing activity could be the basis my dissertation research. This was of course necessary from an ethical viewpoint, but it provided an ulterior motive for my colleagues to participate. I was hoping to positively impact their teaching. They wanted to help me earn a degree.

In the spring of 1995, I proposed a study to my graduate committee that had as its purpose, “...to encourage the use of some writing-to-learn strategies in our classrooms.” “Our” referred to sixteen of the eighteen science teachers at suburban mid-Atlantic region high school who had expressed an interest during the December meeting. The measure of our success, as written in my prospectus, was to have been,

...whether we add these strategies to our teaching repertoire [because] we believe there has been improvement in our students’ writing abilities...[and improved success with the courses’ materials].

I knew that I needed to address several issues in the literature to be sufficiently prepared to facilitate our group. I needed to 1) solidify my understanding of writing-to-learn; 2) review prior examples of collaboration; and 3) reference examples of success. As I engaged the literature, I broadened my foci, but I did not heed any of the warnings I encountered. I was certain that I did

not need to worry, I had “fool-proof” ideas and besides, I would be working with colleagues, and better yet, friends. Even when my committee cautioned me to reconsider my expectations, I charged ahead.

The next chapter describes my initial “review” of the literature. Chapter Three describes the particulars of the study plans with Chapter Four describing the actual occurrences and initial data. The shock of reality continues in Chapter Five, a discussion based upon my immediate reactions to the outcomes of the study. What follows in Chapter Six might be considered by some as an incubation cycle while others may think it a period of mourning. Finally I realized I needed to re-investigate the literature, and the results of reviewing and expanding the literature review are presented in Chapter Seven. With a broader perspective from the literature and more recent additional information from participants, Chapter Eight is indeed “A Wiser Discussion”. Chapter Nine attempts to bring continuity if not closure to several years of pondering, speculating, and finally realizing what did happen when an enthusiastic science teacher attempted to introduce new ideas about pedagogy into the everyday practice of his colleagues.

CHAPTER 2: AN INITIAL LITERATURE REVIEW

A literature review should be "...a thorough survey of what is already known in the area of interest"(Ary and collaborators, 1985, p.56). These authors provide the following functions of the literature review. (pp.56-57)

1. ... Enables investigators to define the frontiers of their field.
2. ... Enables researchers to place their question in perspective.
3. ... Limit their question and to clarify and define the concepts of the study.
4. ... Often leads to insights into the reasons for contradictory results in an area.
5. ... Learn what methodologies have proved useful and which seem less promising.
6. ... Avoid unintentional replications of previous studies.
7. ... Places researchers in a better position to interpret the significance of their results.

Unfortunately, I did not have these tasks in mind and did not gain as much from the literature. The degree of confidence I felt was so tremendous that I read with a most biased eye. I was certain that my colleagues would collaborate. I was certain that they would experience success with the writing-to-learn techniques I had to offer. I was primarily focusing my attention to why strategies, and in particular, why writing-to-learn worked. I skipped the pages that described others' frustrations because I was certain that I would not have difficulties. I was so completely certain, I could have replaced "was certain" in the preceding sentences with "knew". I approached the literature not with an open mind, but with a small specific set of questions and needs.

I wanted to be sure that I could explain why writing-to-learn strategies were needed. I wished to expand my number of strategies. I sought a theoretical basis for my practitioner's knowledge. Several techniques I used "seemed" to work, but I could not explain "how" or "why". Another reason for further studies was to develop an ability to assess and modify suggested instructional practices whether these ideas were from county edicts, colleagues' suggestions, or my own readings. Additionally, I wondered if others had felt a responsibility to share with their colleagues. As I read to fulfill these needs, a few other points arose, such as distinguishing between "writing-to-learn" and "writing across the curriculum".

The sheer number of sources that dealt with writing was overwhelming. Even with reducing the focus, excluding all but "writing-to-learn", the volume of sources was impressive. I also noticed that there appeared to have been several "waves" of interest. There seemed to be many sources from the early and latter nineteen eighties, far fewer from the nineties. In addition to providing "new" ideas to try with my students, the sources provided reasons to write, mechanisms of learning, and also the importance of allowing the students to use their own language. It was easy to find articles that supported my beliefs.

This review section is divided into fifteen sections. The first considers the literature supporting a need for "literacy" in all classrooms. The second section emphasizes specifically, the

need for more writing. Comparison and contrast of three movements follow: the emphases of improving written performance; writing for assessment; and “writing-to-learn”. The latter sections focus upon further descriptions of strategies and successes of “writing-to-learn”.

The Need for Literacy

While opinions differ as to what is trivial and significant in education, few would deny that a mastery of basic skills and a command of fundamental information are essential. (Rubin, 1985, p.28)

Writing is obviously a basic skill. The question remains what is the proper balance among process skills and content? Barrass (1982,p.4) argued that more writing is needed rather than more information. Gere (1985, pp.4-5) stressed that students need to develop thinking skill because memorized facts would rapidly become obsolete. West (1985, p.179) emphasized “...that the most valuable thing...is the knowledge of how to learn it.” West also stressed the need for students to develop confidence in their abilities.

My belief of improving overall literacy while teaching science was very strongly reinforced when I read an article by Dr. George Bugliarello, President of S.U.N.Y. As the opening speaker for a “Technology Literacy Symposium”, Dr. Bugliarello made a very straight forward, unequivocal and obvious statement which since the initial time I read it, has been my talisman. I believed, and still believe, it is one hundred percent correct.

Technology literacy is meaningless without basic literacy! This should be a self-evident proposition, but needs to be constantly underscored. (Bugliarello, 1992)

We enter an age of information overload via the InterNet with a population of students, too many of whom still cling to the belief that “if it is in a book, it has to be correct”. I am frightened when I consider the inability of students to discern conclusions from conjecture, to discriminate fact from opinion. But what are the necessary skills needed by the typical student?

TheodoreSizer suggested a reconsideration of literacy and changing the focus of schools. He believed that too much of our educational resources are expended to attempt to produce results that are neither desired by our students nor truly beneficial to society. Strongly advocating mastery of a much-reduced curriculum, Sizer recommended reducing the requirements of compulsory schooling to “literacy, numeracy, and civic understanding.” He further described his conception of literacy.

Literacy means more than merely skills in decoding words. It means the ability to comprehend and understand ideas and arguments to a degree that allows the individual to use them. Literacy implies clear thought; that is one must read easily and sensitively enough to comprehend at least the basic arguments presented by contemporary political and social life. Without that ability and the correlative ability to present such arguments oneself orally and in clear writing, a citizen can not fully participate in a democracy. (Sizer, 1984, p.86)

Others who have advocated an emphasis of literacy preceded Sizer. I remembered a faculty member's description of a book by Jerome Bruner that had worldwide acclaim. I purchased it years later in a used bookstore. Out of curiosity I checked the index to see if "writing-to-learn" was mentioned. It was not, but "writing" had several pages. The passage below emphasizes the necessity for sentences instead of fill-in-the-blank, and paragraphs instead of sentences.

Written speech may bear the same relation to spoken speech that algebra bears to arithmetic. A written word stands for a spoken word used in any context whatever. A spoken word "stands for" a thing or state or thought—not another word in a different medium. In written language, no interlocutor is presupposed and none is there. Spoken utterances are normally determined in large part by the demands of a dialogue, with the interlocutor helping frame our decisions about what requires saying. Whoever uses written speech must detach himself from the immediate social interaction altogether and conjure in his own mind a situation appropriate to the written words with which he is dealing.

Let me suggest, then, that by virtue of its very separation from intermediate dialogue, the act of writing creates a new awareness about the nature and powers of language. (Bruner, 1966, p.111)

Ever since I read this passage and that wonderful analogy, "...speaking is to arithmetic as writing is to algebra...", I have not hesitated to ask students to write. I have also used an analogy of a stack of building supplies may have the exact same materials as the assembled house, but which is of more utility and which is worth more? (And which can you share more with others?)

The Need for Writing

The literature contained many powerful statements that explained the need for writing and its role in learning. Every imaginable aspect of writing regarding "who, what, where, when, why, how, so what, and what if" was well documented. Moores and colleagues (1982, p.ix) insisted that teaching literacy "certainly ranks near the top" of teachers' responsibilities. Bechtel (1985, p.5) believed with "more emotional overtones" that writing is "central to learning". Barrass (1982, p.ix) wanted writing in all classrooms because "the ability to express oneself is an essential basis for success." Walvoord and colleagues (1982, pp.5-6) emphasized that, "Writing and thinking are much more closely interwoven than conventional wisdom then has acknowledged..." Or straightforwardly stated by a student interviewed by Gere (1985, p.1), "Writing makes more thoughts in my head."

Barrass (1982, p.1) emphasized the numerous types of writing undertaken as an undergraduate, and the importance of quality writing particularly when taking notes and answering examination questions. Writing was the tie-breaker: "In any subject, if students are equal in ability and intelligence, those who are able to convey their thoughts clearly in writing will get the better marks." More importantly than enhancing opportunities for employment, Betchel (1985, p.1) stated writing was also necessary for reaching one's potential because, "The same skills also help synthesize observations, organize personality, and establish a constructive self-

concept. In short, writing is central to the fullest attainment of human potential.” From Betchel’s perspective, our ultimate growth could be limited by limited writing skills.

Last decade, Appelbee and colleagues (1986) found that fifty-seven percent of fourth graders enjoyed writing, but that number dropped to only thirty-nine percent of eleventh graders. Worse, with an evaluation scale from “unsatisfactory, to minimal, to adequate, to elaborated”, *less than twenty-five percent of eleventh grade writing samples were deemed minimal or better!* Langer and colleagues (1987, p.4) agreed with Applebee and colleagues (1996, p.10) that students wrote too infrequently. Both groups also thought the assignments were too short and insufficiently thought provoking. Perhaps most shocking was this finding regarding longer length written assignments:

We found that students were spending only about 3% of the school time –in class or for homework–on writing of paragraph length or longer.” (Applebee, 1984,p.2)

The National Council of Teachers of English studies of the seventies and eighties indicated that there were too few opportunities for students to engage in *composition* (originating, organizing, & developing ideas) and too much emphasis upon *transcription* (grammar, mechanics, spelling, etc.). An overview of their publications included these conclusions:

- 1) That writing has a role in all subjects, not only in English.
- 2) There is widespread confusion about how to use writing in classrooms.
- 3) Almost all writing at length is done for the purpose of evaluation.
- 4) Almost all writing activities students provide information without constructing text.
- 5) Students are more likely to receive critique when done rather than assistance during the composing process. “In part because of these limited uses of writing, writing is more likely to be assessed than to be taught.” (Applebee, 1984, p.184)

For many reasons that will be discussed later in Chapters Five and Eight, teachers avoided assigning writing despite the evidence indicating the need for its inclusion and their own personal beliefs that writing is important. Without intending to, by not insisting upon written work, we reinforced the disastrous notion that writing was not very important (Bechtel, 1985, p.3). The overwhelming use of multiple choice assessments allowed students to “...receive much practice selecting correct answers, but relatively little instruction in developing their own answers.” (Moore et al., 1982,p.106)

There was little disagreement that students needed to write more. What was in question was the purpose of the writing. A more traditional perspective (and the one still currently encultured in the high schools) was that writing should be required to improve writing and used to demonstrate learning. These ideas are discussed in the next two sections.

Writing for the Purpose of Improving Writing

Many teachers do not want to engage their students with written assignments because the students do not write well. Betchel (1985, p.3) countered this perspective, "...because writing is poor is all the more reason for teachers to engage their students in writing." What happened to innovations to improve writing? What happened when the focus of writing was correctness of grammar, spelling, mechanics, etc.? In interviews conducted by Stevens, (1985, pp.215-216) two students' comments were particularly insightful. Their two responses initially seemed at extremes. Due to their "formulaic quality", the first student seemed to find the assignments of little bother, and the second student seemed to dread them. However, both students thought very little about content when they wrote in the traditional formats. The first student, apparently excellent with the transcription skills, literally claimed to pay no attention to what he wrote. The other student had to temper her thoughts so as to not block-out the rules of transcription she was trying to remember.

Proper written language is important, and hopefully, writing in classes other than English would aid its development. As Betchel (1985, p.4) suggested there was no motivation to work on transcription in English if writing was not performed in other classes. Further, this author suggested why there was such a dislike of writing by both teachers and students.

Perhaps we have become slaves to a demand for perfection in writing that is unexpected in other endeavors. A more realistic view of risks and pleasures of writing might encourage both students and teachers to do more of it. (Bechtel, 1985, p.4)

Parker and colleagues (1987) expressed great displeasure with an emphasis of writing solely to improve transcription. Further, they warned that a failure to include the use of language for learning limited what could be learned. The realities of the world would not be comprehended if learning language were a stifling experience of correctness of form. These authors argued inaction or incorrect action regarding issues such as nuclear weapons, poverty, environment, etc. would occur because of a "failure of linguistic imagination, a failure of symbolic creativity, not a failure of correctness in spelling or punctuation or grammar or essay form." (Parker et al, 1987, p.7) Hobson and colleagues, (1990, p.55) reflected about what constituted learning and concluded what were described as writing assignments were not involving higher thinking.

Writing for the Purpose of Assessment

To use writing solely as an instrument to evaluate students' learning is to restrict it. Writing, as an act of cognition, can help students to learn if teachers encourage a variety of writing activities. Though writing uses 44 percent of classroom time, most is mechanical, such as taking notes, filling in the blank, performing calculations, and writing brief phrases or sentences. And, almost all such writing is done so that the student can demonstrate to the teacher that they know something (Fulwiler, 1982, p.15).

Writing needs to be pursued to assist the learning process rather than just assessing it. Perhaps then it is not the typical paper or essay question that assists learning because "... There is some

question as to how writing to show learning has helped students”. (Gere, 1985, pp.1-2) This statement reminds me of my personal perspective regarding teaching versus sorting. “The ostensible purpose of informing someone of something they already know may well, indeed, seem like a pointless activity from a common sense view in the real world.”(Brookes, et al., 1990, pp.14-15) This less than desirable situation was further diminished because teachers frequently were “looking for hints” of some of “the desired material” and then would “construct the “argument” that” made the point of the essay. (Applebee, 1984, p.3) Was it not in the teacher’s best interest to “read” as much as possible into the students’ writing? Did this also not distort the students’ perception of their ability to write?

Writing for the Purpose of Learning

The advocates of increasing the amount of student writing were concerned about more than just the students’ capabilities to write. They were also concerned about the inability of the students to think. Both Applebee and colleagues (1986, p.11) and Langer and colleagues (1987,p.4) acknowledged that school succeeded teaching lower level skills. Both lamented the absence of teaching of higher level thinking skills. Langer and colleagues (1987, p.3) stated the importance of writing and improving writing: “...to improve the teaching of writing, particularly in the context of academic tasks, is also to improve the quality of thinking required of school children. ... Written language not only makes ideas more widely and easily available, it changes the development and shape of the ideas themselves.” Gere (1985, p.4) mentioned that the slower process of writing enabled the brain to consider alternatives and thus writing was “... uniquely suited to foster abstract thought.” Then why was writing not utilized more? “ Nearly everyone believes that reading is *the* basic skill,” according to Fulwiler, (1987, p.1), “ What *isn’t* generally acknowledged is that writing is basic to thinking about, and learning, knowledge *in all fields* as well as to communicating that knowledge.”

The improvement of transcription by all students was a good goal. Students writing more were a good goal. But how was “writing-to-learn” different from these desired improvements? “Writing-to-learn is learning to think on paper, about what the students already know and how that fits with the new information being studied in our curriculum.”(Forsman, 1985, p.162) What did “writing-to-learn” mean? I liked the definition used by the University of Michigan faculty when working with Detroit middle and high school teachers. “We defined writing-to-learn as **writing with a primary purpose of improving thinking and learning about course concepts.**” (McKenna, 1991, p.7) Writing-to-learn involved the students utilizing writing much more frequently. In addition to improved thinking, with feedback, and more practice providing feedback, students’ transcription should have improved. These ideas had a long history; recently I found a 1941 text, Writing and Thinking, by Foerster and Steadman. The title was somewhat misleading as the book focused upon composition and revision. However, on the opening page, the very first sentence stated: “Writing and thinking are organically related to each other.” A paragraph later the authors explained that most writing assigned to students was “ mechanical ” with the topic forced to fit a predetermined format. In contrast, “organically” written pieces acquired a form appropriate to what was said. (p.3)

How pleased I was to realize that over fifty years ago two emphases of my beliefs had already been expressed. The first dealt with the impact of writing formats. Rather than freely focusing on the content, the students were restricted by form. The second emphasis was that as the quality of thought grows so did the quality of writing and visa versa. Thoughts and their expressions grew interdependently. In an ecological setting, we might claim they developed with a “coevolution”. Gere (1985, p.5) contrasted writing-to-learn with writing-across-the-curriculum. The former stressed “better thinking and learning”; the latter aimed to improve the quality of writing. Improved writing is a “side benefit” of writing-to-learn. Several studies indicated, “students acquire information effectively by writing about it” (Emig, 1977; Newhall, 1984). Additionally, the more in-depth writing often lead more complex student thinking. (Moore, and colleagues, 1982, p.106) Further reflection reminded me of Mayher and colleagues (1983, p.1) introduction regarding writing-to-learn as both a means to improve writing and a means to improve learning of content. These authors stressed that writing was necessary for ownership of knowledge, constructing new information with prior knowledge. In contrast, more typically, students were asked to absorb from the teacher and return the information during examination. Returned in the teacher’s format, this information was very likely not relevant or meaningful for the students.

There was little doubt that the ability of an individual to learn was enhanced by improving reading ability. There was little doubt that the ability to formulate and ask more meaningful questions improved ones ability to learn. Likewise, the more one read and the more questions one asked the more learning occurred. So why did it seem odd that writing was also powerful with regards to learning? Perhaps this was the case because writing had not been utilized in effective moods. What could writing have been used for in a classroom?

Historically, writing in school has been used primarily as a means of *testing*; but writing can also be a way of *inquiring, organizing, interpreting, clarifying, decision making, inventing, discovering, and imagining*. Such thinking processes and tasks apply to *every* school subject. For teachers of all disciplines, then writing can become a powerful force in helping students *personalize* knowledge and become active learners. (Wolfe and colleagues, 1983, p. v)

Would writing strategies assist students with those “thinking processes”? Yes. (Some will be introduced in the next chapter.) Regardless of the thinking process, the key point was that writing helped the student uniquely interact with information and ideas. Student writing produced permanent copies that could have been reviewed. Wolfe and colleagues (1983, p.1) remind us that writing involves a unique interaction “...via the action of the hand, the image of the eye, and the thoughts of the brain, information was discovered and its meaning constructed...”.

How did this multifaceted, hand, eye, brain interaction produce ownership? One emphasis of writing-to-learn was the importance of not just allowing students to use their own words, but rather, insisting upon such. Bostein (1989, p.xix) insisted that the terminology of science can only be mastered after the students have individually personalized the information or experience. To personalize required using the individuals’ current language. Writing again was considered an excellent vehicle for such learning. However, use of the students’ own language

made writing-to-learn appear less than rigorous. How could educators have claimed successful learning with “watered-down” language? Quite to the contrary, these endeavors with beginner and novice vocabulary were actually prerequisites of acquiring the meaning and mastery of the advanced terms (Parker et. al., 1987, p.3). The realm of *formal writing* was to display memory and transcription skills. Writing-to-learn involved frequent *informal writing* to develop ideas and ownership of new information (Connolly, 1989, p.3). Mayher and colleagues (1983, p2-3) defined writing as “*language choice on paper*”. (Perhaps if instead of “writing” they had used “composition”, there would be less confusion with the mere act of penmanship.) Emphasizing the “*choice*” of words by the student as crucial to learning, these authors stated, “...that copying is not [composition]...” and “...regurgitative exercises such as filling in the blanks and answering recall questions only barely fall within our definition...”. Further, these authors suggest teaching the students that writing allows continual modifications impossible with speech should alleviate the initial intimidation of having a permanent record with writing. Composition fulfilled the definition of learning that required new information to be integrated with prior knowledge. [Composition] “reveals to both teacher and learner what has been learned and what still must be learned...” because it “...demands that these connections be made explicit and potentially public...”.

Composing involved the higher level thinking and revision provided the opportunities for student authors to attempt different combinations of ideas until satisfied. “Own choice of words” was necessary for a variety of individuals to find common understanding. Objective tests provided only the language of the teacher (or publisher) and cheated the students the opportunity to personalize their knowledge (Robinson, 1983, p.187). Content was more easily mastered when it was first learned in a fashion meaningful to the student. With the written document, the student, peer mediators, or the teacher could then provide information needed for the next level of integration. With writing-to-learn, knowledge grew with more content and more interconnecting of information. The level of organization was tremendously greater than reading or listening alone would have provided. Were there other benefits of writing-to-learn? In addition to helping learn content, writing-to-learn reinforced the idea that writing was a process (Arkle, 1985, p.148). Perhaps I have gleaned fifty books dealing with writing, perhaps one hundred. There was not a single book that did not emphasize writing as a process. One of the most succinct explanations is in What Works (U.S. Department of Education, 1987). Teaching writing was best done with stages of emphases: prewriting, drafting, revision(s), editing. Yet nearly every student that I have taught attempted to write a final draft the first time through. Some students resented being made to pre-write. The emphasis of process could not have been made strongly enough.

How much ‘writing theory’ is involved? How much do we need to know to coach writing? Mayher and colleagues (1983, p.4) described the acquisition of writing skills as a developmental process. First students acquired *fluency*, which involved developing the confidence to develop and express ideas. Once fluency was achieved, then *clarity*, the accuracy of the statements was addressed. Clarity also involved, “Does the writing make sense to others?” The last concern was *correctness* of grammar, spelling, mechanics, etc. “...a crippled or fearful writer is generally one who worries constantly about making mistakes.” Too early of an emphasis on transcription has made writing a painful ordeal for many, if not most people.

The stages of the writing process followed Mayher's developmental sequence of fluency, clarity, and correctness. Successful prewriting should have filled the page with ideas, the goal of fluency. Organizing those ideas and ensuring accuracy was precisely striving for clarity. Transcription concerns were exactly those of correctness. Thus a repetition of the developmental sequence of writing was also the most productive manner by which to write. However, in the classroom, we traditionally have processed backwards. Preoccupation with transcription "cripples" some writers. This also implied that the degree to which they can pursue their thoughts is also limited. A preoccupation with "correctness of mechanics, grammar, spelling, etc." results in people limiting their expression. The adage "Can't see the forest for the trees!" comes to mind here. I believed that this point could be extended to why teachers fear having students write. A preoccupation, and perhaps a justifiable fear, concerning evaluating transcription precluded any notion of assisting students with their idea development and presentation. This was a reason why some of my colleagues declined to participate. We need to encourage hesitant teachers and students to set aside their fears of transcription.

Writing should, and "Writing-to-learn" does place greater emphasis upon developing and clarifying ideas, and organizing them. It is not necessary for "formal" papers to be presented or initial written passages to be evaluated with a fine toothcomb. The assignments are of value even when they have not been completed. As Gere (1985, p.4) states, "Unfinished writing had value, just as finished writing does. ... Writing-to-learn is not "pre" anything; it has a value in and for itself."

Prizes Gained by Using Writing-to-learn Strategies

1) Student actualization: the students become more involved with their learning.

Fulwiler (1986, p.25) emphasized writing involves the action of choice of thoughts and words. Bechtel (1985, p.x) talked of the excitement writing can generate because, "...people yearn to make more meaning".

2) Student growth of expression and integration of content.

Fulwiler (1986, pp.21-22) credited the act of writing with unique thought because "...writing makes our thoughts visible and concrete and allows us to interact with and modify them." Content writing not only teaches "...about..." the subject but also "...how to learn about..." the subject. (Moore, and colleagues, 1982,p.9)

3) The interaction and dialogue between student and teacher writing permits.

Writing helps to "...establish the climate of trust and mutual respect..." between student and teacher (Hobson and colleagues, 1990, p.18). "This results in a dialogue between the student and myself which would otherwise not occur in such a way." (Fauth, et. al., 1983, p.73) The interaction improves communication and learning. "...I feel that I know this group of students better than I ever have any group in the past." (Martin, 1989, p.114-115)

Detection of Alternative Conceptions of the Students

When asked to write, students reveal what they know and don't know. An unexpected finding of these brief writings has been the variety and number of misconceptions that exist even after the class discussion that follows a science activity or investigation. (Bahns, 1989, p.187) Misunderstanding and confusion can surface in students' compositional efforts.

Such writing is more than a rehearsal of facts; it involves the selection of those facts that either harmonize or clash with past learning. Such writing is the opposite of mere verbalism, and it is full of surprises. A student from Kentucky, familiar with the cities in his own state, may be completely baffled upon hearing that the Revolutionary War soldiers traveled from Concord to Lexington; he is thinking that this means they traveled from New England to central Kentucky. Another student of social studies, upon hearing how dense the population is in Japan, surmises that Japanese people are small because they all must fit into so small a land. Such connections—whether appropriate or inappropriate—are made all the time by active learners. But without regular writing they are often buried beneath the level of conscious attention. Expressive writing can bring out these connections, thus serving as a cutting edge for learning. (Bechtel, 1985, p.13)

Risinger (1987, p.3) summarizes research findings regarding learning and writing:

Writing requires knowledge and focuses thought. In order to write, students must have something to say. ... However, students do not merely *express* knowledge by writing, they also *discover* knowledge. Writing is inherently an integrative process, combining the total intellectual capacities of the writer.

Writing enhances critical thinking. ... *Writing shifts the responsibility for learning away from the teacher and toward the student.* Ability to write empowers students with a sense of efficacy and achievement. ... Writing leads to more questions and to the discovery of connections between events, people, and ideas.

Mayher and colleagues (1983) advocate writing-to-learn because it is an active process, because it helps the students learn about themselves, and because it helps students improve writing skills. More specific characteristics of writing-to-learn provided by these authors (p. 92) included requiring imaginative thinking, increasing desire to learn, activating prior knowledge, fitting new information into previous knowledge, and providing more insightful assessment.

The University of Michigan/Detroit teacher collaboration (McKenna, 1991, p.8) produced a list of primary purposes for using writing as a means of learning. This list included some of the previously mentioned reasons plus improved focus, increased critical thinking, and improved identification of students' strengths and weaknesses.

Writing and Learning Science

Narode and colleagues (1987) describe the relationship between writing and learning. More specifically, these authors discuss the relationship of the writing process with scientific thought. “At all levels of science instruction, helping students to generate questions—to raise and test hypotheses about the world around them—is vital to scientific thinking.” (p.45) Organizing ideas in a paper parallels the idea of manipulating variables for an experimental design. In both endeavors, various arrangements are considered and in both clarifications of questions are tantamount.

Improving thinking; making records for reflection; *slowing* the thinking process to increase the opportunity of making more connections with prior knowledge; discovering knowledge; knowing what you know (and therefore what you don’t know); generating questions: these are all experiences I have had in the first and second person, as a student and as a teacher. They are valid reasons for demanding that students are involved with writing. More specifically, they are the reasons for teachers to assist their students to engage in the processes of composition.

Teacher Reaction to Writing-to-learn

Why are teachers hesitant to assign writing to their students? Langer and colleagues (1987, p.3) suggested “...as a profession we lack a clear understanding of the kinds of learning that writing can foster, and in part because we lack careful explanations of how to plan and carry out such activities.” I felt I could provide the need missing information. Encouraging more writing was also for the benefit of my colleagues. Writing opens a dialogue between two parties. It was not only for the students’ sake I presented these interpersonal catalysts. Some of my weariest coworkers were those who continually noticed more clicks each year as they feed their tests through the scantron scoring machine.

Writing-to-learn forces teachers to reexamine their concepts of learning. They lead the students into the exploring, into making discoveries for themselves. The process changes the nature of study questions and analysis, and as students’ creative energies are channeled into useful skills, the dialogue and exchange that occur vitalize both teachers and students. (Bronson, 1985, p. 210)

One of my hopes was to have a positive impact upon my colleagues and maybe help them find more joy in their teaching. I was encouraged as I read statements implying writing-to-learn was impacting both the students’ learning and their teachers’ perceptions. Langer and colleagues (1987, p.8) found that teachers easily modified the writing to meet their students needs. These teachers also discovered new meaning for what was meant by “knowing”, and markedly changed their interactions with students. Would my colleagues really want to modify their interactions with the students? Would they risk the discomfort of attempting something new?

Time Concerns and Writing-to-learn

One obstacle would be to convince my colleagues the writing strategies I was proposing would be worth the time investment. Barrass (1982, p.2) insisted that “even weaker candidates” benefited from learning to better compose and this was demonstrated with improved grades.

I feared “lack of time” would be the biggest objection to trying the techniques. However, when one considered how little students retained from traditional methods, use of more class time than traditional techniques required seemed little reason for not pursuing writing. Yes, grading written assignments required time, but with a process approach and student peer review, the quality of the papers would have improved and therefore the increase in evaluation time would be reduced. Again, the emphasis was leaning and using the content material. The composing stage of writing should have been the emphasis: what information was presented and how it was organized. The transcription and mechanics were also important, but their perfection was the more the role of the language arts educators. We certainly should assist our fellow educators, but not by having discouraged students from composing (remembering, generating, discovering, and organizing their ideas) by excessive criticism of spelling, grammar, and punctuation. (Besides, transcription should only have been “graded” on the last version of a multi-draft document when peers have checked the students’ efforts.) Much of writing-to-learn was done in informal, primordial drafts when the main audience was just the student author. A teacher could have assessed the assignment that had been done with comments pertaining only to content and organization of thought.) This fear of having to make the marks certainly has an inhibiting factor upon the teachers. Many teachers do not have editors’ skills.

In higher education, much of the faculties’ concerns with WAC involved the impact that the time spent would not be productive with respect to promotion and tenure (Walvoord and colleagues, 1982, p. 9). Why should one have tried a technique if it might have endangered your professional career? In some what of an analogous perspective, why should high school teachers have endangered their professional careers via complaints by students, parents, counselors, and administrators, if they could not make the writing-to-learn techniques work?

Other considerations included that the “Techniques are unfamiliar and not the manner by which the faculty members themselves learned as students.” (Walvoord and colleagues, 1982, p.10) I knew that “two or three” of my colleagues were probably not going to participate. In retrospect, I ignored addressing these and other concerns such as student reactions, possible complaints, accepting a different role in the classroom, etc.

Student Reaction to Writing-to-learn

I literally had forgotten about the initial student complaints and was just thinking of their views after a year of using the strategies. I was so overly confident that others would have success that I neglected even thinking of the possibility that my colleagues could have other, less-than-positive outcomes.

However, students disliked changes. In particular, students disliked writing. Their fear of transcription exceeded the occasional satisfaction from composition. Many of my students had little prior experience with writing-to-learn thus they were apprehensive. Others were apprehensive for other reasons. As Betchel (1985, p. ix) warned, "The tradition of red-marking students papers most assuredly has had an inhibiting effect on student writers."

And even if the grading is held off until later years, until age ten, twelve, or fifteen, the same feelings will arise. Just because we are larger doesn't mean our egos are any less fragile. No matter when it occurs, negative feedback is demoralizing and demotivating. Low grades are negative feedback. (Holady, 1997, pp.36-37)

I knew that my own positive perspective had been necessary to convince some students to even begin to comply. Yet I also knew the students I had taught had adjusted and at the end of the year were positively encouraging me to continue with such techniques.

In studies by Stevens, III (1985, pp.211-217), eighty high school students from twenty classes were interviewed after using writing-to-learn strategies. To more fully appreciate these comments, it is important to note that the students were not aware that they were in writing-to-learn classes, and that term had not been used in their presence. The statements indicated that the students viewed the practice as useful. Some extremely powerful points are made succinctly such as "How can you learn if you don't write?" (p.211) And [that the class activities] "...get students to think, as opposed to having the book do it for them." (p.212)

Stevens (p.215) found that fourteen of nineteen groups felt writing, "facilitates thinking". Many of the interviewees expressed a greater personal involvement with the material "...finding themselves able to sympathize with other points of view..." Student comments included:

...[Writing helps you learn] because of the questioning process during the writing process and after."...."You have all these ideas in your head, but you're not aware of them until you write them down."...."If you can write it, you can understand it."...."...some people don't even know what they are thinking until they write."...."If you write about it, you remember it better," and, (writing was a lot of work, but worth it because) "we don't forget anything this way."

Of course not all of the interview statements were positive. One student wanted to drop the writing-to-learn course because of the teacher: "She makes us think too much!"(p.211)

Forsman, (1985, p. 174) also found students reacted positively to the opportunities to be active learners. Comments on evaluations "...confirm my belief that writing-to-learn develops [the students'] ability to work." The students "describe their learning as "finding more questions" and clarifying what they think."

As mentioned before, one of the fears students had was that they did not know the exact direction that their thoughts would head as they write. They needed to be encouraged that this was O.K. Fulwiler had mentioned this several times: "It is not important for writers to know exactly where they are going to start; it is important that they trust the process of composing to take them somewhere." (1982,p.19) Later, with a more personal statement, Fulwiler states: "I begin writing with a more or less clear direction in mind – in my head – and *always* discover that the act of writing takes me places I never imagined. ... I've learned to trust this process...I can *predict* that writing for a certain period of time will usually create meaning."(1986a, pp. 22-23)

For the students, an apparent paradoxical situation existed. Students knew that "writing" helped them learn. Students also knew that they did not like "writing". Again what was missing was the distinction between composition and transcription. Composing aided learning and was enjoyed by some students. Students dreaded being evaluated upon transcription.

Is Writing-to-learn Successful?

Parker and colleagues (1987) suggest the primary use of language is to make meaning for self and secondarily and less frequently, to communicate such meanings. They explained, "To learn is to construct knowledge from experience by transforming that experience symbolically.... A simple diagram looks like this:

symbolization of experience \leftrightarrow learning \leftrightarrow construction of knowledge" (p.6)

A summary of the positive attributes of writing might include:

The role of writing in thinking can be conceptualized as resulting from some combination of (1) the permanence of the written word, allowing the writer to rethink and revise over an extended period; (2) the explicitness required in writing, if meaning is to remain constant beyond the context in which it was originally written; (3) the resources provided by the conventional forms of discourse for organizing and thinking through new relationships among ideas; and (4) the active nature of writing, providing a medium for exploring implications entailed within otherwise unexamined assumptions. (Langer and colleagues, 1987, pp. 4-5)

Other statements explained why writing should have enhanced learning:

...writing becomes clearly valuable when one's conception of learning is of obtaining a personal grasp of ideas and/or exploring one's own thoughts and feelings about a topic... Writing in these cases, can be a means of relating in a structured way new ideas to ones

already held and of establishing for oneself and for others a clear statement on one's current state of mind vis-avis an issue. (Spencer, 1983, p.77)

However, what was not as prevalent in the literature were the statistical data to support the claims. Several authors of this pre-1990 era even commented upon the lack of data. (Applebee, Langer, Parker.) Some statistical data existed: Wotring and colleagues (1981) found little short term difference on multiple choice tests, but there was greater postponed (sixteen weeks later) recall with writing. However, most support for writing-to-learn was testimonial or explanation of how writing-to-learn should enhance learning. For example, Applebee and colleagues (1986, p.11) stated: "Many years of research suggest that better learning occurs when students *use* writing to think about what they are learning in various classes." Johnston (1985) believed the time required was more than compensated by the use of higher level thinking.

What I have discovered is that writing helps my students understand science more fully than any other teaching strategy can. The learning fostered by written reports more than compensate the time they require. Written reports that must be scientifically accurate, interpretive, creative, analytical, and evaluative demonstrate those highly prized goals of abstract thinking which all teachers hope to foster. (p.92)

In the classes which have used writing-to-learn, students have higher test scores than students in other classes. ... In addition to higher unit tests, I find that students do better on semester or year-end multiple choice tests when they have written to learn science. Students understand more and remember it longer because of writing. (p.102)

Bronson acknowledged " Most importantly, writing-to-learn educates the students into the kind and quality of work that utilizes their experiences, their creative abilities, to evaluate what they study. Not only does their writing improve, but they develop skills which they can use in other areas." (Bronson, 1985, p.210) Other authors who supported the higher-thinking-level-learning included Weiss and Walters, (1979) and Walvoord and colleagues (1982, p.6)

Two Detroit science teachers, Rouse and Simpson (1991. pp. 20-21) described their experiences:

...while writing-to-learn is not the answer to all current problems in education, it addresses many of the daily needs of classroom teachers. ...allows a teacher to add to students' knowledge of concepts as well as assess students' comprehension, not test the memorization of facts....allow students to become independent thinkers. ...they have freedom to think for themselves—something they may not be used to doing in classrooms where even lively discussions may leave some students out....make students active instead of passive learners ...more involved because they must produce more than memorized information. ...increase in self-confidence by the students....written evidence of their own learning that shows they are mastering subject matter.

At the time I shared my strategies with my colleagues, I could not quote statistical "study after study" that indicated significant learning improvement from writing-to-learn. Yet, I was confident

the writing-to-learn strategies I have tried have been successful in enhancing my students' learning.

Why Share Ideas with Colleagues?

Why did I feel the need to share my ideas? I had enjoyed learning and teaching. I identified with Clandinin (1986, p.6) who stated, "Notwithstanding the difficulty of explaining myself, I was satisfied with the quality of my work in schools." Other teachers' gloom had frustrated me. Though I was not certain my teaching style was more effective than their styles, I could confidently say that I enjoyed my style more. I had hoped that what I proposed would have addressed the ideas expressed by Fulwiler (1987, p.ii), "...we who teach have so many common concerns, interests, and values. Yet, we have too few formats designed to help us share that commonness." When and how are teachers supposed to learn about modifying their instruction?

Once they go to work, teachers eventually become somewhat more adept, mainly by imitating those who have been around longer and by experimenting, through trial and error until something works. Their in-service training—designed to keep them abreast of changing events and refine their skills—is, as a rule, not much better than their earlier training. (Rubin, 1985, p.iv)

I had a great deal of enthusiasm for sharing teaching ideas. The experiences from my graduate work lead me to return to the classroom with a rejuvenated perspective with many fresh notions. I felt inspired to teach and I felt inspired to try to share ideas. I also felt as if I were on a bit of a crusade because there was (is) a tremendous resource of teaching innovations that has been ignored: that being the teachers and their years of acquired practitioner's knowledge. I hoped to demonstrate that a teacher could indeed take the initiative and make a difference. I wanted teachers to be viewed as more professionally concerned, caring and responsible.

In my work with teachers, I experienced a personal dissatisfaction with the way that teachers are viewed. The prevailing view and organization of the educational enterprise gives little credit to their knowledge. (Clandinin, 1986, p.8)

Now I had an audience of colleagues, one I thought that would have been particularly interested in trying to expand their individual teaching repertoires. I had hoped that this would have been a wonderful exchange of ideas and perhaps the beginning of a bigger series of idea sharing.

Considerations for Strategies

The strategies should have been easy to implement. They required no financial expenditures, and would improve the students writing and learning. Similar ideas had been expressed by Hobson and colleagues (1990, p.7). Flowers (1989, p.206) insisted all academic groups needed strategies and suggested that limited command of strategies may be a greater hindrance for students than is currently recognized. In other words, what some attribute to innate differences in intelligence may be a difference in command of strategies. The difference may persist. Writing and thinking were so critical to the students' later successes, "...our society has

moved quickly from needing people who have memorized to needing people who can reason and solve complex problems.” (Hobson and colleagues, 1990, p.14) And as referenced before, the following was a nightmarish statement:

We found that students were spending only 3% of their school time—in class or for homework—on writing of paragraph length or longer. On the other hand, students were engaged in a variety of related activities that involved writing but not composing: fill-in-the-blank exercises, worksheets requiring only short responses, translation from one language to another, and the like. (Applebee, 1984, p.2)

As an advocate of teaching students rather than teaching subjects I concurred with Hobson and colleagues.

It is vital that students react to what they read. Their lives will be much fuller if they learn to derive excitement from reading because reading forces them to do the kinds of imaging that a medium like television or film does for them. The transaction between readers and books is a much more intimate one than between viewers and television shows or films. Readers are active; viewers are generally passive. (Hobson et. al. 1990, p.47)

More information to be mastered was not needed to improve learning. Rather what was needed was teaching methods that increased students’ interactions with the information. Botstein (1989, p. xx) referred to “The answer...finding pedagogical strategies that enable pupils to ask appropriate questions and to actively find their answers.” Students needed to be more active with their learning. We needed to change our teaching and require that the students discovered their own knowledge. We needed to encourage our students to formulate questions that were personally meaningful and then assist them with the discovery of the answer. I was very much alarmed when I asked a colleague whether he/she assigned the essay questions at the end of the chapter and her/his response was, “ No. I don’t. The students do not write very well and this is too difficult for them.” Had this individual been working with special needs students I could have more easily accepted this response. This individual was working with elite students. I just had to convince my colleagues to try some of the strategies. I knew strategies were important.

The strategies that were shared are described in detail in the next chapter. They include the processes of 1) paraphrasing; 2) prewriting; 3) activating prior knowledge; 4) the writing process; 5) peer critique; and 6) critical reading. These strategies had specific support. The strength of paraphrasing was mentioned in Clegg (1988, pp.61-63). Paraphrasing involved choice of words that evoked ownership. Regarding prewriting, Barrass (1982, pp.41-42) recommended use of 6W’s to activate prior knowledge and imagination. These had been referred to as the “journalists tools” (Hollingsworth and colleagues, 1988, p.52).

Allan Wirth (1983) deplored the “inert knowledge” of our schools. Students possessed two bodies of knowledge: an active one with which they conducted their lives and an “inert” body of knowledge used only in school to pass tests. If teachers were merely sorting students, what was required to be memorized really did not matter nor did the pertinence of this information to the

students' lives. However, if one wished to have integrated school learning with life experience, one must have actively done so by accessing students' prior knowledge.

The common themes of writing-to-learn were to approach assignments stepwise and to not be afraid of learning from errors made, "...and even encouraged as the natural concomitant of tackling new and more difficult problems."(Langer and colleagues 1987, pp.6-7)

Barrass (1982, p.41) acknowledged the need to believe in the use of strategies and for any writing, using a process. Different authors used different names for the stages. Every source that emphasized the "process of writing" mentioned reducing the big task of the final product into manageable pieces. The U.S. Department of Education (1987) stated, "The most effective way to teach writing is to teach it as a process of brainstorming, composing, revising, and editing."(p.31) Further, "Constructive feedback from teachers, including deserved praise and specific suggestions, help students learn as well as develop self-esteem."(p.45) This booklet even described the importance of activating prior knowledge.(p. 55)

Applebee, (1987, p.13) stated, " The art of successful teaching of writing involves helping students think about what to do and how to do it as they are engaged in the process of writing...". Glatthorn (1981) also recommended that guiding effort prior to and during the writing process would result in a great deal more improvement than the same amount of effort invested in grading papers. Numerous rubrics are available to assist beginning writers and beginning reviewers and even teachers' final assessments and evaluations.

As said before, few teachers had the time to assist all students with their revisions. It was critical to provide as much feedback as possible at the early stages. Again, coaching was more effective than judging when we attempted to develop students' skills.

Prewriting activities, the use of multiple drafts, and the incorporation of peer response groups into instructional sequences have been among the most frequently recommended process-oriented activities. (Applebee, 1984, p. 187)

Revision and editing would require a great deal of time if only one individual, the teacher, had done it. Throughout the literature were numerous descriptions of peer review. Hobson and colleagues (1990, pp.61-62) were blunt when they suggested that teenagers might very well be more concerned with what their peers think of their writing than what the teacher thinks. "A sobering thought was that teenagers typically are more concerned with the impression they make on their peers than on their teachers." These authors suggested that peer editors receive grades for these efforts too. My own experience with peer review was that the papers were surprisingly good following two cycles of revision in which two or three students had asked the author questions and had made suggestions. Bechtel (1985, pp.163-164) advocated peer review because students gained by relating writing with peers. There was more ownership and more examples. Additionally, there was less work for the teacher.

The skills necessary to be a peer reviewer need to be developed with direction and practice. "Learning to critique is part of learning to write..." explained Fulwiler, (1986, p.31)

Students found it easier to catch others errors, and that practice in turn, made them even better at critiquing their own writing.

Obviously, setting the students lose without direction upon each others papers would have lead to some productive feedback, but equally probably some very hurt feelings. Hence it was necessary to provide guidelines for the reviewers. Here is an example of suggested questions used for peer response to a first draft (Betchel, 1985, p.164):

What parts of the paper are effective and why? What would you like to hear more about?

What questions about the topic do you as the reader still have?

Will my Colleagues attempt the Strategies?

One major concern of my coworkers was a lack of expertise to evaluate the quality of writing. They should have been comforted to know that our intent was not to become “grammar cops”. Several ideas from Moore (1992) would have been helpful:

Writing is judged by how easily it conveys ideas and helps us learn, not by its adherence to grammatical rules.(p.5) ...Good writing is invisible because it draws attention not to itself, but to the writer’s ideas. Readers don’t automatically think, “This sure is good grammar” when they read a well-written paper. Rather, they quickly and clearly understand the author’s message. Similarly, the mistakes that typify poor writing do not announce themselves with titles such as “dangling modifier” or “passive voice”. Readers know the writing is poor because it doesn’t communicate clearly or quickly. (pp.13-14) ...Writing is clear when readers can quickly get your message and follow your supporting arguments. Anything else is bad writing.(p.168)

My colleagues found comfort in the study by Murray Stewart (1984). The conclusion: when students’ papers were assessed by a cross-section of teachers, there was not a significance difference between the perception of quality by the language arts teachers and the science teachers.

CHAPTER 3: STUDY DESIGN AND METHODOLOGY

The first chapter explained “why” and “how” I became interested and confident with basic writing-to-learn strategies. When the school district decided to emphasize writing in all content areas, the opportunity to share ideas arose. I was granted permission by the school’s administration to embark upon my study of sharing several writing-to-learn strategies with the members of the science department.

With Whom to Share?

At the time of this study, the science department, as part of a large high school in a large suburban school division, was well respected by the schools’ administration and by the county’s science specialist. Numerous teachers had received county, state, regional, and even national awards. As teachers, we worked with a large special needs population of students and also a large pool of gifted and talented students. The school has a history of excellence in science fairs at both the local and state levels. At the time of the study, most of the science faculty had master’s degrees, one member had a doctorate, and two were actively working towards their doctorates. There were nine men and eight women; one African American and sixteen Caucasians. Two had been teaching less than five years; five had been teaching more than twenty years. Five taught Earth Science courses; six taught Biology courses; five taught Chemistry courses; three taught physics courses. Only two members taught classes in two disciplines.

How to Share?

All the members of the science department shared a common lunchtime. During these times I planned to meet weekly on Wednesdays with my colleagues sharing what had happened in the previous week and introducing a new technique to try. I elected not to try to explain the mechanisms by which they worked. Several factors lead me to this decision. First, there was a terrible time limitation during our lunch meetings. Secondly, I was not sure whether some of my colleagues would have accepted the educational underpinnings of the techniques. This second concern was based upon comments I had heard some colleagues make about “educational theories”.

Rather than trying to convince my colleagues on the basis of the literature, I decided to use my own experiences as examples. After distributing handouts I had prepared, I described a strategy, when to use it, explained the instructional sequence, and described my successes using that specific learning activity. I attempted to have the department member to briefly try the strategy, providing a task for them to try, and then elaborating on the results I had in the past. I encouraged questions and I particularly encouraged those who tried techniques to describe what they had done and what happened. I made myself available to answer questions after school. Following the recommendation of my committee, Friday’s lunch was designated for “brown bag sessions” to informally discuss the activities.

Immediately, some might question, “Why not have your meetings after school?” The answer was simply that I was trying to influence the department and lunch was the only time I could count on having participation. After school is so busy, we do not even try to have departmental meetings after school. They, too, are held during lunch. I felt fortunate to have most members present at lunch.

What Was Shared

I knew that in order to have success I had to really “sell” two points to my colleagues. The first was that we were focusing on the use of writing-to-learn as opposed to using writing to demonstrate learning. We wanted the students to think and compose and revise. We were not intending to spend long hours marking transcription errors on students’ papers.

The second point I wanted to emphasize was that the “cerebral differences” among our students could sometimes be attributed to “strategies”. Often the “seemingly brighter” students had strategies that were too automated for easy perception. My own critical readings had usually been “OK”, but I knew that there must be a format that would had assured better success or at least better confidence in my effort. I sought such a strategy for several years. I asked one of my graduate faculty members if he had any array of questions that he asked while reading. After careful thought, the response was, “No, though I have read a tremendous amount.” For this individual, critical reading was an automated process. I still believed there had to be some strategy or guide to help the beginning and novice “critical reader”. Two years later while working with student teachers I came across an article with a list of seven critical questions that the authors encouraged students to consider when attempting to “critically” read certain materials. I would have benefited had I had this list while I was reading for my graduate classes and it was helpful with the literature review for this document. This personal experience illustrated what I had sought regarding the expression of automated thoughts of practitioners into a form beneficial to beginners and novices. From the list of questions I made a mnemonic, which is the fifth strategy I proposed to share with my colleagues.

The strategies I intended to share were sequenced. We would start with slight modifications of the students’ current, routine, general processes, such as reading assignments. This would be followed with multiple-step modifications, such as activating prior knowledge before exposure to new material. We would end with new assignments, such as peer mediation or using guiding questions for critical reading. On the following pages, the strategies are presented in the order I wished to share them with my colleagues.

Strategy One: One Sentence Paraphrasing: 1 S P

How could we have improved students’ comprehension and retention while reading the text? For three years I had been requiring my students to use “one sentence paraphrasing”. Every year in each class before introducing “1SP”, I have asked my students to raise their hands if in previous classes their teachers told them to read a passage and then, a few minutes later asked, “Who is finished?” or “Who needs more time?” Just about every student raised her/his hand. I then asked for a show of hands of those who had been asked after a period of reading, “Who

understands?” or “Who is comprehending all of this?” Few if any hands were raised. I then told my students I was more interested with their comprehension and long term memory of material than the speed at which they read it.

“One Sentence Paraphrasing” helped place an emphasis on understanding. As the students read, they paused at the end of each paragraph and wrote one and only one summary sentence. By *extracting* all important information, and then *evaluating* which was most important, and then *synthesizing* a meaningful relationship among these ideas, the students used much more higher-level thinking than if they had only phonetically sounded words in their heads. The student skipped three lines between paraphrasing sentences so that he/she could add more information at later times and also to allow the teacher to write comments. This format encouraged students to insert the answers to their questions into their summary of the content.

ISP enhanced student reading, helped them to learn to judge the value and pertinence of information, and to practice expressing ideas and writing sentences. (It should be mentioned that questions are sentences too.) Additionally, the students prepared quality materials from which to review. I accidentally discovered the impact of ISP with a special needs class. It was but a three-page section with less than fifteen paragraphs, describing a topic of little familiarity, rickets. The students were given class time to work because we only had a classroom set of texts. I collected the assignments and checked that the students had not missed key ideas. Though the penmanship was poor and the sentences contained numerous spelling and grammatical errors, I was pleased with the effort and wrote comments on each paper. I placed the corrected assignments in a folder intending to return them the next day.

The next week we had a quiz and I asked several questions about the topic. The questions were fairly difficult because I knew I had reminded the students to review their ISP of the topic. As I graded the quiz, I was quite pleased with the students’ answers to those questions. Elated, I opened my folder to place the graded quizzes inside and discovered that under another assignment were the students’ ISP’s which I had not returned. The students had neither seen the text again nor had they a chance to review the notes they took. Writing the one summary sentence had “coaxed” a great deal of information into their long-term memories.

Strategy Two: Activating Prior Knowledge with Six W’s

A second concern was that students frequently did not include most of the information they knew when answering a question. This was particularly true with written work. How could we have improved students’ access to their prior knowledge?

For more successful learning and writing, the writing process approach would later be introduced. It emphasized a pre-writing step. (Parker and colleagues, 1987, pp.21-26)

Incubation ← → Pre-writing ← → First Drafts ← → Revising ← → Editing

The “Six W’s” were a good place for most students to have started prewriting. This allowed them focus on “what” to say before becoming occupied by what sequence would be followed and

“how” the thoughts would be expressed. The strategy should have been employed with any assignment or quiz question that asked, “Explain..., Define..., or Elaborate...”. These “Six W’s” were “Who”, “What”, “Where”, “When”, “Why”, and “HoW”. If the students who disliked writing had the writing process in its entirety introduced to them, most would not have been happy and some, if not many, would have withdrawn from the activity. I believed “Six W’s” was a more palatable move forward, “crawling before running”. The next strategy, C:A:E, was “walking”.

Strategy Three: Connections: Additions: Extensions (C:A:E)

How could we have assisted in making education relevant learning? Good lessons usually began with an activation of prior knowledge. Then provided new information that would be integrated with or even replaced prior knowledge. A good lesson ended with the opportunity for the students to pursue the learning further. These ideas lead to the development of “Connections: Additions: Extensions”.

Prior to having watched a video, read an article, or even prior to a lecture, the students were asked to 6W’s the topic. From these lists of information, passages of one to a few paragraphs were written which expressed some of the students’ prior knowledge. Hence this first stage was named “Connections” because students connected to their prior knowledge.

While watching, reading, or listening the student should have employed some note taking technique. “1SP” worked well with articles. The scheme for lectures that I introduced to the students was called “Three Column Note Taking”. A piece of paper was titled and then folded in half from right to left. On the front side, the left column was for new vocabulary; the right column, key ideas. When questions occurred to the students, they flipped their papers to the backside and wrote them down. (One advantage when students wrote their questions was that they did not blurt out inquires during the presentation, thus they did not interfere with classmates concentration.) After viewing the film, and after some of the more general questions were answered, the students wrote another passage. In it they modified their prior knowledge and added to it. Hence this section was called “Additions”. The “Extensions” section was a list of the student’s unanswered questions with sufficient space for their teacher’s response. The opportunity for the teacher to respond was one of the beautiful aspects of this and other written strategies. Dialogue was permitted that was otherwise not possible given the constraints of time in a classroom.

Strategy Four: The Writing Process with Peer Editing

In our department’s December meeting, some teachers referred to students’ written efforts and particularly their longer papers as “pathetic”. Why was the students’ writing so poor? Part of this was due to a lack of explanation, direction, and guidance regarding how to write; much was due to a lack of practice; some to a lack of encouragement. (One could also contend it was a reflection of a lack of organized thinking.) So how could a group of science teachers guide student writing?

Because the writing process had several steps or stages, I believed it was critical to have students understand that much thinking needed to be done before even considering writing their first sentences. I particularly liked the term “incubation” as the first stage because the future growth of ideas and words would be stunted if the incubation period were not sufficiently long.

“Composing” encompassed the first few steps of the writing process. Composing was emphasized in writing-to-learn strategies. Thought generation, recollection of prior knowledge, organizing ideas, these and more were composition. Transcription and the acts of editing had to be at the end. Premature concerns regarding transcription impaired the thought development during composition.

Each text had questions that required either synthesis or evaluation on the part of the student. These were not capable of being answered by merely skimming the text and copying appropriate paragraphs. As teachers, we often elected not to assign these more demanding questions because of anticipated poor results. It could have argued that this was the writing the students needed the most. Two questions arose: 1) “Were the students capable of thinking their way through the answer?” and 2) “Were the students capable of expressing what they thought?”.

High school students were not used to dealing with questions that require accessing and organizing more information than they could maintain in their working memory. We had to teach them to investigate the question and organize information such that they then could choose what should have been used. For this incubation and pre-writing period, I proposed a scheme I was sure others have used, but one for which I could find no reference. I called it, “Use of Secondary Questions”. Every reference that approached writing as a process emphasized the need to pre-write to recall information that may be useful. I suggested the students be required to ask questions, i.e. secondary questions, which pertained to the one to be answered by the assignment, the primary question. I emphasized that the quality of the secondary questions would dictate the quality of the answer for the primary question. How did students generate secondary questions? By using “Six W’s” with the nouns and verbs of the primary question.

This example I share is several years old. The Earth Science text (Ramsey and colleagues, 1989,p.69) had an essay topic I assigned my freshman: “Explain the role of technology in the progression from the hypothesis of continental drift to the theory of plate tectonics.” I modeled for the students the process of generating secondary questions. When we had finished, there were numerous bits of information available. I then asked the students to review the lists and check the information they thought that they might use in their answers. After we generated questions and their answers and selected the information to use, I suggested that the students count the number of checks. Then the students picked the bits of information with which they wished to begin and end and numbered them accordingly. Next, the second and second to last information was picked, and this process continued until all of the numbers were assigned. Now the students had an idea of what they wanted to say and the sequence in which they wished to present it. With this done, writing a draft was much easier. The draft was constructed upon content and logic. I then employed a bit of positive motivation. I suggested how proud they would be that evening if they were to show their parents their rough draft. The next day one of the girls who usually was not very involved came in beaming. She said that when she showed her father the rough draft that he

cried as he read it, in disbelief that she had intellectually grown to the point of being capable of such work.

Obviously, this required time and thought. However, the students were actively making their connections among the information. Following peer review, the students papers could have been revised, reviewed, and revised again. The last strategy I planned to share would have assisted with this situation.

Strategy Five: ACE MAC V

A lack of critical reading skills leaves student peer reviewers ill prepared to respond to what they have read or to evaluate what they have written. My department chair and I have discussed three levels of evaluating what one has read. There was a mechanical level- grammar, spelling, organization, etc. There was a second level of correctness of information or claims. Then there was one that most eluded the students, a measure of quality and significance. How could we increase students thinking at this level?

I concocted ACE MAC V specifically for this process. It was based upon these suggested questions for improving critical review: (Browne and colleagues, 1985, p.81. Note: This was from an original source, Browne and colleagues, 1978, pp.219-226.)

1. What is the conclusion or the main point?
2. What are the reasons or evidence?
3. What are the elements of ambiguity?
4. What assumptions are being made?
5. How convincing are the reasons of evidence?
6. What value priorities are evident?
7. Is there important information missing?

A list of questions, though, was awkward to carry around all the time, hence I condensed the key terms of this list of questions into the acronym. “ACE MAC V ” represented: Assumptions (from question # 4); Conclusions (#1); Evidence (#2); Missing Information (#7); Ambiguities(#3); Convincing (#5); Values(#6).

I have asked my students at two high schools to try “ACE MAC V ”and have found quite a range of results. Determining “Assumptions and Values” was the most difficult for the students. However, the use of the other five questions has been a relatively good self- and peer-review guide. I believed that freshman were capable of stating a conclusion and providing the evidence. Sophomores were capable of adding missing information and discussing ambiguity. Juniors and seniors should have been able to add “Convincing, Values, and Assumptions”.

Thus I had five strategies ready to share. What were some of the other considerations?

Advantages of a Departmental Approach

Again, if, as a department, we worked together, there should have been a more meaningful progression of skills, starting from the more concrete of what was there, perhaps evolving to the reading-between-the-lines abstractions. The strategies would have become useful skills by repetition in several classes. Writing would improve due to increase practice and feedback. Students learning and skills would have grown.

In addition to these five strategies, I encouraged my colleagues to be positive in their critique of students' work. (Compliment List, See Appendixes p.180. Also see U.S. Dept. Ed., 1987; Maguire, 1989; Palmer, 1983). To further encourage my colleagues, I intended to introduce them to the book by the Issac and Janet Assimov entitled, How to Enjoy Writing: A Book of Comfort and Aid. The positive introduction was to be read aloud at a meeting. The Assimov's point out that:

1. Anything is more fun when you improve your skills,
2. We, teachers and students, already know a great deal about writing, and
3. The effort of writing is part of the fun.

I concurred with these ideas: I believe that writing can be more fun as an activity, particularly if done very positively. There was tremendous room for growth of the students and growth of interactions among students and with teachers while focusing on the subject matter.

Data Sources

Sources of data were to include but were not to be limited to:

- 1) June 1994 survey of my Earth Science students: Students were asked to circle their choices regarding their use in mine and other classes, and their attitudes towards several strategies I had used with them. Based upon their input, I selected the more productive strategies to use in the study.
- 2) Handouts and tape recordings from lunch meetings
- 3) December 1994 survey of science department members. When we had met to discuss how to approach the county's directions to increase writing in the science classrooms, I asked my colleagues to list their hopes and concerns. The initial purpose was to ascertain what the staff already thought and knew regarding writing and writing-to-learn.
- 4) April 1995, Pre-collaboration survey of students. Students were asked what writing strategies were already in use, and their opinion of how writing affected their thinking and learning. The listing of writing strategies included admission tickets, exit slips,

- minute papers; journal, notebook, log; ungraded or lightly graded assignments; multiple draft papers; assignment sequences: prewrite, write, revise, edit; writing letters to explain to relative; shown examples of excellent writing and thinking; peer critique; student collaboration; oral reports; etc.
- 5) April 1995, Pre-collaboration survey of science department. From the information obtained in December, a circle-the-choice survey was to be prepared to assess the teachers' feelings concerning "writing-to-learn" in science.
 - 6) April, May, June 1995, Interviews of faculty participants. In addition to suggestions from the literature for conducting interviews, I intended to apply some of the strategies mentioned (such as ACE MAC V). I felt that my colleagues realized I was attempting to conduct a professional study and that I would prefer their honest answers rather than only positive comments. (Conducting interviews was a new experience for me. I consulted several sources for guidance including Brady (1976), Schumacher (1990), Metzler (1977), McGlaughlin (1990), and Oppenheim (1992). From these authors I learned the importance of having a prepared list of questions, not interrupting, disliking your own voice, and maintaining the agreed time boundaries, etc.) The interviews would produce notes and tape recordings that would be reviewed and at least partially transcribed.
 - 7) June 1995 survey of participant students. Similar to the one used in 1994, I planned to include year in school, course, and anticipated grade earned in the course. By collecting data coded for individual teacher and period, I planned to identify variations due to these factors. I assured my colleagues that I would tally their surveys because I wanted to minimize their time expenditure for this project.
 - 8) June 1995, Post-collaboration survey of science department members. Essentially identical to the pre-survey, the June survey was to detect opinion change by asking the participant to respond to the same questions as the pre-survey.
 - 9) Exit Slips from the weekly sessions. These would provide an immediate understanding of how my subjects were feeling with regards to the study.
 - 10) Daily research journal. It was to include what I perceived had been done, what were the outcomes, what modifications needed to be made and a general assessment of how the study was proceeding.

The impression I had received from the initial meeting and that December faculty survey left me with the impression that approximately a dozen teachers would participate. As a study of the successes of writing-to-learn strategies from twelve classrooms, data was anticipated from approximately three hundred students. With a pre- and post-survey design, changes in student use of strategies could be monitored. Changes in teachers' practices would also be detected with the pre- and post-survey design. Further confirmation of change would come from interviews.

CHAPTER 4: IMPLEMENTATION AND RESULTS

The first departmental writing-to-learn meeting was held in December and the response was positive. I left that meeting feeling confident that the majority of my department colleagues would try the writing-to-learn strategies. We agreed to postpone the strategy sessions until after the science fair was completed.

There were several snow days at the time of the science fair and it was delayed. It was then recommended to me that I might want to wait until the fourth quarter to share my ideas. I was very excited because I knew that the majority of the department would be willing to try some of the strategies. To entice my colleagues even more, I prepared lunch for them (a Shrimp Creole) and presented information while they ate. I emphasized that the goals were 1) to improve thinking and organization of thoughts, 2) to move away from assignments that prescribed the form of the paper over the content, and 3) was not to make more assessment or grading necessary. I began my presentation with several people absent; I figured that I could inform them on an individual basis (if they were interested). I distributed my information about 6w's, and 1SP, and sequencing thoughts to be used prior to writing. I knew there would be little extra time for what I wanted to say and questions. I almost hoped for no comments. About twenty minutes into my thirty-minute pocket another teacher arrived. This individual listened for about two minutes and then raised a hand. The comment dealt with "a great writing technique" this individual had acquired from one of the English teachers. Students wrote an introduction and then three paragraphs, with each paragraph containing at least three different bits of information about that paragraph's topic. I was in a bind. I had just allowed someone to spend five minutes detailing the very form of writing I was begging us to avoid (what Parker (et al., 1987) refers to as formal writing: filling in a form). I had greater concern that several of the others seemed more interested with this "formal writing" idea than the ones I had presented. I suggested that level of writing was what we would be dealing with in future sessions and that it "sounded like a good assessment tool, but the focus I was encouraging was for learning." Even having lost about twenty percent of my presentation time, I felt relatively good about the session and believed that we were on our way.

After the meeting I quickly distributed information to the individuals who had missed the meeting. I said that if they wished to participate or had questions to contact me after school. While I distributed the information, several provided clear response that they were not interested. Some of the reasons for declining included: impending retirement, already had the students sufficiently writing, impending sabbatical, and just plain not interested. One individual met with me that afternoon and did not seem to realize that the techniques were my proposals and ones I believed I had used successfully with my students. This individual was under the impression that these techniques had been assigned to me by my committee to implement and study. A quick and very negative treatise was spoken before I could suggest that I had success with them. Many negatively stereotypic comments about academia were included, such as "ivory towers" and "out-of-touch with students abilities" and "dumping their research upon graduate students." I was not surprised when this individual withdrew from participation within the week, after once trying one sentence paraphrasing. Without realizing that four colleagues had already informed me 1SP had worked well, this individual said, "The technique is too difficult for my students."

Our second meeting began better than I could have possibly imagined. Several people spoke positively about their experiences with 1SP and Six W's, and I wanted them to provide as many positive comments as possible. They were reinforcing what I had said and presenting ideas in a different voice. They were excited about the strategies.

One sentence paraphrasing received very strong support from those who tried it, excluding the one individual. I was stunned that several had tried the technique the same afternoon I suggested it. One of the teachers commented, "My students really understood the chapter well with one-sentence-paraphrasing. I was really delighted." A week later, the same teacher observed,

I can't believe how much better prepared my students are for class after using it [1SP] with reading assignments. It is a technique that should be taught to all pre-service and in-service teachers and used much more widely.

One of the Advanced Placement teachers asked students to prepare for the AP test by assigning each a chapter to 1SP to prepare review information for their classmates. This teacher was pleased with the care with which the students undertook the assignment. The students really wanted to do their best for their peers. The class consensus was it was a good source of review material. The notes were sufficient for most of the classmates to recall and review the main points of the chapters.

For yet another teacher, one sentence paraphrasing in addition to being a positive in the class also elicited a very positive phone call from a parent. The parent's daughter had been struggling through the year with the text for the course, reading and believing she comprehended, but having very little recall. The one sentence paraphrasing bolstered her comprehension and retention and the student's grade improved by a letter and one-half. The mother thought it was tremendous that the teacher had taken the interest time and effort to try to teach ways of learning in addition to the material.

Two other teachers who tried it agreed that 1SP gave them a better feel for what the students were acquiring while they were reading. One liked the active nature it added to the student's reading. The second was initially very enthusiastic, but became concerned about the number of students copying the sentences from those who were paraphrasing.

The use of the 6 W's was attempted and praised by three of the teachers. They were using the technique to probe for prior knowledge, to activate recall of information for essay answers, to provide format for class presentations, and to organize group reviews of videos. I was quite impressed with this last application and how effortlessly one of my colleagues modified the strategy to better meet the course's instructional needs and students' desire to cooperatively learn. I was encouraged by the seemingly effortless ease by which these individuals were trying ideas and hence became even more perplexed by those who did not attempt them.

Using C:A:E for review of videos was deemed a good alternative to the typical fill-in-the-blank worksheets by my two colleagues who used it when they showed a video. The opportunity

to activate and assess prior knowledge made good pedagogic sense to them. However, whereas I was very excited about the opportunity for students to raise their own questions in the “Extensions” portion, they were relieved when few questions were asked.

After these praises, the second meeting turned into a real disaster. I never even had a chance to introduce another technique. Those who had not used the techniques began to speak. Some were sure their students could not perform the tasks; others doubted their students would even attempt them. I found it very difficult to listen to this because I had success with these techniques in the special needs classes I had taught and was teaching that very year. I tried to let others share their successes again, but then I realized we were just heading for an argument. As I tried to review the reasons for pursuing writing-to-learn, I was interrupted by one of the teachers who had already said s/he was not going to participate. This person asked, “Yeah? Well, how are we supposed to accomplish this?” Before I could respond the individual was reciting the negative perspective on the plight of teachers. Incompetent people, as administrators, are demanding more and more, when the parents are less and less supportive, etc., etc., etc. The meeting had turned into a gripe session. I sank. Finally a colleague interjected, “How to do this is exactly what Ken is trying to help us do.” Following a brief silence several people commented that they soon would be finishing a unit and that they would be willing to try some of the techniques when they started their next topic. At least the turkey breast that I had cooked for that day was good.

Within a day or two after that meeting, my situation deteriorated. The county released the results of a teacher self-report survey and concluded there was sufficient writing occurring in the science classrooms and any follow-up would be done on an individual basis. There now was no external motivating factor for my colleagues to participate.

I had realized from the beginning that there were some folks who were unlikely to participate. Unfortunately, there were several other folks whom I was certain would as they had been telling me, begin trying the strategies with their next unit. I decided to have a lunch meeting with those who were participating and those who were talking as if they soon would, and exclude those who had said that they were not participating. I thought a group smaller than ten would be easier to manage. I had prepared an interesting turkey stew and had it heating in a stock room when, just minutes before our meeting, the fire alarm went off. By the time we were allowed to reenter the building, the stew was a mush and lunchtime had been cut in half. Essentially people had just enough time to see there wasn’t a very good lunch at the meeting and to go grab something at the cafeteria. Who knows? Given the way the previous two meetings had gone, may be this was more easy on my ego.

I presented some of my preliminary results at the Virginia Academy of Science meeting. After a reassuring and redirecting lunch with a committee member, I realized that the folks who had not “gotten into the pool yet” were “never going to swim.” Thus at that point I decided I would only work with the individuals who were already participating. This effectively changed the study with respect to a department effort and focused on an internal subgroup. Thus, there would not be the follow-up surveys. (I was in the awkward situation: some of the folks who were trying the strategies had not provided the pre-treatment survey data.) I was feeling as if I were a failure because only four of the original sixteen were participating.

The day after the Virginia Academy of Science meeting was to be one of the Friday “brown bag” meetings for those with interests or questions that wished to pursue them informally. I sat in the science office and ate lunch by myself. Usually, several members of the department ate lunch in the room. Could there have been such discomfort with what I was trying to do that everyone elected to eat elsewhere? Or, was it out of respect for what I was trying to do that nobody wanted to intrude unless they had questions and there simply were no questions? I knew it was probably neither of these possibilities. Nevertheless, I was surprised and sad. I knew I had good ideas to share, but few felt like receiving them. I did not try to conduct any more meetings. The latter survey data I collected represented only four responses of seventeen. This was further evidence of the lack of interest of the broader science faculty in my ideas.

Colleague Participation

As best as I could, here I have briefly described the participation of my colleagues. I randomly assigned them numbers and have been cautious to maintain their anonymity. Those who were more active participants will later be described more fully. Comments attributed to the individuals were either exchanged in personal discussion and jotted down in my notes/journal or were recorded during one of the departmental lunch meetings.

Colleague One

Extracurricular involvement required sufficient time that C1 did not attempt the strategies with students. C1 in later interviews commented that her/his college experience involved very little writing, even including laboratory reports. Problem solving and quantitative skills were emphasized. C1 felt that s/he “probably should include more writing” but felt very successful with her/his teaching approach.

Colleague Two

Stating that the instructions of the strategies too confused the students, Colleague Two was one of the first to drop from the study.

Colleague Three

Colleague Three postponed participation until the beginning of a new unit. Completing the current unit required several weeks. However, when a new unit was begun, C3 elected not to incorporate any strategies due to planning constraints of the fourth quarter and students objections.

Colleague Four

In many ways, C4 may have been my most frustrating participant. Having elected not to participate initially, C4 then attended the second group meeting, not having been at the first, and then dominated the conversation time. The most limited resource I had was the time for large group meetings and a person not even participating monopolized the time. As a friend, I could not abruptly tell C4 to be only a non-participating observer. Sadly, I am sure C4 had no idea of how out of whack the meeting became due to her/his comments. Several questions raised had been specifically answered in the first meeting; much of the remainder was griping about education in general. After the second meeting, I felt my efforts were doomed.

Colleague Five

During the spring of 1995, Colleague Five provided the best, unanticipated and unsolicited comment regarding the potential of the strategies. C5 energetically employed the One Sentence Paraphrasing with students and was pleased with the results. After just two weeks of employing the strategy, C5 received a phone call from a parent. The parent was exuberant because her daughter finally understood her reading assignments and had jumped one or two grades in several classes on her quizzes and tests. The parent encouraged C5 to continue to share strategies with the students. C5 has continued to do so.

C5 also made the observation that the stronger students were the ones complaining the most about the strategies. The “A” students did not understand why they had to do all this extra work to maintain their “A”.

Colleague Six

Enthusiastic initially, Colleague Six was the first to discover that the students would “cheat” with the strategies also. C6 tried the strategies we discussed and willingly employed them. Disappointment followed when in some classes, a significant portion (estimated at thirty percent) of the students were merely copying others One Sentence Paraphrasing. (I did not pursue the idea that probably the same number of previous worksheets and short answer assignments had been copied. With the one sentence paraphrasing, it is so clearly obvious. On the other assignments, it had not been.)

C6 was also frustrated that I did not have more time to spend with the participating individuals and more ideas about how to assess more in-depth writing. I had strategies that I did not make time to share because it would have widened the gap between those already participating and those who had not started. In retrospect, I wish I had reduced my group to that smaller, more enthusiastic nucleus of four or five. This would be my plan in future endeavors.

Colleague Seven

I greatly appreciated the frankness and forthrightness of Colleague Seven. When I asked if C7 would be interested with trying new strategies, the answer was, “No. I believe I may have my students writing an amount that is excessive already. As it is now, I can barely keep up with my workload. Including writing already is a priority of mine.” This said, this individual was invited for lunch and to enjoy observing us. In the spring of 1997, C7 complemented me for really caring about students, learning, colleagues, and teaching. C7 encouraged me to continue to share ideas with others.

Colleague Eight

Not realizing it then, Colleague Eight, just like Colleague Seven, did the next best thing to being an active participant. C8 initially and immediately told me, “No! Thank You!” I did provide the information and C8 looked it over and commented that it seemed interesting, but the spring of 1995 was neither the time nor place for C8 to be participating.

Colleague Nine

Colleague Nine wanted to postpone implementing the strategies until beginning a new unit. And when the previous unit was completed, C9 took advantage of what I had offered to all of my colleagues. C9 was the only teacher to have me make a presentation about the strategies to his/her class. This seemed to energize the students because another teacher’s presentation gave it more validity, and C9 could also observe his/her students’ responses, interests, and confusions. This worked very, very well. C9 continued to frequently and repeatedly use 6W’s, 1SP, and C:A:E.

Colleague Ten

Extracurricular involvement required sufficient time that C10 did not attempt the strategies with students. This colleague really wanted to participate, but was just too busy. This conflict caused a major difficulty with the first meeting. C10 joined us about halfway through the meeting after having to deal with more pressing, more important issues first. I had just completed my introduction that writing-to-learn is an attempt to move away from the concept that writing must always be formal. I had particularly emphasized Parker’s point that formal writing was “fitting” a given form or format. The whole point was that no two ideas or thoughts or topics necessarily require the same amount or style of expression, particularly when the purpose is the authors’ intellectual growth rather than presentation. Just as I asked for questions, C10 entered and without even asking what was being discussed, asked to share an idea. As it was supposed to be an open meeting and as there were no other raised hands, I said “O.K.” C10 proceeded to use most of the time remaining in the meeting to describe a writing approach that had been shared by a Language Arts Teacher: Write your topic sentence and then write three sentences supporting it. Use each one of those sentences as the topic sentence for three subsequent paragraphs, and then write a three-sentence summary. I felt torpedoed: gaping holes below the water line, filling

quickly, sinking fast. The next round of explosions occurred when two other teachers thought C10's idea sounded great and asked if they could have a copy of the outline given to the students.

Within two weeks, C10 realized other obligations would prohibit participation in my efforts. Sincerely apologetic, C10 commented, "Well, at least I am glad to have helped you as much as I could at your meeting."

Colleague Eleven

From the initial meeting in the Fall of 1994, C11 was not interested in participating. When we discussed benefits of writing-to-learn, C11 listed few. Under concerns, C11 clearly stated that it was outside her/his comfort range to "try to be a grammar cop". As with others, C11 expressed personal limitations in her/his ability to assess and evaluate students' written work.

Colleague Twelve

As with C6, I may have been far more successful with Colleague Twelve if I had initially focused upon those who immediately tried the strategies. While trying to repeatedly encourage others to take their first steps, I lost several that were already walking. C12 started immediately and had wonderful initial results with One Sentence Paraphrasing. It so dramatically improved students' comprehension of the text, the C12 provided the following testimonial.

I can't believe how much better prepared my students are for class after using it [1SP] with reading assignments. It is a technique that should be taught to all pre-service and in-service teachers and used much more widely.

C12 continued to require 1SP for the remainder of the spring, but I was unable to encourage C12 to attempt other strategies. I give C12 credit for trying one strategy and finding success when the other strategies obviously were not deemed by C12 to be likely to succeed. Much later I realized the other strategies might not have been adaptable to C12's teaching repertoire.

Colleague Thirteen

Due to student objections, Colleague Thirteen left the study after a single initial attempt with 1SP. Unfortunately, C13 had missed the beginning of the first meeting when I had the teachers attempt the strategies and shared examples from my students regarding the strategies. It is always difficult to write instructions, and I am not sure C13 could have been successful without the experience and the group opportunity to ask questions. C13 also expressed a bias against my study that surprised me. Even though I stated in my initial descriptions that I had picked the strategies and had success with my students, C13 commented: "I can't believe that your committee is asking you to try these ideas *of theirs*. They are in ivory towers and then ask their students to try out *their* ideas. They are so out of touch!" I thoroughly explained that these were my ideas and that I had requested to study sharing them with my colleagues. C13 returned within the week and withdrew stating that 1SP was too confusing for her/his students.

Colleague Fourteen

Colleague Fourteen initially postponed trying the strategies wanting to wait until the end of a unit. At that time, C14 tried ISP but was confused with its purpose. C14 never reported trying other strategies or ISP again. I assumed this silence represented a withdrawal from participation with the study.

Colleague Fifteen

Colleague Fifteen was hesitant to initiate the writing-to-learn strategies. At the end of the year prior to exams, C15 requested that individual students one sentence paraphrase individual chapters of the text for to prepare review material for one another. C15 was very impressed with the students' participation and the intensity with which they undertook their task. The ISP's seemed effective as review materials and the students commented about the clarity of particularly the chapters that they had paraphrased.

Colleague Sixteen

Due to student objections to the initial attempt to ISP, C16 withdrew from the study within the first week.

Survey Data

With regards to the initial surveying of students, only seven classes responded of a possible sixteen. Nevertheless, even before the strategies were shared, two-thirds (67.2%) of the students (n=204) in these classes agreed with the statement: "Writing helps me learn". (These data may be affected because the teachers who were more likely to administer the survey were more likely to utilize writing already.) Three-quarters (75%) of those surveyed agreed with the statement: "Writing makes me think." Three-quarters (78.4%) also agreed with the statement: I study to pass or do well on tests rather than trying to learn the material for future use.

Other surveys that were distributed were not returned. I decided here was no point in distributing the last two surveys.

With regards to exit slips, the lunch meetings were so hectic that I decided not to employ them and save them for the brown bag lunches. Our successful brown bag lunches were attended by the people using the strategies and gave us a chance to hear about others efforts. As the groups were small and there was sufficient time for all to say what they wished, the exit slips seemed a redundant measure.

With respect to my journal, I did not maintain a regular entry pattern. I was so disappointed with the level of participation that I spent my spare time talking with those who had not yet begun. I know that there is spread throughout my boxes of classroom materials, basement file cabinets, and in various computer files a dozen or so journal entries that highlight the positive

comments already made, but that are for the most part, ambling testimonies of surprise and frustration.

The school year too rapidly came to a close; I did not feel sufficiently energetic nor sufficiently prepared to attempt to interview any colleagues. I felt I needed to reflect and decide whether to continue before I invested any more of my colleagues or my time.

CHAPTER 5: AN INITIAL DISCUSSION

I was curious if other teachers would find the strategies helpful. Those who tried them more than once found the strategies useful. What surprised me was my inability to convince more of my colleagues to try them. I was naïve. As the spring turned to summer and the school year ended, I had collected some data, but felt a failure because of the low rate of participation.

When I first considered trying to report my findings, I feared our department would be negatively viewed. I also did not want to deal with realizing that I had perceived the setting so incorrectly. I had been as confident and enthusiastic as I could have been. I was so wrong. Nevertheless, I can not possibly fault my colleagues. Allowing me to dominate several of their lunch times and just listening was awesome. It is not inappropriate for me to again thank my coworkers for participating with my study. I know that each sincerely wanted to help me complete my degree. I unfortunately did not perceive the distinction between “wanting to help me earn my degree” and “willingness to modify teaching techniques”.

Patterns of Participation

What a hodgepodge of contrasts this study has produced. In Earth Science, Biology, Chemistry, and Physics, different teachers who were teaching the same courses claimed both that the strategies worked and that the strategies were too difficult for the students. Grade level made no difference; the strategies worked or did not work with freshman, sophomore, juniors and seniors. Some teachers and students rejected them for being too simple, others rejected them for being too difficult, and while yet others found they worked.

I found that there were basically four categories of reasons given by colleagues for withdrawing from participation in the study:

- Not perceived professionally necessary
- Too busy with current curricular plans
- Student Objections, and
- Too much extracurricular involvement.

Group One, “Not perceived professionally necessary”

I lost no time and expended no energy upon these individuals because they immediately established they were not participating. Their honesty and frankness has reminded me that I should try to be very “upfront” with regards to professional matters. I included in this group two individuals who were approaching retirement, another who had an impending sabbatical, and one who thought that writing was outside the realm of the science classroom.

Group Two, “Too busy with current curricular plans”

With this as an explanation, several colleagues postponed their initial implementation of the strategies. Some managed to delay trying indefinitely. I found this somewhat ironic because I felt I had provided sufficient variety of possible activities (1SP, 6W’s,C:A:E) and that all were sufficiently universal that any of my colleagues could have used them.

Group Three, “Student Objections”

In fairness to the students, many have had little experience with writing-to-learn and perhaps even writing. This certainly contributed to their anxiety. Even worse, some have had horrendous previous experiences with writing having been excessively critiqued. When students are required to follow strict format and “properly” use an extensive new vocabulary list, there is a greater experience of anxiety than learning.

I include my colleagues’ students rejecting strategies as a direct contrast to my own experiences in which students actual request more strategy instruction as they approach college.

One colleague dropped participating after introducing a strategy as, “... something to be tried for a study...”. Almost immediately a student complained that, “I should not have to sacrifice my learning [for a study].”

Perhaps the ironical twist to this “student objection” was a comment made by one of my colleagues. S/he has “interviewed” our recent graduates and found two frequent comments. The first was that the new college students are surprised by the quantities of writing required as opposed to their high school experience. The second was that college professors do not care how much effort you expend, they want results and mastery.

I believe the strategies I proposed, if used regularly, would help alleviate this writing shock. Also, two of the strengths of strategies were to aid students both in becoming more productive and being better able to monitor their success.

Group Four: “Too Much Extracurricular Involvement”

Two colleagues were overwhelmed by their extracurricular obligations. One was a class sponsor who was in the process of orchestrating a prom. The time commitment for this literally leaves the sponsor teacher in a “survival mode” in the classroom. It was certainly not a time for one to assess, with fairness, teaching ideas that seem somewhat contrary to previous approaches and philosophies. By the end of the prom season, this individual had essentially “grown a phone” out of her/his head.

The second individual was just helping out with a sports team when the head coach suffered a “season-ending” injury. Suddenly, this individual was the “boss” of a sport having never coached before at this school. We literally never saw this individual after school again until the season ended.

A more mundane factor may have been a major reason for the lack of participation. To appease my colleagues desire to first complete the science fair, I delayed presenting my ideas until a time of the year when success was unlikely to be more than minimal. Those who had tried the techniques suggested difficulties of waiting until the fourth quarter. These included:

- general fatigue of both faculty and students
- specific fatigue from just having completed competing in the regional science fair
- anxiety about completing the year's curriculum objectives;
- anxiety about covering material for the AP tests;
- anxiety about reviewing for final exams;
- concern about changing the assessment of students so close to their final grades
- the traditional senior slump
- just wanting to “get through the rest of the year” with minimal discomfort
- making plans for summer employment
- the beginning of summer course work
- the lower level of cohesiveness within a department as the year progresses

A way to summarize all of these is to simply say, “It's the fourth quarter, time seems scares, and I'm already too busy”. The most glaring error I made in retrospect was attempting to involve those who did not initially partake. The next time I share ideas I will focus on those who are actively participating and “willing to experiment” in their classrooms, rather than trying to encourage others to begin. If I had only limited myself to the initial participants, I believe they would have had a more positive experience and we would have succeeded with attempting some of the more elaborate techniques. I also know that in fairness to both my colleagues and myself that I did not have the energy level to have been as effective of a facilitator as I would have liked to be. Perhaps with more energy, I could have encouraged some of the others to participate. I certainly would have had more fun and I believe I would have provided better explanations, suggestions, and answers to questions.

I also in retrospect realize I should not have tried to work with a department, but rather, work with individuals. However, at that time there was uneasiness within the department regarding unequal treatment of teachers by the administration. If I had selected but a group of teachers, with administrative approval, I was afraid this issue would flare up further.

I would not have felt comfortable approaching my non-participating colleagues and asking, “Why did you not participate further?” It would have been very awkward and difficult to attempt to corroborate their answers.

CHAPTER 6: THE INTERLUDE

After I had tried to share my strategies and because I was consumed with what I deemed as failure, the summer months quickly passed. I was afraid to describe to my committee what had happened. Prior to sharing I was as confident as I could have been and ignored their cautionary comments. I had ignored large segments of the literature because I just “knew” that most of my department would participate and I would not have the sort of attrition problems that others described. Indeed, I had been so confident, that I had almost shared with my department an idea for more formal collaboration. We have a strong reputation as a department: why not share what we do? Better yet, why not share amongst ourselves and try to more formally test some of our pedagogical ideas. I had even envisioned a name for this collaboration, C.S.E.R.G., “sea surge”, for ____ Science Education Research Group. To have plummeted from such an incredible lofty delusion to only having four participants was as great a professional letdown as I have ever endured. I spent the summer trying to figure out what I had done wrong. I knew that my presentation of the materials could have been more encouraging and complementary. But how could so many of the teachers have been unwilling to try modifying their teaching for just a few weeks? My initial fear was that reporting such limited participation would portray a very negative image of the department. I knew that the department was strong and had several excellent educators. What did it mean that these very good teachers would not try what I had suggested, particularly after responding favorably to wanting to use more writing? Thus, I began to question the strategies.

When I had tried to find evidence that the strategies worked in the literature, I had been disappointed. Very few studies provided quantitative proof. Why would so much have been written about “how” to “write to learn” if the “results” of “writing-to-learn” were in doubt? My own statistics indicated that my students believed it aided them, but perhaps my doubting colleague had been correct. Perhaps my students had only told me what I wanted to hear. As I dwelled more upon the effectiveness of the strategies, and their essential rejection by my department, I began to realize that I was no longer confident with the strategies which also meant I was no longer confident with my teaching. I interpreted my colleagues’ choices regarding participation as a rejection of ideas regarding instruction and thus a rejection of me as a teacher. The logic in my mind followed this path: 1) I knew they were good teachers. 2) I knew good teachers would take advantage of good ideas. 3) They had decided not to become involved. 4) Therefore, my ideas were not good. And because I extensively emphasized this ideas within my teaching, 5) my teaching was not good. The other alternative I pondered was whether point number one was correct. Either way, my efforts appeared to reflect poorly upon somebody and neither choice was tolerable. I felt that I had lost the respect of my department.

As the summer came to a close, I was certain that there was little point in pursuing the dissertation. Why write a document about how “not only had you found out that your techniques were not good, but that you are also a lousy teacher”? In the fall, I would be teaching chemistry and I decided to try to generate numerous quick student activities to illustrate the topics of discussion. These mini-labs were quite fun and I found I had a pretty good knack for writing them. I decided there was really no where to go with the dissertation.

In August, when the teachers returned to school, we had an ice cream social. As I awaited the opportunity to devour a wonderful banana split, as I placed my first huge spoonful into my mouth, C13 asked, "How is your study coming along?" I was caught totally off guard. I had no idea what to say and began to chew my huge bite even slower. I was at a loss of words. Suddenly, a response came from across the table. C1 interjected, "You know. I wish I had participated with that cause it seems like everyone who really tried the strategies liked them. They thought they were good." I was off the hook momentarily, but more importantly, C1's statement provided a positive perspective I had not realized. Prior to that comment, I had been entirely focused upon how few had really even attempted the strategies. I did not realize that all who had tried them more than once found them sufficiently useful and had continued to use them through the end of the year. When I finished my bite I responded, "It's going O.K. I need to speak with the folks who used them last spring to see if they are going to use them this fall. "

In the spring, my preoccupation was with those who had not participated. Now I realized my focus should be upon those who had. I arranged interviews with C5, C6, C9, and C15. As I listened to these colleagues, I was very pleased with their kind and positive words.

C9 was the most experienced teacher of these four participants. Earlier in her/his career, C9 had frequently required writing. C9's teaching career had included periods when writing was given more emphasis and when it was essentially forgotten. As curriculum materials and plans of study and standards of learning have changed, so too had the amount of recommended writing. C9 admitted that it seemed that the students writing had deteriorated during C9's career, but also emphasized his/her students were a grade level younger now. Nevertheless, C9 believed that when students wrote they learned more.

Quick to add that there had been a great deal of writing in his/her elementary and secondary education, C9 talked of his/her personal enjoyment of writing. " I enjoy writing because I seem to think more clearly." C9 wrote many letters in years past. "There just isn't the time now. " (A sentiment also expressed about grading "formal written assignments".) C9 explained that in the past, his/her assignments had been "formal" frequently with instructions regarding numbers of paragraphs, etc. Over the years the students did not seem to do as well, so C9 assigned fewer and fewer.

Excitement described C9's renewed use of writing without having as much attached assessment. C9 was certain that the students were learning more from their text with the 1SP. S/he felt the students were also gaining more from videos when the C:A:E technique was used. The idea of activating prior knowledge with the 6W's and a paragraph or two prior to the video was quite appealing. "By asking the students to consider specific points while they are doing their initial writing before the video, you plant the seeds as to what the students really should gain from watching." C9 felt that students miss too much of the videos when they are busy trying to fill in an accompanying worksheet. C9 was definitely excited by the aspect of including more writing again.

During the spring of 1995, Colleague Five provided the best, unanticipated and unsolicited comment regarding the potential of the strategies. C5 energetically employed the One Sentence Paraphrasing with students and was pleased with the results. After just two weeks of employing

the strategy, C5 received a phone call from a parent. The parent was exuberant because her daughter finally understood her reading assignments and had jumped one or two grades in several classes on her quizzes and tests. The parent encouraged C5 to continue to share strategies with the students. C5 has continued to do so.

C5 stated that writing had been emphasized throughout his/her academic years, both at school and at home. C5's parents were insistent that their children read and write. Throughout childhood, writing had been emphasized as not only being necessary for doing well in school, but also for doing well in the working world. C5 pursued another career field before becoming a teacher and indeed, writing was a major component of the job and a lack of writing ability could impede promotion. This individual had always deemed high quality of writing a major characteristic of those who were successful. C5 assessed her/his writing ability as "good" and was very alarmed by how poorly her/his students wrote. C5 also recognized part of their writing problems were writing so infrequently. Hence using writing-to-learn seemed a logic step.

Though C5 writes well, s/he neither really likes nor dislikes it. C5 also had not really considered the possibility of using writing-to-learn strategies though s/he did remember hearing something about it once in some education course s/he took to become endorsed.

What really appealed to C5 was that the writing-to-learn strategies "made the students think more" than most of the text questions that only required skimming to find the correct answer. C5 was also frustrated by the numbers of students who claimed to have read the text the night before and had no recall of the information the next day. With the 1SP, the students at least could activate some of the information with a quick read of their notes.

Colleague Six one of the first to try the 1SP and then modified them by having the students write a condensed version of the reading assignment by including the information from the 1SP. (C6 had a great deal of time to invest in grading in those days.)

C6 had a very similar professional background to C5. Working in private industry before becoming a public school teacher, C6 had endured firsthand the frustration of receiving poorly written instructions. Some had been inaccurate; some had been incomplete. Sometimes the writing made no sense whatsoever. A writing skill deficiency would limit one's career.

C6 did not remember doing that much writing in school, however, s/he felt so wrote more than sufficiently well. C6 confessed to "sort of enjoying" writing, as long as s/he know the subject well. C6 also explained several types of writing that s/he already had her/his students doing such as keeping a notebook, assigning one minute papers, using multiple drafts, among others. C6 felt the students needed to work with their writing and that writing increased some long-term memory. C6 did not necessarily enjoy the writing component of her/his teaching, but felt it was vital if the students were to really process and use the information.

Enthusiastic initially, Colleague Six was the first to discover that the students would "cheat" with the strategies also. C6 was also frustrated that I did not have more time to spend with the active participants and more ideas about how to assess more in-depth writing. C6 was

already using a process approach to writing. The results would have been interesting had C6 tried to share the critical reading strategy ACE MAC V with her/his students. I have no doubt it would have been successful. (Yet then again, I had no doubt that ten or twelve would incorporate the writing-to-learn strategies.)

C15 remained skeptical even after her students had successfully used 1SP to review for their exam. Still not convinced, C15 had a course the following summer that sent a great number of articles to be read prior to the first class meeting. C15 decided to try reading the articles using 1SP. This way C15 would “truly” know if 1SP really worked. Though it initially slowed the reading, C15 persisted. In fact C15 persisted to the point that s/he was “cursing under her/his breath” because there were articles still to be read and without 1SP, all would have been finished. At the first class meeting, the instructor proceeded to give a “pop quiz” to overview the readings. C15 was the only student who did well. With clear recollections of notes taken but never reviewed, C15 was now a firm believer in the power of writing-to-learn. “It seemed as if nobody else had even read the articles. I knew the answers to almost every question that was asked. Others who swore they had read all the stuff remembered so little.” When the fall of 1995 arrived and I asked for an interview, C15 asked for further explanation of the writing-to-learn techniques and in turn incorporated 6W pre-writing, C:A:E, and adding questions that required paragraph answers to tests. C15 remarked that initial fears of how to grade assignments gave way to the enjoyment of reading students’ perceptions and questions. Witnessing the concepts develop was far more indicative of students’ growth and easily worth the price of the ambiguity of “subjective” grading.

As with C5 and C6, C15 had also worked in private industry and had witnessed the emphasis placed upon writing. However unlike C5 and C6, C15 absolutely, without question hated to write. Even more interesting was C15’s confession that s/he a horrible writer. I asked about college assignments. “I nearly drove my English teaching assistant crazy asking for help so frequently. I am sure he was very happy when the semester was over.” “As a [science] major in college, I never had to write very much in my classes.” What makes C15’s statement “poor writer” even more extraordinary is that C15 was the valedictorian of a large high school.

“I never asked my students to write much because I did so little of it in school and I do not think that I am a good writer.” C15 was willing to try the writing-to-learn because the purpose of the activities was learning and not assessment.

The interview with C15 left me feeling much better. At least my efforts had made a difference. Someone who avoided writing was now employing it in the classroom. I thought I would have several C15’s when this all had begun. Well, at least I had one and for that I was appreciative. However, I was not certain that I had enough to justify a dissertation. My anticipated results were triple what my actual participation had been. I only covered three of five strategies. And still in the back of my mind after these interviews I feared that the majority of the department did not believe that the methods I used to teach were effective.

Even with the positive statements from the participants, I feared the department, my colleagues who wanted to help me, would be harshly portrayed in a written summary. I was

preoccupied trying to figure out what I should have done differently and how I could present the department in a positive venue. I elected to place the dissertation on hold. (A personal note: this was also when my sleep apnea became a problem. I reached the point that in order to be able to read or grade papers I had to stand and work on the top of the five-foot height lockers. Sitting for twenty minutes without engaging in conversation was a quick route to sleep.)

In the spring of 1996, I was asked to pilot a course new to the county. I was one of the few who had prior knowledge of Principles of Technology and it was also clear that whomever took the position would be involved with a great deal of curriculum development and writing. My administrator suggested I was the “perfect” choice as I working upon a degree in curriculum and instruction. I was selected for the position and began working upon the curriculum plan of study that summer. The following year was very busy not only with the new course but also with an idea we developed about a course for students who had already had physics. I was writing continuously, and then the summer came and I was offered a course to teach and also more curriculum work.

The fall of 1997 arrived very rapidly. The courses were going well and my teaching and extracurricular involvement was keeping me more than busy. The spring of 1998 arrived and with it, two key moments. The first was a realization that I had become so preoccupied thinking about writing-to-learn and thought it was so good, that I had essentially overlooked all the other characteristics and activities of excellent teachers. On a day when a visitor was coming my classroom was very cluttered. As I remarked to myself, “I hope this person is not a neatness freak.” I realized that hopefully nobody would judge me just on tidiness. Suddenly, I realized that nobody reading a dissertation would judge department members solely upon their participation with writing-to-learn. It was suddenly obvious: one could be a great teacher without using writing-to-learn. I would add that I believe they would become even better if they did use writing-to-learn. (As will my instruction improve with better organization!)

The specific date of the second insightful moment was the afternoon of Thursday, January 22, 1998. It dawned on me to ask the members of the department who had first tried the techniques if they were still using them. I may not have had frequency of participation, but I discovered I had history.

Then I realized that I could report my findings and not tarnish the image of the department. Roughly a quarter of the department tried the techniques proscribed and was still using them. The techniques had lasted more than three years in all of the active participants’ classrooms. I realized how much this meant to me: I had indeed positively impacted these individuals. I realized I was happier with this outcome, continued use of the strategies, than I was unhappy about only a few trying the ideas more than once. I had definite success with these individuals and had actually become much closer to them professionally. Another quarter of the department had at least tried the techniques and pursued them to various degrees before declining further participation. Another quarter continually promised they would begin soon, with “soon” never arriving. And the last quarter of the department elected from the beginning not to participate. Three years earlier, I was devastated by these results. All had said that they wanted to help me with my research and I still believe they were sincere. They just did not realize that I was

indeed asking them to deviate from their established procedures. They were either not willing to change, or not capable of changing how they taught.

After my years of personal success, the one quarter of the school year with my questionable group outcomes, and more months with more literature, reflection and incubation, I finally could be fair, honest, complementary and critical. Obviously, my prediction did not come to fruition and my disposition accordingly became less than positive. Though I would not believe that I had become a cynic, I would admit that I was too naïve to understand the nature of educational change when I began this effort. I had no idea of the amount of inertia that must be overcome. Several times while working with my results I felt like quitting. Nevertheless, three years of uncertainty and a feeling of failure abruptly ended.

A conversation I had during lunch with my current administrator was very informative. After listening to me describe my study, s/he noted that I did not have any extrinsic rewards for participating (and no punishments for not participating). S/he summarized, “The Human Nature’ of teachers is to stay the same as long as they are satisfied. Why should they have changed and risked feeling uncomfortable or risk having a bad class? Very few teachers are motivated to attempt change without more encouragement.” I tend to agree, but I am uncertain what reward I could have provided given the situation. I began the idea because writing was to be made a priority and that is when I felt unanimous support. Once it was “de-prioritized” by the county, interest waned.

I realized that as I had developed a monomaniacal perspective regarding others using writing-to-learn, so too had I developed a paranoid perspective of others judging me negatively solely based upon my belief in writing-to-learn. As it is now so clear to me that one needs to be very careful regarding colleagues as research subjects (Don’t!) I could have never anticipated the degree of distress I had felt when I could not succeed in persuading some of my peers to try what I was suggesting. And just as I realized that they were not bad teachers because they did not heed my advice, I suddenly realized they did not perceive me as a bad teacher simply because I had confidence with different instructional ideas. Teaching is far too complex an endeavor to have one or two “acid tests”. And even though I was using many instructional tools, writing-to-learn seemed to always be in my hand when I was reflecting upon my research. Yes, I wished more teachers would have used more writing-to-learn, but this alone should never have been the measure of the quality of a teacher or of a department. I say again, I was very fortunate to have had the opportunity to share my ideas with my friends. I wish now I had been able to realize a better, more productive perspective. To make a simple summary of years that have passed seems somewhat inappropriate. However, the many thoughts distill to a few notable observations:

First: The quality of an individual teacher or of a department is the summation of numerous techniques and emphases. There is no one “acid test”. In other words, not using writing-to-learn does not make one a poor teacher.

Second: Even when a teacher believes a change would be for the better, it is likely the teacher will not perceive circumstances suitable for attempting implementation.

There are several “excellent” teachers with whom I had the pleasure of working who assign essentially no “writing-to-learn”. I can easily imagine an unsuccessful individual who attempts “writing-to-learn” strategies exclusively. After years of reflection, I am surprised I did not grasp these ideas sooner. More importantly, I now somewhat appreciate why good teachers may let good ideas pass untried.

I decided to reread some of what I had worked with before and try to gain more from it. (And yes, when possible, I did use 1SP). I realized that when I initially read in preparation for this study, I was looking only for answers to some very specific questions and ignoring information that could have been quite helpful. Additionally, with the passage of time there were now more studies and more that had been reported. There was more information available which hopefully would assist me to better understand what happened.

CHAPTER 7: A SECOND LOOK AT THE LITERATURE – COMPLETING A LITERATURE REVIEW

Even as I approached the literature for the second time, with more open eyes, I continued to seek answers to my original questions. Now three and one-half years later, I found more support and clearer articulation of points I had tried to make. But more importantly, I found the information needed to resolve my dilemmas. Some information came from rereading older sources and some came from publications that were more recent than when I began my study. I also now had several other questions dealing with the reluctance of the teachers to try writing-to-learn and why had my predictions been so incorrect. This supplementary review was necessary in order to understand the outcome of my attempts to influence my colleagues. I was also pleased to have references (and quotes) which were more recent.

Simply put, *writing-to-learn* is the use of writing to help a person understand or make sense of information, learn a new concept, or move forward on a project. It is writing done to make material one's own or to grapple with difficult content. (Gardner, 1997, p.191)

Writing and thinking skills are inseparable and necessary for discovery and critical understanding. With this new focus on evaluating critical thinking, educators must sharpen their expectations of students' writing skills and include specific writing-to-learn activities in the classroom. There is no better way to know how students think than to require that students explain themselves in writing. (Poirrier, 1997b, p.14)

Reexamining the Need for Writing and Writing-to-learn

Those who have been teaching for any length of time are familiar with the waves of curricular and methodological "innovation" which have swept in and out during the past decade or two. Team teaching, flexible scheduling, open classrooms, phonics, new basals, new math, new chemistry, and so on have washed over American schools, leaving only the smallest traces of academic flotsam and jetsam behind. One of the reasons they didn't have much permanent effect was that they were usually imposed from without and attached piecemeal to an already overstuffed curriculum. (Mayher and colleagues, 1983, p.147)

Is writing-to-learn just one of many fads that comes and goes? To present a balanced perspective, this must be remembered when discussing the curricular pendulum:

Writing may be a present-day educational fad, but that does not automatically negate its value. (Mullin, 1989, P.205)

Writing is an excellent vehicle for students to integrate new information with their prior knowledge. This makes the new information, in the words of Wood and colleagues (1995, p.2) "*meaningful*".

Reexamining the Need for Writing-to-learn in Science Education

I completely disagreed with my few colleagues who felt improving students writing was not part of being an effective science educator. Professionally speaking, I agreed with those who believe all teachers should teach reading, writing, and arithmetic. "...writing activities are appropriate—even necessary—in all courses" according to Betchel (1985, p.*ix*) to maximize learning.

Again, I believed we should be teaching the students rather than focusing on the subjects. Writing in science? Is not publication one of the measures of success of scientists? Writing is a critical skill in science or any other profession.

Top scientists spend more than one-fourth of their working-day writing. Most of these scientists claim that their ability to write effectively helped advance their careers. Similarly, Fortune magazine recently asked successful executives what students should learn to prepare them for careers. Their answer: Learn to write well. (Moore, 1992, p.9)

Success for many professionals, in industry or higher education, is directly related to success as an author. However, their publication writing is supposedly more for the purpose of communicating than making meaning. Certainly the publication writing style is strict.

I have long been aware of the contrast between a scientist's view of writing and my own. Clear, precise statements, closely reasoned argument, unambiguous and very felicitous use of language are much admired and sought after among scientists. But writing, to *them*, is a kind of aftermath of thought or work; not the means to understanding. (Tobias, 1989, p.48)

Composition needs to be emphasized as an effective means of learning content within science. This is not the kind of writing performed only for the sake of further drilling with a poorly used communication skill. It should be part of an instructional program that includes inquiry and problem solving. Otherwise, this statement will probably remain true.

Thus, to the extent that writing is perceived as a *substitute* for either problem solving or mastering the code, I believe science and mathematics instructors will resist writing-to-learn. (Tobias, 1989, p.49)

Without change this statement will also probably remain true, too.

Nevertheless, I frequently hear colleagues complaining that their students "know the formulas" but don't really understand the 'physics' behind them. (Mullin, 1989, P.200)

Reexamining the Success of Writing-to-learn

With respect to the success of writing-to-learn more evidence could be found in more recent publications. Wood and colleagues (1995, p.2) state "...all strategies presented in this book have been *empirically validated*; that is, their positive effects on students' learning have been demonstrated experimentally, clearly identifying them as effective procedures."

More up-to-date results were given by Poirrier, (1997c, p.21) who stated, "Reports (Bowers & McCarthy, 1993; Burling, 1982; Fulwiler & Young, 1990; Olds, 1990; Walvoord, 1996) indicate undergraduate development of analytical thinking skills, enhanced communication skills, increased valuing of writing skills by students..." Writing-to-learn is successful and worthy of student implementation.

I am still surprised by the number of examples of articles and books that discuss "how to use" writing-to-learn, and its benefits, but do not provide explanations of "how" or "why it works". Many authors state that writing will increase learning but suggest no mechanism by which this happens. (Examples would include Wotring and colleagues, 1981; Steinacker and colleagues, 1984; Hightshue and colleagues, 1988; Williamson and colleagues, 1988; Cannon, 1990.) (Sensenbaugh(1992) went to the extreme of suggesting that developing an understanding of how strategies work was beyond the need of teachers and suggests in his preface that such knowledge might be an idealized distant goal.) Some authors provided some general description such as Langer and colleagues (1987, pp. 4-5).

The role of writing in thinking can be conceptualized as resulting from some combination of (1) the permanence of the written word, allowing the writer to rethink and revise over an extended period; (2) the explicitness required in writing, if meaning is to remain constant beyond the context in which it was originally written; (3) the resources provided by the conventional forms of discourse for organizing and thinking through new relationships among ideas; and (4) the active nature of writing, providing a medium for exploring implications entailed within otherwise unexamined assumptions.

Other authors remind us of the "intrapersonal" and "interpersonal" aspects of writing and how these affect learning. (Poirrier, 1997b, p.16; Smith, 1994, p.17) Only recently I found an article that I wish I had been able to share with all my participants. Though it is neither recent nor easy to read, Janet Emig's article from 1977 was powerful. It was referenced numerous times earlier and then I came across the article in a lithograph. Emig attributed a greater necessity for writing than I had considered. Only with the unique cognitive processes of writing could an individual enhance or completely develop certain higher levels of thinking. If this is indeed true, to borrow a phrase from one text: "Students Must Write" not only to have a better position for employment, but even more importantly for the maximum development of their intellectual potential. Emig (1977, p.91) also emphasized the difference between writing and talking and why conversation is not sufficient for the development of the higher level thinking skills. When we write, we proceed more slowly with more thought placed upon each word. There is no immediate audience and environment providing context and asking for clarification. Words spoken may be remembered: with writing

there is a permanent record that can at a later time be modified. This permanence also results in more careful thought as it may last through time.

One of the main reasons I like writing is it allows us to “keep track of” more information that we could possibly hold in our working minds. Smith (1997, p.41) touched upon the limited capacity of the mind with regards to “holding” in working memory larger amounts of information. This is the one aspect of strategies that must be stressed. Strategies need to be utilized because the working mind is limited. I always ask and every student always agrees that during an essay test they have left out information that they knew was critical to the answer and indeed had even briefly thought of while answering, and then been dismayed that they had neglected to include it. (Multiple Choice tests rarely exceed the working memory.)

Reluctance of Teachers to Change Instructional Practices and Try Writing-to-learn

The inertia of teachers and the allegiance to few specific teaching formats or methods were just far greater than I could possibly imagine. Hightshue and colleagues (1988, p. 726) commented, “So we were reminded once again that it is not easy to change teachers’ attitudes...”.

One of the big concerns regarding writing-to-learn is it requires more time and limits the amount of material than can be covered. How can this be dealt with? Is it worth the time investment?

Faculty and students must get accustomed to the idea that all written work does not have to be graded. Faculty can evaluate the writing and stay “in touch” with students by collecting the writing exercises at the end of class and scanning through them. It is possible to scan through 85 to 90 in less than an hour. (Broussard, 1997, p.156)

Recognizing the preeminence of thinking over facts means changing ideas about “covering” material. Many of the teachers involved with the Writing-to-learn project came to the conclusion that reading a specific number of chapters was less important than working with a small number of chapters in a way that enables students to make connections with the material. (Gere, 1985, p.4)

...some teachers have found that extensive writing-to-learn meant that they did not “cover” the same amount of material as they had in past years, but these teachers were convinced that the increased quality of learning more than compensated for the slight decrease in quantity. (Gere, 1985, p.6)

Other teachers may avoid writing because they feel writing is not a skill that can be taught, but rather an innate ability.

Traditional writing assignments often ignore the writing process. ...Neither traditional directions nor traditional evaluation procedures take into account *how* a person writes. Some students seem to know how to proceed, others obviously have difficulties, and this

discrepancy contributes to the widespread notion that writing can't be taught, that some people just have a "talent" for it. (Bechtel, 1985, p.20)

From the literature, I can find many reasons for a lack of participation. Some who were hesitant may not have understood the differences among practicing writing, assessing with writing, and writing-to-learn. Perhaps I did not sufficiently emphasize "...that writing is not writing is not writing..." (Langer and colleagues, p.132). Given the time constraints and the amount of time that my colleagues spent discussing pro's and con's of traditional writing I should have been more dominant. I should have heeded this advice: "What we must help teachers in other content areas see is that we're not asking them to become teachers of writing." (Mayher et. al., 1983, p.86) Perhaps some of my colleagues felt anxious with the strategies because of changing their typical interactions with the students. The role of the teacher in a classroom involving writing-to-learn involved a different type of teacher-student relationship. Here was an interesting, seemingly contradictory perspective:

Writing-to-learn requires changes in teacher behavior. When writing-to-learn strategies are introduced in a class, the teacher's role changes. Instead of being the source of knowledge, she or he becomes a guide who helps students find their own knowledge. In practical terms this often means adapting a more student-centered teaching style. However, the shift toward student-centered teaching does not relieve the teacher of any responsibility. In fact, it becomes even more important for the teacher to exert leadership and control: without firm guidance who write to learn will flounder. (Gere, 1985, p.5-6)

Perhaps I neglected considering the discomfort some of my colleagues would feel if thirty students were pursuing thirty different topics and then forming seven to ten groups for peer mediation. They may have feared discipline problems or the appearance that their classroom was out of control. The following passage addressed these issues.

Ironically, however, the effectiveness of teachers is often judged by their ability to keep their classrooms orderly and their students quiet, even though order and quiet seldom accompany real, vital learning activities....Good teachers will always be able to bring their classes back to order if the need occurs, but their classes will be buzzing with activity much of the time."(Hobson and colleagues, 1990, p.25)

Of the many reasons I could list for not participating, this would be the one that I would have the most difficulty assisting my colleague. If a teacher feared loss of control or feared that s/he could not regain control at any moment, then it was almost unimaginable that teacher would ever venture from the comfort zone of the established routine.

The nature of assessment may have prevented some from continuing. I did not emphasize that grading is but one type of responding. Does all student work require grading? NO! Does all student work require response? When possible, yes. And here the development of student peer review would help. Of more concern may be the teachers' feelings of inadequacy regarding grading written assignments. Our experiences as students had emphasized penmanship, grammar, spelling, punctuation, etc. rather than ideas, organization, and expression.

Another reason [in addition to overcrowded curricula] content area teachers cite for not wanting to include writing in their classrooms is they're not qualified to teach it. What they usually mean is they've not been trained to edit students' work or don't have the expertise to correct spelling, punctuation, or other surface features. And they're right about this. That's why it is so important to make sure they understand that no one expects them to be writing teachers, but rather to provide a better way for their students to learn what they are teaching. We aren't asking them to edit students' work, but to view writing as a genuine communicative activity, which means we do want them to demand clarity in students' writing. (Mayher et. al., 1983, p.88)

In Mayher and colleagues (1983), the final chapter is entitled, "Surviving Together in the Real World". It begins with a heading, "It's Dangerous Out There, So Let's Be Careful". Numerous items are listed illustrating reasons why writing across the curriculum implementations failed. My experience resonates with several including these descriptions:

Teachers of other disciplines involved in talk and planning for a writing across the curriculum program at an urban high school resisted any change in their current approaches. Some complained that asking students to write would require too much reading on their part. Another group had already run off their dittos for the entire year and didn't want to upset their schedules. A third group was concerned that if they had their kids write they wouldn't be able to "cover" all the material in the curriculum. Once again, the department chairs caved and the principal caved in and the program died.(p.144)

It will also demand more from the faculty. Most teachers are overburdened and often discouraged. Those teachers who are convinced that their approach is flawless or that no improvement is possible aren't the ones to start with. (p.149)

Langhorn and colleagues (1987, pp.145-150) summarized implementation constraints. They included standardized testing and evaluation concerns, lack of suitable textbooks and materials, concerns of managing paperwork and professional constraints. From the individual teacher's perspective, the literature provided a list similar to mine. Bechtel (1985, pp.2-3) listed concerns of time required to grade, poor quality of students' efforts, too much to do already, teachers' feelings of inadequacies, and again, professional constraints: it's somebody else's job. Langer and colleagues, (1987, pp.22-23) specifically stated that two-thirds of the teachers were concerned about extra time needed to read and respond and that students lack sufficient skills. Applebee (1984, pp.187-188) also mentioned time and expertise concerns, but added the threat to individual teacher's conception of instruction role and the teachers' own discomfort with their own writing. Additionally, teachers may fear of the unanticipated question or outcome. (Flowers, 1989, p.206-207) While reviewing my notes, I discovered these passages specifically about the reluctance of science teachers.

Science teachers, for example, were less likely than social studies teachers to perceive writing activities as falling within their curricular province. They felt, in general, more tied

to a specific curriculum and spoke of their responsibility to cover a given number of topics during a school year. . . . Both the science and the social studies teachers felt they had little time or inclination to include many writing activities in their classroom. (Langer and colleagues, 1987, pp.20-21)

Most science teachers I know do not think of writing as an important part of their classes. To be sure, they assign lab reports and occasionally ask students to answer questions at the end of the chapter, but writing is not really important in their class. Moving and caring for delicate and expensive equipment takes a great deal of time. Then there is the demanding problem of preparing for laboratory sessions and the subsequent clean-up, repair, and replacement of equipment. "With all those other concerns," they say, "who has time for writing?" (Johnston, 1985, p.92)

As I considered these possibilities, I realized that those who participated are indeed "risk takers". What could be done to reduce their risk or lower their workload? I may not have done enough to encourage my colleagues to participate. I did not want to "oversell" my product; I wanted them to assess the techniques merits based on their classroom experiences. I did not realize I needed to consider their confidence; this was/is an outstanding department.

I certainly wish I had shared these next two passages with my colleagues. These authors address some of these anxiety issues and clarified the teachers' assessment role.

The best way to begin improving student writing is to banish three popular beliefs that frustrate students and teachers. One is the belief that the instructors should write a lot in the margins and between the lines. Another is that instructors ought to know and use a lot of specific grammatical rules and grammatical terms if they want to comment effectively. A third is that the most effective responses to students writing are instructor-written comments on the final copy. All three beliefs are false. (MacAllister, 1982, p.59)

The final point is that content area teachers have all the expertise necessary to determine clear form unclear writing in their disciplines. They are qualified to require clarity and to teach it. (Mayher and colleagues, 1983, p.89)

I am not sure what prior knowledge my colleagues had with regards to learning and teaching. When the techniques I proscribed were avoided by so many, was this because of careful evaluative consideration or because these ideas were too different to connect and therefore immediately dismissed? Or had they seen it not work before with previous curricular innovations?

Reexamining Peer Review

The use of peer evaluation was a topic I was only able to share with two of the teachers. In addition to reducing the workload for the teacher, I believed the actual interactions among the peers were important for learning too. Students learn from hearing others' explanations and by attempting to make explanations. Some would argue an inability to articulate an idea would indicate a lower level of comprehension. Expressed a bit differently, "...being able to perform operations without being able to explain these operations to oneself or others is at best an ignorant skill."(Connolly, 1989, p. 6)

Audience is a key factor when writing. Audience is in part determined by the purpose of the writing—informing, persuading, and clarifying. "It is therefore important to help learners to become conscious of the purpose underlying each piece of writing. This will help them match what they want to convey and how it is written."(Brookes & Grundy, 1990,p.16)

What is added by peer mediation? The use of peer mediation introduces more interactions between the individuals composing and their audience(s). Social interaction is lacking in many traditional assignments, particularly if the other party is a textbook, film or lecturer. From a social constructive perspective, utilizing a larger audience would favor more learning. Peers must be instructed to praise and ask questions with their feedback rather than pass judgment. Peer review can be directed by providing guidelines. Soven (1996, p.13) suggests using checklists that include questions that apply to most kinds of writing.

- What is the main point of the essay?
- Do the details show this point clearly?
- Does the essay leave me with any unanswered questions?
- What are the strengths of the essay?
- Are there mechanical problems that hinder my reading?

Sovan advocates peer review for several reasons. First, the students can avoid being penalized for errors they do not detect in their own work. Secondly, it provides another real audience for students rather than only the instructor. Thirdly, by having to evaluate other students' papers, they improve their ability to judge their own writing. This last point is one quite alien to many students. I recently made more than a few of the juniors and seniors in my physics class ponder the notion that they should be able to anticipate their scores on tests and papers at this stage of their academic careers. Perhaps it is an esoteric knowledge, but perhaps the most important part of knowing is "knowing you know".

What's important isn't that *the teacher* thinks that the student has done well, but that *the student* knows how to determine if she's done what she set out to do in a particular piece of writing...(Bauman, 1997,p.163)

Groups of Participation

With respect to non-participants, I had my grouping (p. 85). I felt my categories were even more reasonable when I discovered the WAC authors also had grouped levels of participation. Walwood, and colleagues (1997, p.138) described six groups in which they could categorize faculty:

Not Participating

WAC on Hold: doing other things first

Embracing, then winnowing start, then overwhelmed

Little by Little

Revolutionary turnaround

New Worlds: catalyst for previously untried directions

I am not surprised to read of non-participants yet how amazing it is for me to discover that at the collegiate level, pseudo-participants have their own category also. (One or two of my group initially embraced. I'd say four went Little by Little, three had Revolutionary turnarounds.)

In addition to their participants, Walwood, and colleagues (1997, p.140) relate their "Directors Perspective" or how it is they can survive trying to be agents of change.

Humility: that we can not win converts over to our vision;
can't even get them to focus on acceptance or rejection;
participants want what works for them

Trust: that others will find a way without WAC

Awe: what is accomplished in the long run

I wish I had seen this before I attempted to interact with my colleagues. I certainly appreciated each word thoroughly: Humility, Trust, & Awe.

Coaching versus Judging

Perhaps one difficulty for science teachers and their objectiveness is developing the ability to coach writing in addition to judging it. From a teacher's perspective, one of the most important discoveries was that the quality of the product of writing was directly related to the amount of assistance during composition and not to the rigor of evaluation of the final product. As Walvoord and colleagues (1982, p.3) stated, "Writing is both a noun and a verb, both a process and a

product of that process. In the past, teachers...have concentrated mainly on describing and evaluating the written product, not on coaching the writing process.” What did “coaching” mean? Developing the skills to assist students while they were writing was quite different from assigning a paper and only interacting with the students by grading the final product. Previously, there may be no more interactions than errors highlighted and a grade. Walvoord and colleagues (1982, p.3-6) continued,

The current emphasis on understanding and coaching the process of writing, not merely on describing or judging the product, has major implications for writing across the curriculum.... Teacher coaching helps improve writing more than increasing the number of assignments, increasing the grading comments, or increasing grammar instruction.

Holady elaborated this distinction between coaches and judges (1997, p.41)

We don't need our teachers to be judges. We have more than enough judges in this world. Coaches, however, are something we don't have enough of. Coaches are on your side; judges are not. Coaches are friendly; judges are aloof. Coaches want you to do well; judges don't care. Coaches believe you can do well and show you how; judges lecture you on what you should be and are not. Coaches offer encouragement; judges offer—*judgment!*... Teachers are not in the classroom to judge; they are there to help children meet the standards of the outside world.

(Unfortunately, too many of my colleagues never knew or have forgotten about being a coach. Many are judges without a doubt. Worse yet, a few have now become prosecuting attorneys!) What a powerful images the description below provides. Would a judge or a coach have allowed this?

Thus the writing task is often more like a raid into alien territory, with all its attendant risks and uncertainties, than a companionable walk through familiar country with excursions from time to time into unknown bits of terrain. (Martin, 1983, p.21)

Teachers and Self Image

My confidence, which mislead me with respect to grossly overestimate participation with this endeavor, has been very beneficial in my other professional endeavors. It is a pleasure to try a new instructional strategy rather than a horrific experience. However, following “my surprise” with my results, I did a great deal of soul searching. “In reflection, experience, for the person, is reorganized in what Dewey calls reconstruction of experience. ...one comes to challenge one's assumptions *and* reconstruct one's experience....we come to challenge our assumptions and reconstruct our experiences.” (Clandinin, 1986, pp. 166-167)

In the first chapters of this document, I followed my progression of “writing-to-learn” as a student, instructing with “it” as a teacher, investigating “its” literature as a graduate student, and attempting to share “it” with other teachers as a colleague researcher. I included aspects of all three perspectives because they are parts of my “image” as a teacher (Clandinin, 1986, pp.129-

149). As my sharing and research stalled, part of my problem that I had no idea of the “images” of the other teachers. Clandinin (1986, p.132) described four areas that influence “image”: 1) Professional Experience; 2) Professional Training; 3) Experience as a Student; and 4) Private Life. It was obvious that sixteen different teachers would have sixteen different images. Some newer teachers had less than five years experience. Others were nearing the ends of their careers with more than twenty-five years of experience. Some had recently completed course work for endorsement or recertification; others had been years without any educational psychology or curriculum and/or instruction courses. Most had enjoyed being students; few described their own writing experiences with joy. Some were very involved in the school community; some others were very involved in the school community of their children. What may have made me unique in this group were two types of experiences. The first dealt with having multiple endorsements such that, at the time this study began, I had been directly involved with instruction for eleven different courses, at seven different schools. (Since the study began I have added three more courses and another school location.) This broader view of science education lead me to realize the overwhelming majority of “facts” most students memorized for one class are forgotten by the next year. Even problem solving skills that were supposedly emphasized in chemistry are all but nonexistent the next year in physics. Why expend the time and energy if most students recall but a depressingly tiny portion of the facts and essentially none of the analytical skills?

The second factor that made my “image” quite different was working with student teachers only two years prior. I observed many student teachers, their cooperating teachers, for many hours (perhaps over one hundred hours.) I had seen various science classes, of various grade level students from seventh to twelfth, at fourteen different middle schools and high schools. These experiences reinforced my concern regarding the effectiveness of most teaching activities. How foolish I was to have thought writing-to-learn would also juxtaposition with any of my colleagues. But I really did think more than four would accept my offerings.

Despite our training, most of us have regressed back to teaching in the manner in which we were taught. Weinberg explained that educational cultures are difficult to change (1975, p.133). I had personal experiences with writing-to-learn from a student’s perspective before trying to use it with my students. Perhaps I had been more fortunate to have exposure to several “classroom cultures”.

Of course a consideration I should have asked earlier was the teachers enjoyment of writing. Of those few who participated one absolutely hated it through college and hence was thankful for suggestions to aid students’ efforts. Another had loved to write and had wanted to once again incorporate more writing. The other participants seemed to perceive it as a very necessary skill and felt positively towards developing the skill. They enjoyed being skilled more than the actual act of writing.

But what if some of my other colleagues just absolutely dreaded it? What if they even more dreaded the idea of judging students’ written efforts? Below is a very blunt statement that might have given me more comfort if I had recognized it before my efforts.

Among our many responsibilities as teachers, the one we seem to enjoy the least is evaluating student writing. It often seems a bore – a responsibility we do not accept zestfully. On a scale from one to ten, it commonly earns a one-half; or as someone has suggested, “Its pleasure places it somewhere between a root canal and a parking ticket.” (Wolfe and colleagues, 1983, p. 143)

Perhaps another part of my “image” is my tendency to be self-reliant. As I read the phrase below I thought of my study and why it was so overbearing. I kept too much to myself and I kept to myself too much.

Don’t try to do all this by yourself; innovative teachers need all the support they can get from students, colleagues, parents and administrators; share your experiences, successes, and difficulties with people who understand your situation. (Smith, 1994, p.231)

A Last Observation

I recently discovered in the GMU library a 1993 book, Writing Across the Curriculum: An Annotated Bibliography. It certainly reinforced my thoughts that there was already a fair amount of pertinent literature. “That we began the bibliography thinking that we might reach one hundred references and ended-up with over one thousand suggests something of the fields tremendous vitality.” (Anson et al., 1993, p.xi). Their total number was one thousand and seventy. And that is a publication that is now five years old. An observation of the editors I found quite fascinating.

WAC has not been accompanied by much empirical research that might lend support to the movement....But in spite of these theoretical foundations, the bulk of the literature on WAC has been discursive and testimonial, sometimes citing general scholarship on the writing process but very rarely reporting on original research on writing within or across specific academic disciplines. (p.xiii)

I am relieved to see that those who have perused over a thousand sources had the same conclusion I had from my much smaller sampling. I also will comment that the more recent authors (for example Soven, 1996; or Poirrier, 1997) do cite more examples of research based upon experimental design studies and those with more quantitative measures.

CHAPTER 8: A WISER DISCUSSION

I originally thought that my colleagues did not participate because they doubted that the strategies would work. Now I understand that due to the complex nature of being a classroom teacher, my colleagues did not participate because they did not perceive the conditions to be right and appropriate to attempt writing-to-learn (Fulwiler, p.55, 1984). Had I initially read the literature concerning teachers' reluctance to changes, I would have realized that my focus should have been on their discomforts. If I had addressed their issues regarding any change and specifically regarding writing, I might have had better results. That my colleagues chose not to try the strategies was a statement that they were uncomfortable with a change at that time and not that they doubted that the strategies would work.

Since the time of the study, eight new teachers have joined the science department. As I have been at the other end of the huge complex these past few years, it is with pride that I report that three of these newcomers have learned some of the strategies from my original four active participants. I had an opportunity to talk with these individuals.

Newcomer One is an experienced teacher who has taught at many different schools. N1's spouse has a career that requires frequent relocation. N1 shared a classroom with C15, saw C15's assignment on the board and asked about the 1SP. C15 then shared several of the strategies and N1 immediately started to use some of them. Ironically when I meet N1 and the topic of my dissertation was mentioned, N1 excitedly said, "You MUST talk with [C15]. S/he knows a lot about writing-to-learn!"

With respect to Connection: Additions: Extensions, N1 really liked the activating the prior knowledge and directing the students' focus with writing prior to videos. N1 then used a collaborative approach and asked groups of students to be responsible for the key points. For the Extensions step, N1 asked the groups to pictorially represent their point on newsprint and share with the class, rather than having the group ask a list of questions.

When I asked N1 about teaching and modifying instruction, s/he commented that "...after being at numerous schools, one realizes how much one can learn from colleagues. Every year I try to learn some new instruction methods from someone." N1 is very comfortable with trying new ideas because as s/he said, "[the stress related with trying] A new idea is nothing compared to [the stress of being at] a new school." N1 is a very unique teacher; in addition to being very open to receiving ideas, s/he is very open to sharing ideas. I have no doubt that if N1 had been here, that N1 would have been an initial participant.

Newcomer Two also picked up ideas about writing-to-learn due to sharing a classroom with C9. N2 too asked C9 to explain about 1SP. In particular, N2 really liked the 1SP because the students were more active in their reading and prepare materials from which they could review. N2 was rather quiet about writing-to-learn and when I asked, N2 confessed, "We switched texts this year, and in the margin there already is a summary sentence for each paragraph." When the next textbook change occurs, N2 will likely start to ask the students to 1SP again.

Newcomer Three wants to learn about writing-to-learn, but has “just never had the time”. However, this year N3 was teaming with a special needs teacher who asked, “What writing do you have your students do?” N3 immediately sought consultation with C9, and ever since, N3’s students have been using 1SP and 6W’s. N3 expressed great satisfaction with both techniques and requested that another writing-to-learn workshop be given.

In addition to newcomers, I discovered that one of the original non-participants had started to also use 1SP. C3 has been assigning students to review and summarize science information web sights on the InterNet. When the students discovered several pages of text at some of the sights they asked, “How can we summarize all of this?” When C3 realized the students had absolutely no strategy for approaching this tack, s/he suggested they try 1SP. It has worked well according to C3.

With the passage of time, interviewing my original participants made sense. Unfortunately, I could not arrange a mutual time to speak with C5. I know that s/he continued to use 1SP, 6 W’s, and the C:A:E while she was a member of our science department because s/he always wanted to cheer me by letting me know the ideas were still in use. C5 has transferred.

When interviewed again, C6 talked about using much writing including the ideas from the spring of ’94, but it was in the past tense. This past year the state has mandated SOL testing and C6 feels pressure.

The SOLs have definitely cut into that. Absolutely, no question. I am not doing as much writing either with strategies that you have shared or with some other things that I used to like to do. I really feel the pressure and the time element. Especially with my situation (extended personal leave) and with substitutes, the kids are really behind. I am feeling like I have to cram as much as I can into them. So now I am in that trade off of covering, but what are the kids learning of the material.

We’re not really having the kids exchanging papers anymore and the summary work comes in with the kids writing conclusions to lab exercises. That’s where the summary comes in or not.

C6 was sad that the pressures of the SOL test had resulted in modified instruction.

On the other hand, C9 was still frequently using writing and had modified several of the techniques. I believe this section of the interview was quite interesting. When asked if s/he still uses 1SP:

Yes I do! Extremely successful! Not only are the students using it in [my] classes but also in their other classes and when I ask them to show evidence [that they have done their reading assignments] they have then preferred to do 1SP than other methods described in class. I introduce it at the beginning of the year so that they will have it throughout the year. It’s working very well, both in GT, the gifted and talented, as well as the regular class.

By any chance, have you ever had any parents make comments about trying to teach the kids strategies, study skills, or learning skills?

...At the beginning of the year on back-to-school night, I inform them that this is one of the strategies that I'll be using and I give credit to you, that you were the one who actually introduced it to me...

Now you don't have to do that!

I do that because I don't want to take credit for that because it is your thing, and most of them just nod their head, "Yes, yes, yes... This is good. You are teaching different methods and this is not the only one. And some of the parents say they appreciate it because it's good study skills and not only could it be used for this class it could be used for other classes. I understand it's also good with the GT kids in their history, their English and history.

Do you still use the 6 W's?

...The "who, what, when, why" I used when I was having them make a timeline about the cell theory, and that works extremely well. Some integrated this into when they were doing biographical sketches.

Do you still use the "Connections: Additions: Extensions" ?

I do that. I have them write their prior knowledge. Then I have them write down facts. And then I would ask them how it relates to class. And then I ask them what more they would like to learn about it. Some of the topics though, they really don't have much prior knowledge: then I have them start with facts, connect the video to class, and then pursue what they wish to know more about.

I had a visiting [college] student who will be student teaching next year and she observed my classes. She was very impressed. She felt that not only were the students participating, that they were invested in their learning and we had done some of these strategies.

So you think writing is powerful? Yes I do.

So you think that it is important for the students to do? Yes I do.

Could you imagine students learning things as well if they did not write? I don't think so!

(Later C9 added)

The kids will ask, "How is this connected?" I will ask the kids to write about how things relate. And what's really cool about this, is what they have done, is that they have connected with some of the things that are on the SOLs without me even saying that this is an SOL objective.

That is something I am trying to do now, I ask how everything is connected. I say, "Let's fall back now and review what we've learned earlier and relate to what we have just covered."

Do you feel at all overwhelmed with all the changes that have occurred in the past five or six years, for instance the SOLs and the technology?

I think it just reduces the teachers' creativity. Even this year I find myself trying not to teach to the test, but it is almost impossible not to do that and it just lessens my creativity. I like to do these kinds of strategies that we have mentioned, so I have tried to work with them into the SOLs. Other times I use to do a lot of different things. I use to have a project every quarter: now I don't have time for that. We are going to cut out more of the projects next year and I think it is too bad, it not only reduces my creativity, it also reduces the students' creativity. And they like to see the end products and they enjoy listening to one another describe what they have done.

C9 had a two-sentence summary.

"When you use the strategy, you have ownership. It is beautiful."

With C15, we talked so much, I had to flip the tape. With respect to four years prior:

Wasn't I really skeptical?... I only participated initially because you were my colleague; you were my friend...I was like, "Auuuh, what the hell is this?..."

What strategies are you still using?

I still do the one sentence paraphrasing. I like it.

Then I asked C15 to recall her/his use of 1SP for graduate summer course work:

Sociology of education course. The professor gave us all this material to read before class, and I one sentence paraphrased that, and then on the first day of class with no fore warning or prep he gave us a quiz on that material to kind of take a pulse on where we were and what we had gotten out of the material and... the professor later gave us a breakdown on the scores, and there was one person who knew like everything (pause) and that person was me. ...It sounds egotistical but it wasn't me, it was the one sentence paraphrasing!

If you had just read the stuff, you don't think you would have done as well?

I am convinced that I would not have done that well. I'm convinced.

Did you ever get a chance to review your one sentence paraphrasing notes before the class?

I am sure I did not. I did not know he was going to give us this quiz...
I had no reason to review...

Do you ever have the kids approach something using who, what, where, when, why, how?

Yeah...I enjoy doing that when we watch a video. When prepping for a video, the who, what, when, where, and I remember telling you this that the big thing with the kids I teach, the kids with the honors or whatever, they stress out because its like, "We don't know these answers,...These are too vague!" Of course the whole purpose is to get your mind percolating about what you know and what you may not know. And then like as we watch the video, they chronicle down, they correct their misconceptions, and you know, they add to their knowledge.

Before four years ago, you had not used [any writing-to-learn strategies]?

No. No. No, it had never even occurred to me. I never even knew of.

Do you feel comfortable now looking at students' written work and giving it some credit or checking it off?

Yes. But I'm not (pause) ...I certainly don't examine it for English skill. I'm not looking for grammar or spelling. I'm looking for "Is there a connection with the knowledge?" When I asked them to write, I am asking them to express themselves, and I believe it is only courteous to listen, which means reading what they have written. On the flip side, the reason that I ask them to write is not so much that I can listen, but that they listen to themselves.

Have you picked up any other writing strategies these past four years?

No, the strategies I use are those you showed me. I have my kids 1SP everyday. I am totally generalizing and I have no data to back this up, but I believe more and more, if you are in a classroom setting and you ask your pupils to silently read these three paragraphs, to them reading means laying your eyes on each word and hearing the sound of the word in your mind whereas like what reading should really mean is do that and then have each sentence say something to you and when you ask them to 1SP you make them do the last step. I know that I have been reading a novel and turn the page and say to myself I have no clue what that was. Yet I know I have been reading, I just haven't been listening. 1SP is a safety net...it truly helps some kids to know (pause)...(to comprehend?)... Yeah! To comprehend!

How have things changed in teaching the last four years?

Technology. Technology has hit. It's in the Program of Studies. It tells us to use the technology. Writing is there too, but more for communication.

Do you distinguish between writing to communicate and writing-to-learn?

Yes. Yeah, only because you taught me that! Yeah, like when I have the kids one sentence paraphrase, I am not having them do that to tell me something, I already know. I'm having them do that to tell themselves, to communicate to themselves.

***** LATER*****

Now that more years have passed and you've earned your Master's how have you changed as a teacher?

I am not sure.

Do you have more theoretical underpinnings?

Well, I am not sure what that means! (laughter) But I... It certainly sounds like something I want! (more laughter)

Where there any unintended outcomes from what we tried to do? Positive or negative?

OH! Oh, absolutely! Because yeah, the unintended outcome is that I actually use some of these strategies. Like my attitude going in was like, "Yeah, OK Ken, I'll do what you ask me to do because I want to help you, but you know, the clock is ticking and when May 15th comes around then I am out of here. The big unintended outcome was that I came out of this with something I really like and I think really helps my kids.

Did this experience cause you to be more open minded towards other changes, like the technology?

Yeah. This is like one more datum point in my mind, always percolating in the back of my mind when the doubting Thomas starts to come out... This is like one BRILLIANT data point, you had negative expectations and then (pause) beauty. You know what I am saying?

How have you modified the strategies?

Another way to do the C:A:E, is have the kids do the 6 W's, watch the video and make additions and then for the third step, have kids get in groups of four and on newsprint collect their knowledge together and showcase that to the rest of the room.

Can you imagine having the students group and discuss and then have one stand up and share with the class without the written stuff?

I don't think that would have worked. Somehow there would not be a focus on organization. It would have just floated... the knowledge would have just floated...the knowledge would have just vaporized into the air and floated out the door. (laughter)

But wouldn't it have?

From these transcripts it is clear that at least two of the participants from four years ago have deeply integrated writing-to-learn into their instructional presentations. Interesting contrast between C9, who had used writing for many years, and C15 who abhorred writing and had never used it in the classroom prior to the study. There was one individual with a dramatic behavioral change and that would have been C15.

Are there any general, bigger-picture statements, which can be inferred from my work? There are several commonly held beliefs that my experiences support.

First: Writing-to-learn has a positive impact in an educational setting.

This positive impact includes but is not limited to:

- engagement of content utilizing higher-level thinking skills;
- better understanding of students' prior knowledge;
- greater opportunity for students to pose questions,
- greater opportunity to address students' alternative conceptions;
- a permanent record of ideas for revision or reflection; and
- increased dialogue among teachers and students and peers.

Second: It is unwise to conduct research upon people with whom you work.

I am very glad to report that I did not discover or stumble upon any deep, dark, sinister secrets of my colleagues. However, I did unnecessarily stress the interactions I had with several colleagues. I found that "the rejection of my ideas" was too easily interpreted as a "rejection of my teaching credibility". A preoccupation with but one group of strategies blinded me for more than two years. I did not recognize the many, many wonderful learning activities were occurring that did not involve writing. And of course now I realize my colleague did not reject my strategies or me. Rather, most of my colleagues were not in a "zone of sufficient comfort" at that moment which would allow them to even try the strategies.

Third: Due to the complexity of the teachers' roles, classroom settings, public demands, and contemporary students' lives, there is a tremendous resistance to change in public schools.

When my committee suggested that it was overly optimistic, in fact, unrealistic, to anticipate more than eighty percent of my colleagues participating, I was nevertheless confident. I was ignorant at best, undoubtedly overconfident. When only twenty-five percent tried strategies more than once, I was devastated. Had I listened better, had I read with a more open-mind, had I known to contrast coaches and judges, I would have not been devastated with my results. Rather I would have realized that was a reasonable response particularly considering the minute time frame. I do not know why the situation was right for four of my colleagues to embrace my suggestions. I do not know why the situation was not correct for twelve of my colleges to not embrace the suggestions. What I can report is that one-quarter of my department did try and that several years later, the strategies are still in use. I believe continued use of the strategies is a greater measure of their worthiness than the percentage that initially tried them. This is a change of judgment criteria. I initially was interested in the percentages: I did not intend to have the study be one of duration of instructional change.

I believe my isolation from my committee was a major flaw in my efforts. I did not wish to report less than positive comments and thus compounded errors and increased anxiety and stress. Contacting my committee might have saved me many needless hours of negative reflection. I now can report with satisfaction and some pride, what went right. Researching with people you immediately work with is obviously an invitation to quite a confusing experience. Worse, it leads to unrealistic anticipated outcomes and involves far too much emotion. The "facts" seem at best disappointing.

I have realized several other factors that before I had not considered. I must in retrospect acknowledge that initially my students were not in favor of employing strategies. As I heard the complaints at the beginning of the year, I did yet not know who were my "better students". Perhaps if it had been the fourth quarter, I might not have stayed the course if my better students were the most vocal (because they did not appreciate the extra work to make their grades.)

Summary

Trying a new technique in the classroom requires an acceptance of discomfort as being part of the price of progress. Wood and colleagues (1995, p.2) offered the "...reminder that strategies require training and practice." In other words, they will not work perfectly the first time, and probably not the second or third. Unfortunately, this "price of discomfort" is just another factor against innovation and change. Asking a "judge" to become a "coach" may be too great of a change.

Change is difficult; change is discomforting; change is sometimes lonely. I believe now I can say that the perception that most teachers do not want to change is likely incorrect. I believe a more accurate portrait would be that most teachers desire change, but at any given movement,

there is a very low likelihood that any suggested strategies will seem appropriate to attempt given the teacher's current situation.

Many years ago, I wondered if strategies indeed could be helpful for students. My own classroom results indicated they made a positive difference. Then I wondered if my own views were biased. Hence I attempted to share and found that those who became involved also found the strategies worked. In the spring of 1995, there were five individuals in the science department interested in some new teaching strategies and they found my suggestions useful.

In my result section I said I was puzzled how easily some of the teachers implemented my suggestions and then modified them. At that time I had not really considered the information I had collected in the first student survey when I asked about what writing was already done in the classroom. The listing had seventeen choices and the average used in the department as reported by the students from nine classes was "5.7". The high was "10" and the low was "3.1". The interesting finding was that when one listed the nine teachers' types of writing assignment averages, the top three were participants in my study, and the bottom three were the first three to drop. Those in between were individuals who showed interest, but never quite "got around" to trying the strategies. More specifically, those who tried my suggestions averaged "8.6" writing assignments in their classrooms. Those who almost immediately dropped-out averaged "3.8" writing assignments. Quite obviously it appeared that those teachers who were already most comfortable with writing assignments were most likely to try new assignments. Likewise, those who seemed less keen with writing to begin with were least likely to pursue more writing-to-learn.

Changes I wish I could have made would include:

- 1) starting earlier, preferably at the beginning of the year
- 2) survey the participants about their current use of writing anticipating that those who already use writing will more likely participate
- 3) try to alleviate participants' concerns revealed by survey
- 4) extending the time frame to at least an entire semester if not a year
- 5) having made more introductory presentations to colleagues' students
- 6) more intensely distinguishing composition from transcription
- 7) more intensely distinguishing coaching from judging
- 8) reemphasizing points six and seven
- 9) investing my time with those teachers who were participating.

If I could have made those changes, I have no guarantee that my results would have been any different. However, the experience would have been far less stressful if I had focused on those participating. A smaller, active group would have covered more ideas.

An interesting scheme Fulwiler used to estimate success has been described by Gorman (1986, p.35). In Fulwiler's "Evaluation Ballpark", changing faculty attitude constitutes a "single". A "double" is changing faculty practices. Changing student attitudes merits a "triple". Improving students writing is worthy of a "home run". In this study, I "struck out" a lot. Colleagues who were so vocally positive and ready to try with their next unit; they were but fly balls caught at the warning track. I hoped to be an "all-star" my first time in the major leagues and it seemed I ended-up a two-fifty hitter.

As I said before I was ready to "hang-up the spikes" on several occasions. The "strike outs" were really troubling me. Why bother writing about such a failure? I had pondered my efforts for a summer and had nothing positive to write. But one evening changed that and in turn changed my life. In the fall of 1995, with two minutes left in the homecoming football game, I was paged over the PA system to report to the press box. I assumed someone needed some assistance. As I neared the press box I was engulfed by a dozen or so of the preceding years' seniors whom I had taught in Physics. They were home from college and they wanted to thank me for "that unusual way" I had taught them in Physics. They talked about the advantages they had using strategies and anticipating their first-year writing requirements better prepared than others and being so much more confident. They had asked that I be paged to the press box because they so strongly felt the need to let me know. Yes, I can say that for that dozen students "writing-to-learn" in but one high school science class improved their college experience. And had they not made the effort to let me know that I had made a difference, I doubt that I would have continued with this dissertation. But I then discovered I had "hit" a dozen or so "home runs".

CHAPTER 9: FINAL THOUGHTS

How did this all get started? A summer program for excellence in physics instruction? An overseas teaching experience that was shortened by illness? Just wanting to be a better teacher? It would be difficult for me to trace the exact path back to the beginning of this endeavor. I probably would have to go back to my beginning experiences working upon certification to teach. I believed I could improve as a teacher if I continued my academic experiences. It has worked and I am happy with the path I followed.

With respect to writing-to-learn, this had been an interesting lesson in contrasts. The two most powerful are: 1) distinguishing composition from transcription, and 2) distinguishing between a coach and a judge. These two comparisons are at the core of writing-to-learn. Composition involves higher-level thinking, activating prior knowledge, integrating new information, organizing thoughts, and developing ideas. It provides the positive attributes that are associated with writing-to-learn. My colleagues who did not want to become “grammar cops” did not need to worry. Transcription was never to have been our focus, but that point may not have been made clear enough. However, I know the point was made and I suspect that many could not envision a teacher accepting students efforts which were not to be scrutinized for transcription. Somehow, the hang-up over transcription seems to also be a clue for the second contrast. Focus upon inspection of transcription certainly seems more in the realm of judging. The whole idea about even being a “cop” sounded more towards the judge’s role than that of a coach. Input, helping with each and every step, wanting to encourage success is so much more meaningful than grading with a fine toothed comb. It is also a more enjoyable role for the teacher. Two simple ideas that need to be so emphasized.

Perhaps what this study best illustrates is that even when teachers agree that proposed ideas would benefit their classrooms, implementation may not be deemed possible at that time. Agreeing that a change would be good is, unfortunately not sufficient to alter the deeply ingrained beliefs, practices and routines of many teachers.

With respect to conducting research and also of affecting change, patience may be my greatest personal lesson from this endeavor. As one of my friends and mentors is fond of saying, “Making changes in an educational setting is like turning the Queen Mary ocean liner. You can only proceed a few degrees at a time!” As I reflected upon that statement and thought about my study, I originally thought in terms of the amount of material I tried to present. I now realize it was probably a greater error to attempt to include as many people as I did. Some change occurred: four participants. And in the years since? Three new participants. As with some curriculum development for which I have been selected, patience has been the key. Few can muster a force sufficiently enormous to instantaneously change the inertia of a system. However, the same outcome can be accomplished with a small force applied over a longer time frame.

I made another fundamental error, one that I should have caught immediately. My advocacy of teaching students escaped me when I proposed changing a department rather than changing individuals. I am pleased to say I influenced the teaching of seven colleagues. I am not too keen with the idea of impacting but a quarter of the department with my first attempt. I doubt

that a changing a department was a feasible idea. Perhaps because I was so focused on the department, I did not feel I could comfortably leave out individuals, even though they were still not participating after several weeks.

I would have never believed the resistance to change among teachers had I not attempted this effort. In a similar vane, two years after I attempted to share my ideas I was asked to mentor a beginning teacher. This individual had just completed a thirty-year career as a mechanical engineer. S/he attempted to teach in the style s/he had experienced as a student. Though s/he wanted to modify her/his teaching, s/he found it extremely difficult to follow suggestions. If this individual who was asking for assistance found change difficult, how must it have been for my colleagues who were not asking for change? For the many reasons speculated previously, as Fulwiler (1984, p.55) would say, "...general ideas only translate into specific practices when an instructor perceived the conditions are right and appropriate." What I now realize, is the likelihood that "conditions are right and appropriate" is much, much lower than I could have imagined.

Writing-to-learn worked with my students. Writing-to-learn worked with the students of four and then seven of my colleagues. I recently conversed with one of my colleagues and I said I was close to finishing my dissertation. I shared that I was initially disappointed that only four had really given the strategies a chance, but I was delighted that they still used them. I also added the pleasure I felt that three of our more recent staff members had also started to use the strategies. I described how my thoughts had been so confused. I was wondering, "How could anyone not use writing-to-learn?" It seemed particularly confusing because we had good teachers in our department. Not using the approach certainly did not indicate a poor teacher, but I could not understand why more of the staff did not try the techniques. I then explained that I now have comfort and confidence saying that those who do not use writing-to-learn would probably be better teachers if they did. My colleague agreed in entirety with this assessment and acknowledged s/he regretted not having used the strategies. I thought that rather reaffirming. I found my colleague's next comment even more interesting. "If I had been teaching general or special needs classes, I might have been more likely to participate. With the high caliber of the students I teach, it does not seem as necessary." I was immediately struck by the adage, "If it ain't broke, don't try to fix it!" Maybe this is the source of reluctance for many of my colleagues: "Don't mess with success."

I began all this based upon the survey results of my first group of students when I changed high schools. As I stated before, another staff member questioned the validity of those answers with the statement, "The kids are just going to say what they think you want to here." Well, that bothered me for quite a while. However, after several years of incubation, I have made these conclusions. First of all, it was an anonymous effort: I certainly could not distinguish the markings of one student from another. Therefore there was neither anything to be gained by buttering-up the teacher, nor was there any fear of retaliation. Secondly, I do believe that the rapport I had with the students was sufficiently strong that they would have told me their opinions because that was what they knew would most please me. They knew that I would adapt my teaching based upon their input. They knew that I would appreciate honesty over flattery. They also knew that there was the potential for me to be one of their teachers again in the future. Thus it was in their

best interest to have been honest. However, what was the convincing evidence came two years later. The students who paged me at the football game verified what the survey indicated. The students appreciated my attempt to help them develop their higher level thinking and written expression.

Several years ago I wrote a note, which included these thoughts. They also apply now:

Yet even with this realization, even with the understanding of missed opportunity, I can now say triumphantly I understand that this assignment was never to be an ending. Rather, it was supposed to be a thoughtfully taken step forward. (Dec. 1992)

My study has limited the amount I have been able to use writing-to-learn. However, writing this dissertation has now made me remember how good it felt to engage the students in such a manner. I am glad to have it completed so that I may again engage my students in more dialogue on their assignments.

I now realize there was nothing wrong with being so enthusiastic. However, I hope I have learned the lesson that the more certain one becomes, the more open-minded one needs to become regarding information provided by others. If my future endeavors are to be more successful than this one, or at least far less agonizing, I need to remember the points listed in chapter two with respect to reviewing literature. I might have been able to write this a bit more easily had I realized that the level of participation in my study was consistent with the workshops facilitated by those who have been advocating writing-to-learn for years. I could have immediately reported my results and now provide a follow-up regarding the longevity of use.

Do I anticipate continuing to share instructional ideas with others? Yes, in fact, one of the administrators wants to begin the school year with a voluntary writing-to-learn program for faculty from all academic disciplines. The incentive will be some re-certification points. I imagine I will attempt to share with teachers in an organized format for at least as long as I teach students. My expectations are now more realistic.

To bring closure to all of this, I will answer the following question posed by the literature.

What happens to change-agent teachers during their careers? Do organizational socialization processes change or eliminate them? (Marshall and colleagues, 1986, p.29)

No, we continue to refocus and continue on, changing the world, one student at a time. Perhaps also we change the world, one teacher, by one strategy, at a time.

BIBLIOGRAPHY

- Allen, D. G., Bowers, B., & Diekelmann, N. (1989). Writing-to-learn: a reconceptualization of thinking and writing in the nursing curriculum. Journal of Nursing Education, 28(1),6-11.
- Anson, C.M. (1993). Introduction: The Future of Writing Across the Curriculum: Consensus and Research. In Anson, C.M., Schweibert, J.E., & Williamson, W.M. (1993). Writing Across the Curriculum: An Annotated Bibliography. (pp. xi-xviii). Westport, CN: Greenwood Press.
- Anson, C.M., Schweibert, J.E., & Williamson, W.M. (1993). Writing across the curriculum: an annotated bibliography. Westport, CN: Greenwood Press.
- Applebee, A. N.(1984). Contexts for learning to write: studies of secondary school instruction. Norwood, NJ: ALEX Publishing Corp.
- Applebee, A. N., Langer, J. A., & Mullis, I. V. S. (1986). The writing report card: Writing achievement in American schools. Princeton, NJ: Educational Testing Service.
- Arkle, S.(1985).Better Writers, Better Thinkers. In Gere, A. R., (Ed.) Roots in the Sawdust (pp. 148-161). Urbana, IL: National Council of Teachers of English.
- Ary, D., Jacobs, L.C., & Razavieh, A. (1985). An introduction to educational research (3rd ed.). New York, NY: Holt, Rinehart, and Winston.
- Asimov, J. & Asimov, I. (1987).How to enjoy writing: a book of aid and comfort. New York, NY: Walker and Company.
- Bahns, M. (1989). Writing in Science Education Classes for Elementary School Teachers. In Connolly, P., & Vilaridi, T. (Eds.)(1989). Writing-to-Learn Mathematics and Science. (pp.178-189). New York, NY: Teachers College Press.
- Barrass, R. (1982). Students must write. New York, NY: Methuen, Inc.
- Bauman, M. (1997). What Grades Do For Us, and How to Do Without Them. In Tchudi, S. (Ed.) Alternatives to Grading Student Writing (pp. 162-178). Urbana, IL: NCTE.
- Bechtel, J. (1985). Improving writing and learning. Newton, MA: Allyn and Bacon Inc.
- Botstein, L. (1989). Forward: The Ordinary Experience of Writing. In Connolly, P., & Vilaridi, T. (Eds.)(1989). Writing-to-Learn Mathematics and Science. (pp. xi-xviii). New York, NY: Teachers College Press.
- Bowers, B. & McCarthy, D. (1993). Developing analytical thinking skills in early undergraduate education. Journal of Nursing Education 32(3), 107-114.

- Brady, J. (1976). The craft of interviewing. Cincinnati, OH : Writer's Digest Books.
- Bronson, B. (1985) An Impartial Observer's View of Write-to-Learn Classes. In Gere, A. R., (Ed.)Roots in the Sawdust (pp. 202-210). Urbana, IL: NCTE.
- Brookes, A. & Grundy, P. (1990).Writing for study purposes: a teacher's guide to developing individual writing skills. Cambridge, England: Cambridge Univ. Press
- Broussard, P.C. (1997). Views About Writing-to-Learn. In Poirrier, G.P.(Ed).(1997). Writing-to-Learn. (pp. 151 – 158) New York, NY: National League for Nursing Press.
- Browne, M. N., & Haas, P. F. (1985). Achieving excellence: Advice to new teachers. College Teaching, 33(2), 78-83.
- Browne, M. N., Haas, P. F., & Keely, S. M. (1978). Measuring critical thinking skills in college. Educational Forum, 42, 219-226.
- Bruner, J. S.(1966). Toward a theory of instruction. Cambridge, MA: Belknap Press of Harvard University Press.
- Bugliarello, G. (1990). Empowering citizens through technology literacy. Bull. Sci. Tech. Soc., 10, 187-190.
- Burling, R. (1982). An Upper-division writing course. Southern Regional Education Board, 14(1), 4-5.
- Cannon, R. E. (1990). Experiments with writing to teach microbiology. American Biology Teacher, 52(3), 156-158.
- Castillo, A. (1994) as quoted on p. 199 in Sabre XXXV. Taylor Publishing Company.
- Clandinin, D.J. (1986).Classroom practice. Philadelphia, PA: Falmer Press
- Clegg, C. S. (1988). Critical reading and writing across the disciplines. New York, NY: Holt, Rinehart, & Winston, Inc.
- Emig, J. (1977). Writing As A Mode of Learning. In C. Bazerman, & D. Russell, (Eds.) (1994). Landmark Essays on Writing Across the Curriculum (pp.89-96). Davis, CA: Hermagoras Press.
- Fauth, G., Gilstrap, R., & Isenberg, J. (1983). Teaching Teachers to Teach Writing: A Modeling Approach. In Thaiss, C. (Ed.) Writing-to-learn: essays and reflections on writing across the curriculum (pp.72-87). Dubuque, IO: Kendall/Hunt.

- Flower, L. (1989). Talking Through: The Role of Conscious Processing in the Making of Meaning. In Maimon, E. P., Nodine, B. F., & O'Connor, F. W. (Eds.) Thinking, Reasoning, and Writing (pp. 185-211). White Plains, NY: Lohman Inc.
- Forsman, S. (1985). Writing-to-Learn Means Learning to Think. In Gere, A.R., (Ed.) Roots in the Sawdust (pp. 162-174). Urbana, IL: NCTE.
- Fulwiler, T. (1982). Writing: An Act of Cognition. In Eble, K. E., & Noonan, J. F. (Series Eds.) & Griffin, C.W. (Vol. Ed.) New directions for teaching and learning: No. 12. Teaching writing in all disciplines (pp. 15-26). San Francisco, CA: Jossey-Bass Inc.
- Fulwiler, T. (1984). How Well Does Writing Across The Curriculum Work? In Bazerman, C. & Russell, D. (Eds.) (1994). Landmark essays on writing across the curriculum . pp.51-63. Davis, CA: Hermagoras Press.
- Fulwiler, T. (1986). The Argument For Writing Across The Curriculum. In Young A., & Fulwiler, T. (eds). (1986). Writing across the disciplines. (pp.21-32.). Upper Montclair, NJ: Boynton / Cook.
- Fulwiler, T. (1987) Teaching with writing. Portsmouth, NH: Heinemann.
- Fulwiler, T. (1988). College writing. Glenview, IL: Scott, Foresman and Company.
- Fulwiler, T. & Young, A. (1990). Programs that work: models and methods for writing across the curriculum. Portsmouth, NH: Boynton/Cook.
- Gardner, H. (1983). Frames of mind: The theory of multiple intelligences. New York, NY: Basic Books.
- Gardner, S. (1997). Improving Teaching, Improving Learning: Effectively Using Writing-To-Learn Across Disciplines. In Poirrier, G. P.(Ed.) Writing-to-learn (pp. 187-202). New York, NY: National League for Nursing Press.
- Gere, A. R. (1985). Introduction. In Gere, A. R., (Ed.) Roots in the Sawdust (pp. 1-8). Urbana, IL: NCTE.
- Gladis, S. D. (1989). Process writing: a systematic writing strategy. Amherst, MA: Human Resource Development Press, Inc.
- Glatthorn, A. A. (1981). Writing in schools: Improvement through effective leadership. Reston, VA: NASSP.
- Gorman, M. E. (1986). Developing Our Research Model. In Young A., & Fulwiler, T. (Eds.) Writing across the disciplines (pp. 33-41). Upper Montclair, NJ: Boynton / Cook.

- Hightshue, D., Ryan, D., Mckenna, S., Tower, J., and Baumley, B.(1988). Writing in junior and senior high schools. Phi Delta Kappan June 1988, 725-728.
- Hobson, E., & Shuman R. B. (1990). Reading and writing in high school: a whole language approach. Washington, DC: National Education Association.
- Holady, L. (1997). Writing Students Need Coaches, Not Judges. In Tchudi, S. (Ed.) Alternatives to grading student writing (pp. 35-45). Urbana, IL: NCTE.
- Hollingsworth, H. & Eastman, S. (1988). Teaching writing in every class: a guide for grades 6 - 12. Newton, MA: Allyn and Bacon, Inc.
- Hurd, P. D. (1990). Historical and philosophical insights on scientific literacy. Bull. Sci. Tech. Soc., 10, 133-136.
- Johnston, P.(1985).Writing-to-Learn Science. In Gere, A. R. (Ed.) Roots in the sawdust (pp.92-103). Urbana, IL: NCTE
- Joyce, B. & Weil, M. (1986). Models of Teaching . Englewood cliffs, NJ: Prentice-Hall, Inc.
- Langer, J.A. & Applebee, A.N. (1987) How writing shapes thinking. Urbana, IL: NCTE
- Lincoln, Y., & Guba, E. (1985). Naturalistic inquiry. Beverly Hills, CA: Sage.
- MacAllister, J. (1982). Responding To Student Writing. In Eble, K. E., & Noonan, J. F. (Series Eds.), & Griffin, C. W. (Vol. Ed.) New directions for teaching and learning: No. 12. Teaching writing in all disciplines (pp. 59-65). San Francisco, CA: Jossey-Bass Inc.
- Maguire, F. (1989). Eleven strategies for building self-confidence in student writers. Clearing House, 62, 256-258.
- Marshall, C., & Rossman, G. B. (1989). Designing qualitative research. Newbury Park: CA. Sage Publications.
- Martin, K.H. (1989). Writing “Microthemes” to Learn Human Biology. In Connolly, P., & Vilardi, T. (Eds.) Writing-to-learn mathematics and science (pp.113-121). New York, NY: Teachers College Press.
- Martin, N. (1983). Mostly about writing. Upper Montclair, NJ: Boynton/Cook.
- Mayher, J. S., Lester, N. B., & Pradl, G. M. (1983). Learning to write/writing-to-learn. Portsmouth, NH: Boynton/Cook Publishers.

- McKenna, E. (1991). Introduction. In Morris, B. S. (Ed.) Writing-to-learn in disciplines: Detroit teachers combine research and practice in their classrooms (pp. 7-19). Ann Arbor, MI: Michigan University. (ERIC Document Reproduction Service No. ED 333 420)
- McLaughlin, P. (1990). How to interview. Bellingham, WA: Self-Council Press.
- Metzler, K. (1977). Creative interviewing. Englewood Cliffs, NJ: Prentice-Hall.
- Moore, R. (1992). Writing-to-learn Biology. Orlando, FL : Saunders College Publishing.
- Moore, D. W., Moore, S. A., Cunningham, P. M., & Cunningham, J. W. (1986). Developing readers and writers in the content areas k-12 . White Plains, NY: Longman Inc.
- Morris, B. S.(1991a). Preface. In Morris, B. S. (Ed.)Writing-to-learn in disciplines: Detroit teachers combine research and practice in their classrooms (pp. 3-6) Ann Arbor, MI: Michigan University. (ERIC Document Reproduction Service No. ED 333 420)
- Morris, B. S. (1991b). Detroit Teachers' Plans and Concerns: Toward Dissemination of Writing-to-Learn Throughout the Curriculum. In Morris, B. S. (Ed.) Writing-to-learn in disciplines: Detroit teachers combine research and practice in their classrooms (pp.108-114). Ann Arbor, MI: Michigan University. (ERIC Document Reproduction Service No. ED 333 420)
- Mullin, W.J. (1989). Qualitative Thinking and Writing in the Hard Sciences. In Connolly, P., & Vilardi, T. (Eds.) Writing-to-learn mathematics and science (PP.198-208). New York, NY: Teachers College Press.
- Narode, R., Heiman, M., Lochhead, J., & Slomianko, J. (1987). Teaching thinking skills: Science. West Haven, CT: NEA Professional Library.
- Olds, B.M. (1990). Does writing make a difference? A ten-year comparison of faculty attitudes about writing. Writing Program Administration, 14(1-2), 27-40.
- Oppenheim, A. N. (1992). Questionnaire design, interviewing and attitude measurement. New York, NY: St. Martin's Press.
- Parker, R. P. & Goodkin, V. (1987). The consequences of writing: enhancing learning in the disciplines. Upper Montclair, NJ: Boynton/Cook Pub. Inc
- Piaget, J. (1977). The development of thought: equilibration of cognitive structure. New York, NY: Viking Press.
- Poirrier, G. P.(1997a). Introduction. In Poirrier, G. P.(Ed.) Writing-to-learn. (pp. 1-8). New York, NY: National League for Nursing Press.

- Poirrier, G. P. (1997b). Writing-To-Learn: Important for Education, Practice and Research. In Poirrier, G. P.(Ed.) Writing-to-learn (pp. 9-18). New York, NY: National League for Nursing Press.
- Poirrier, G. P. (1997c). How to Incorporate Writing-to-Learn into a Curriculum. In Poirrier, G. P.(Ed.) Writing-to-learn (pp. 19-28). New York, NY: National League for Nursing Press.
- Poirrier, G. P.(1997d). Designing a Writing-to-Learn Intense Course. In Poirrier, G. P.(Ed.) Writing-to-learn (pp. 29-50). New York, NY: National League for Nursing Press.
- Poirrier, G. P.(1997e).Incorporating Writing-to-Learn Across the Curriculum. In Poirrier, G. P.(Ed.) Writing-to-learn (pp. 51-60). New York, NY: National League for Nursing Press.
- Ramsey, W.L., Phillips, C.R., Watenpugh, F.M., Naaney, R., Sumners, C., & Yasso, W.E. (1989). Modern earth science. Austin, TX: Holt, Rinehart and Winston, Inc.
- Risinger, C. F. (1987). Improving writing skills through social studies. ERIC Digest No. 40 . (ERIC Document Reproduction Service No. ED 285 829)
- Robinson, H. A. (1983). Teaching reading, writing, and study strategies: the content areas. Newton, MA: Allyn and Bacon, Inc.
- Rouse, S., & Simpson, J. (1991) Writing in Science Classes. In Morris, B. S. (Ed.) Writing-to-learn in disciplines: Detroit teachers combine research and practice in their classrooms (pp. 20-32) Ann Arbor, MI: Michigan University. (ERIC Document Reproduction Service No. ED 333 420)
- Rubin, L. J. (1985). Artistry in teaching. New York, NY: Random House.
- Santa, C. M., & Havens, L. T. (1991) Learning Through Writing. In Santa, C. M., & Alvermann, D. E. (Eds.) Science learning: Processes and applications (pp. 122-133). Newark, DE: International Reading Association. (ERIC Document Reproduction Service No. ED 331 022)
- Schumacher, M. (1990). The Writer's complete guide of conducting interviews. Cincinnati, OH: Writer's Digest Books.
- Sensenbaugh, R. (1992). Reading and writing across the high school science and math curriculum. Bloomington, IN: EDINFO Press.
- Smith, F. (1994). Writing and the writer (2nd Ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Soven, K.M. (1996). Write to learn: a guide to writing across the curriculum. Cincinnati, OH: South-Western College Publishing.

- Spencer, E. (1983). Writing matters across the curriculum. Scottish Council for Research in Education.
- Stevens, III, R. S.(1985). Writing and Learning: What the Students Say. In Gere, A. R., (Ed.) Roots in the sawdust (pp.211-220). Urbana, IL: NCTE.
- Stewart, M. (1984). What do high school teachers across the curriculum think of freshman writing? English Quarterly, 17(1), 97-101.
- Symons, S., Richards, C., & Greene, C. (1995). Cognitive Strategies for Reading Comprehension. In Wood, E., Woloshyn, V.E., & Willoughby, T. (Eds.) Cognitive strategy instruction for middle and high schools (pp. 66-87) Cambridge, MA: Brookline Books
- Tobias, S. (1989). Writing-to-Learn Science and Mathematics. In Connolly, P., & Vilardi, T. (eds.). Writing-to-learn mathematics and science. pp.48-55. New York, NY: Teachers College Press. PE 1404 .W75 1989
- U. S. Department of Education. (1987). What works: Research about teaching and learning. Washington, D. C.: U. S. Government Printing Office.
- Walvoord, B. F., & Smith, H. L. (1982). Coaching the Process of Writing. In Eble, K. E., & Noonan, J. F. (Series Eds.) & Griffin, C. W. (Vol. Ed.) New directions for teaching and learning: No. 12. Teaching writing in all disciplines (pp. 3-14). San Francisco, CA: Jossey-Bass Inc.
- Walvoord, B.F. (1986). Helping students write well (2nd ed.). New York, NY: Modern Language Association of America.
- Walvoord, B. F., Hunt, L. L., Dowling, Jr., H. F., & McMahan, J. D. (1997). In the long run: a study of faculty in three writing-across-the-curriculum programs. Urbana, IL: NCTE.
- Weinberg, C. (1974). Education is a shuck: How the educational system is failing our children. New York, NY: William Morrow & Company.
- Weiss, R. & Walters, S.A. (1979, March). Research on writing and learning: some effects of learning centered writing in five subject areas. Paper presented at the convention of NCTE, San Francisco, CA. ERIC ED 191 073
- West, J.K. (1985). Thirty Aides in Every Classroom. In Gere, A. R. (Ed.) (1985). Roots in the sawdust (pp. 175-186). Urbana, IL: National Council of Teachers of English.
- Williamson, R., & Osborne, D. C.(1988). Using conceptual analysis in the classroom: a writing process approach. ERIC Document Reproduction Service No. ED 292 119.

- Wilson, D. E. (1994). Attempting change: teachers moving from the writing project to classroom practice. Portsmouth, NH: Boyton/Cook Publishers.
- Wirth, A.G. (1983). Productive work in industry and schools: Becoming persons again. Lanham, MD: University Press of America.
- Wolfe, D., & Reising, R. (1983). Writing for learning in the content areas. Portland, ME: J. Weston Walch, Publisher.
- Wood, E., Willoughby, T., & Woloshyn, V.E. (1995). An Introduction to Cognitive Strategies in the Secondary School. In Wood, E., Woloshyn, V.E., & Willoughby, T. (Eds.) Cognitive strategy instruction for middle and high schools (pp. 1-4) Cambridge, MA: Brookline Books.
- Wotring, A. M., & Tierney, R. (1981). Two studies of writing in high school science. Berkeley, CA: California University. (ERIC Document Reproduction Service No. ED 238 725)

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