USING WRITING-TO-LEARN STRATEGIES IN COMMUNITY COLLEGE ASSOCIATE DEGREE NURSING PROGRAMS

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Dissertation submitted to the Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF EDUCATION

in

Community College Education

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April, 1992

Blacksburg, Virginia

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(ABSTRACT)

This study investigated the use of writing-to-learn strategies in freshman associate degree nursing classes at Wytheville Community College, Wytheville, Virginia. It sought to determine if the use of writing-to-learn strategies would affect the students' achievement in the course and their critical thinking skills. The design of the study was experimental. Two groups of freshman nursing students were randomly selected and randomly assigned to either an experiment group or a control group. The experiment group used the writing-to-learn strategies. The achievement in the course was measured using teacher-developed tests. Critical thinking skills were measured using the Cornell Critical Thinking Test, Level Z.

The study found that the students in the experiment group achieved higher aggregate semester scores than those in the control group. The difference in mean aggregate semester scores for the two groups was statistically significant. The results of the critical thinking post-test indicated the mean scores of both groups declined, but not significantly. The mean score of the experiment group was higher, but again not significantly.

It was concluded that the use of writing-to-learn strategies is an effective means of improving community college nursing students' achievement. The results of the critical thinking portion of the study were inconclusive.

ACKNOWLEDGEMENTS

In completing this dissertation and degree, I received assistance and support from many people to whom I owe much gratitude.

First, I thank the members of my doctoral committee, Dr. Darrel Clowes, Dr. Steve Culver, Dr. Pat Kelly, and Dr. Sam Morgan, for their assistance, suggestions, and advice throughout my program and during the writing of this dissertation. In particular, I thank Dr. Dan Vogler, my committee chairman, whose direction and patience guided me through the process. Without his rapid, thorough responses to drafts and his positive and constant encouragement and prodding, I would have never completed the dissertation and degree. He believed in me even when others and I, myself, had doubts.

I also thank the following administrators at Wytheville Community College for their endorsement of the research project: Dr. Terry Suarez, Chairman, Division of Allied Health and Science; Dr. Lee Hall, former Dean of Instruction; and Dr. Bill Snyder, President. Their interest in and support of the study made the way much smoother. I especially thank the nursing faculty who taught the courses for freshmen, Betty Paulson, Sue Thacker, Sue Smith, Teri Moore, and Debbie Gerberich, for their hard work and support of the project. Without their assistance, the research would have been impossible to complete. I also thank my friends at Wytheville Community College and elsewhere for their encouragement and well wishes.

To my mother, Lula Myers, and my sisters, Alice Gay Robinson and Lois Simms, I offer my heartfelt thanks for their support and love.

Also, a special thanks goes to Baxter, who helped keep my blood pressure under

control throughout the entire process.

Finally, my wife, Phyllis, constantly encouraged and prodded me. Her proofreading skills, her patience, her understanding, and her love enabled me to complete this task. To her I give my undying gratitude and love.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Would associate degree nursing students benefit from a systematic writing program in their nursing classes? Questions such as this often create heated debate. Some faculty complain that teaching writing is not their job, that they do not know how to teach writing, and that they do not have time in their classes to teach writing. Others say that they already ask students to write reports and then get English teachers to critique the grammar. Still others say, "I'm doing my part; I count off for misspelled words."

The writing-across-the-curriculum movement did seem to emphasize improvement of writing; however, writing to learn presents an entirely different focus. Its basic premise is that writing helps students learn the content because writing makes them think about the content. Writing to learn is simply what it says: students write in order to learn, not about writing, but about the content of the course. Writings are not graded nor marked for grammar and structure. Teachers respond to the ideas, reactions, and feelings of the students. They do not need to know how to teach writing to employ writing-to-learn strategies. Writing to learn does not take up a large block of time, and the time it does use is focused on the course content.

Would writing to learn help nursing students learn content better? Would writing to learn improve their critical thinking skills? These questions are at the crux of this study.

Conceptual Framework

The conceptual framework of this study is based in the writing-to-learn movement. Although many teachers have used writing as part of their pedagogy for years, the current movement had its beginnings in the work of Britton (et al., 1975). After examining the way in which writing was used in British schools, Britton identified two major components in students' writing processes which have a large impact on learning and thinking: audience and function. Audience is important in the process because, as Applebee (1984) indicated, what a student thinks or discovers through writing can differ according to the audience for whom he/she is writing.

The second component, function, is also important because what the student thinks and learns depends on the reason for writing. Britton (1972) labeled three functions of writing: transactional, poetic, and expressive. Transactional writing is writing that is done for a particular purpose; it is product oriented, aimed for an audience. Poetic writing is highly creative and artistic and may or may not have an intended audience. Expressive writing is, according to Britton, the most important. It is writing that is personal, private, and written for the writer's own eyes only. Expressive writing most closely resembles thinking, allowing for exploration of ideas and opinions. Britton contended that expressive writing is the matrix from which all other writing emerges.

Emig (1977) built an even stronger relationship between writing and learning and thinking. She related writing to Bruner's (1971) ways of representing and dealing with actuality: enactive or learning by doing, iconic or learning through images, and symbolic

or learning through restatement in words. Writing employs all three of these processes, reinforcing learning through the hand, the eye, and the brain. In such a way, writing becomes a powerful learning tool. Emig further related writing to the left-side/right-side brain functions. Writing involves the full functioning of the brain, engaging both the left hemisphere in the physical hand movements and linear processing and the right hemisphere in abstracting and creating. Writing also provides immediate feedback and thus reinforcement of the thinking process through the product that is now before the student. Finally, Emig compared selected attributes of writing to selected characteristics of successful learning strategies. Writing requires a process uniquely multi-representational and integrative. It also represents a powerful instance of immediate and long-term feedback. Furthermore, writing provides connections and is active, engaged, and personal.

The connection between writing and thinking is also clear. Bruner (1966) felt that, when one articulates connections between new information and what is already known, he/she learns and understands the new information better. Writing provides such connections. Vygotsky (1962) said that one thinks and figures things out in symbol systems, commonly called languages. Luria and Yudovich (1971) stated that writing is a slow, repeated mediation process of analysis, allowing not only development of thought but reversion to earlier stages in a simultaneous, self-revising process. Writing, therefore, is a powerful instrument of thought.

Problem Statement

Writing-to-learn strategies have become accepted in many subject areas over the past few years. There exists ample evidence of its use at primary, elementary, secondary, and post-secondary levels (Hesson, 1987; Watkins, 1990). It is used in many academic areas: English, history, social sciences, science, and mathematics (Page, 1987; Steffens, 1987; Beaman, 1985; Tobias, 1989). Those who have adopted the process extol its virtues in assisting students to learn content and think more critically.

One area for which there is little evidence of its use is in occupational-technical programs and courses. Nursing is one such example. If writing-to-learn strategies are effective in other areas, then they may prove equally effective in areas such as associate degree nursing programs in community colleges. However, nursing faculty, like many other occupational-technical faculty, need evidence that writing to learn can enhance learning without reducing the content taught in their courses. Therefore, the procedural problem of this study was to analyze the effects of writing-to-learn strategies on community college nursing students' achievement and critical thinking.

Purpose Statement

The general outcome purpose of the study was to establish the efficacy of using writing-to-learn strategies in community college nursing classes. In addition, the following ancillary purposes were addressed:

1. to synthesize the extant literature concerning writing-to-learn strategies and their relationship to achievement and critical thinking

2. to generate specific writing-to-learn activities for use in community college nursing classes (see Appendices A and B)
3. to determine the relationship between the use of writing-to-learn strategies and the aggregate semester score of students in community college nursing classes
4. to determine the relationship between the use of writing-to-learn strategies and the scores on a test of critical thinking skills taken by students in community college nursing classes.

Research Questions

The following general research questions were addressed in the study:

1. What are the literature-based findings concerning the relationship between writing-to-learn strategies and student achievement and critical thinking?
2. What is the difference between the aggregate semester score of those students in community college nursing classes using writing-to-learn strategies and the aggregate semester score of those in nursing classes not using the strategies?
3. What is the difference between the scores on a test of critical thinking taken by those students in community college nursing classes using writing-to-learn strategies and the scores of those in nursing classes not using these strategies?
4. Are writing-to-learn strategies an effective means of improving community college nursing students' achievement?
5. Are writing-to-learn strategies an effective means of improving community college nursing students' critical thinking skills?

Assumptions

The following assumptions provided a starting point for this study:

1. Aggregate semester scores are an appropriate measure of achievement in associate degree nursing programs.
2. The Cornell Critical Thinking Test, Level Z, is an appropriate measure of critical thinking skills.

Delimitations

1. This study was delimited to freshman students in associate degree nursing classes at Wytheville Community College.
2. This study was delimited to the use of the set of writing-to-learn strategies in general.

Limitations

1. Because the subjects of this study were students in freshman associate degree nursing classes at Wytheville Community College, the results must be cautiously generalized to other regions and to nursing students and to occupational-technical students in general.
2. The study analyzed results of using writing-to-learn strategies in general and did not measure the effectiveness of individual strategies and activities.

Definitions

The following definitions refer to terms as they were used in this study:

1. Associate degree nursing program - a two-year curricular program leading to an

Associate in Applied Science degree in nursing and eligibility to become licensed as a registered nurse (Council of Associate Degree Programs, 1982).

2. Critical thinking - skills involving inference, recognition of assumptions, deduction, interpretation, problem solving, and evaluation (Watson & Glaser, 1980).

3. Aggregate Semester Score - the total points earned in Nursing 111 on the six unit tests, the mid-term examination, and the final examination. All tests are treated equally in aggregating the scores. The students' final semester grades are determined in this same manner.

4. Writing-to-learn - writing used while students are in the process of learning about subject matter (Self, 1987).

5. Writing-to-learn activities - specific activities which are used in teaching such as, "Write down what you already know about diabetes" (Self, 1987).

6. Writing-to-learn strategies - general types of or purposes for writing such as writing to discover what one does or does not already know (Self, 1987).

Significance of the Study

If writing to learn is shown to be effective in community college associate degree nursing programs, then it may become easier to convince faculty in other occupational-technical programs to try, or at least consider, using writing as a means of enhancing their students' learning and thinking. Widened use of writing-to-learn strategies may help to develop students who are able to think and solve problems better. It may serve to develop education in such a way that student and teacher are in dialogue,

thus leading to what Apple (1990) called critical awareness.

Organization of the Study

This study is organized into five chapters. Chapter 1 includes the introduction, conceptual framework, statement of the problem, purposes, research questions, assumptions, delimitations, limitations, definitions, and significance of the study. Chapter 2 presents a comprehensive review of the literature related to writing to learn. Chapter 3 outlines the methods of research, including a discussion of the population and sample, the instruments, research procedures, and statistical analysis. Chapter 4 presents the findings and analysis of the data organized around the research questions. Chapter 5 includes an interpretation of the findings, conclusions, implications, and recommendations.

CHAPTER 2

LITERATURE REVIEW

This chapter presents the literature concerning writing to learn to provide a context for the present study. It looks first at the learning theories upon which the strategies are based. It looks at writing-to-learn theory. It looks also at critical thinking, its definition, its measurement, and its relation to writing. Next the review examines research studies that concern writing and learning. Finally it looks at the practice of writing to learn at various educational levels, and in various subject areas, focusing on its use in the community college and in nursing programs.

Theory

Many of the proponents of writing to learn cite three learning theorists as background for their ideas. These theorists are Piaget, Vygotsky, and Bruner. While their theories do not deal directly with writing to learn itself, they provide the theoretical context in which writing to learn is set. Therefore, before examining the basic theory of writing to learn, it is important to consider their ideas.

Learning Theories

Piaget (1959) provided the fundamental learning theory for much of the writing-to-learn movement. His classic study of the stages of development in children began by looking at the needs which a child tends to satisfy when he/she talks. He classified child language by purpose and structure. He characterized stages of development as revealed

through language use. He pointed out the importance of noncommunicating or egocentric language. His developmental or cognitive model of learning has provided the basis for much of the theories and methods of teaching writing.

Vygotsky (1962) provided an important discussion of the relationship between the development of speech and the development of thought. He stated that thought and speech have different hereditary roots and follow independent developmental lines. In humans, however, the two lines of development interact with and foster each other, causing the connection between the two to develop. He described the development of an inner speech. This concept was paralleled later by Britton's (1972) concept of expressive writing.

Bruner's (1966, 1971) learning theories have played an important role in the development of writing to learn. He stated that the mind deals with actuality in three ways: enactive, iconic, and symbolic or abstract; thus learning parallels these ways. Enactive learning involves doing, much as Dewey (1916) stated. Iconic learning involves visual images. Symbolic or abstract learning is that which relates to language, words, or ideas. Also, Bruner said that articulating ideas improved the understanding of them. As is seen later, Emig (1971) drew upon these concepts in her presentation of writing as a means of learning content.

Writing-to-Learn Theory

Most of the literature concerning writing to learn deals with the applications used in classrooms settings. Almost all begin with some references to a few seminal works and studies. Two important studies were conducted by the Schools Council Writing across

the Curriculum Project in England (Britton et al., 1975; Martin, et al., 1976). In the first study, Britton and his associates sought to investigate the development of writing in students 11 to 18 years of age. The first stage was the determination of writing classifications. For their study, the researchers set up and pilot tested hypothetical categories of written discourse. The two-dimensional model was considering two factors: the audience for the writing and the purpose or function of the writing. The audiences were defined as self, teacher, wider audience (known), and unknown audience. Some of these audiences were further delineated. (See Figure 1.) The functions were defined as expressive, transactional, and poetic. Expressive writing explores the writer's feelings, mood, opinions, and thoughts; it could be called "thinking aloud." Expressive writing most often has the writer's self as the audience. Transactional writing is writing to get things done, to inform, to report, to instruct, or to speculate. Its audience is most often outside the self. Poetic writing uses language as an art medium; it uses writing as a means of pleasing or satisfying the writer and allowing the reader to share in that satisfaction. (See Figure 2.)

After validating the categories, Britton and his colleagues analyzed 2000 pieces of writing from 500 students, aged 11-18, in terms of the writing categories. The analysis attempted to determine the stages by which the students became competent in each category and to determine the relationship among the categories. The researchers found that most school writing was very narrow, with 84% having an audience of the teacher as examiner. Also, most writing done was transactional at its lowest level, reporting. Believing that all writing for learning comes from the expressive, they were disappointed

Child or adolescent to self

Child or adolescent to teacher

-- as trusted adult

-- in teacher/learner dialogue

-- as examiner

Child or adolescent to a wider audience

-- expert to laymen

-- peers

Child or adolescent to an unknown audience

-- general public

Figure 1

Britton's Audiences for Writing

(Glaze, 1987b, p. 89)

Transactional ←---- Expressive ----→ Poetic		
Writing to get things done	*Writing closest to talk and thinking*	*Language as art*
	Examples	
to inform	journal entries	poetry
to report	thinking on paper	stories
to instruct	first drafts	plays
to speculate	persoal letters	novels

Figure 2

Britton's Functions of Writing

(Glaze, 1987b, p. 89)

to find that little if any writing done in school was expressive or of a higher level. For example, in history and science classes, less than 6% of the writing was higher-level writing, such as writing to speculate, to hypothesize, or to theorize.

The implications drawn from the findings by the researchers were that much of the writing done in school was not conducive to learning. They proposed that in making writing assignments, teachers should pay more attention to the purpose and audience: what is the writing for and who is to read it. More opportunities should be given for expressive writing, poetic writing, and for higher-level transactional writing.

Emig (1977) clearly made the connection between writing and learning in her often-cited article "Writing as a Mode of Learning." She discussed how and why writing is a powerful tool for learning. She demonstrated how writing reinforces learning because it involves the hand, eye, and brain, thus causing enactive learning, iconic learning, and symbolic learning. She pointed out that writing involves both the right and left sides of the brain; that it integrates past, present, and future to make meaning; that it involves both analysis and synthesis; and that it provides a record of the process of learning as well as its product.

Emig (1983) dealt further with the hand, eye, brain connection. She stated four possible reasons why muscular movement is crucial in the writing process: first, writing is physically activating; second, the literal act may be an aesthetically necessary part of the process; third, the linear organization of writing may reinforce the work of the left or linear hemisphere of the brain; and fourth, writing by hand keeps the process slowed down. She indicated that writing involves the eye in each stage of writing: the eye

presents the experience to the brain during prewriting; the eye coordinates with the hand and brain during the physical act of writing; and the eye does the scanning and review during revision. Drawing upon medical and psychological researchers, Emig presented possible areas for connection between writing and the brain, particularly in the area of left brain/right brain functioning.

Haley-James (1982) described six reasons why writing promotes learning. First, writing focuses thought in that one must think about a subject to write about it. Second, writing makes thought available for inspection. By recording what one thinks, writing allows the thinker to review and reconsider thoughts. Third, writing allows more complex thought. Having been recorded, thoughts can be held onto, compared, contrasted, and synthesized. Fourth, writing translates mental images, allowing nonverbal thinking to be made verbal. Fifth, writing is multisensory, involving sight and touch in the generation and refining of ideas. Sixth, writing motivates communication. It serves as a means of transcending time and space, conveying experience to others. Haley-James went on to give conditions under which writing facilitates learning and how teachers can link writing to learning content.

Odell (1974) developed a set of heuristic procedures designed to make students examine data more thoroughly, to organize their essays more effectively, and to solve problems more adequately. Using writing samples from two sections of freshman writing classes, he found that the essays revealed an increase of some of the operations studied in the experimental class. He did not make clear, however, how the use of surface features in a written product affected problem solving strategies. The study is important

for the kinds of questions it raised.

Nostrand (1979) analyzed 600 writing samples to demonstrate how writing can generate new knowledge. He examined how inferencing occurs during the writing process. He found that 80% of the time writing engendered new knowledge even in single paragraphs. Nostrand explained these results as based on a writer's need to find new relationships when communicating to readers.

Weiss and Walters (1980) sought to determine whether subject-related writing tasks assigned in college courses would increase the amount and clarity of student learning. They found that students understood concepts more clearly when they wrote about them.

Critical Thinking

One of the purposes of this study was to determine the relationship between the use of writing-to-learn strategies and the scores on a test of critical thinking skills taken by students in community college nursing classes. The review of the literature concerning critical thinking focused first on the definitions of critical thinking. It then focused on various means of and instruments for measuring critical thinking skills.

Definitions and Theories

What exactly constitutes critical thinking varies from writer to writer. Sternberg (1981, 1985) defined critical thinking as "...the mental processes, strategies, and representations people use to solve problems, make decisions, and learn new concepts" (1985, p. 46). He presented a theory of intelligence that emphasized thinking and

learning skills drawn from an information-processing approach. He specified particular mental mechanisms that include learning how to do things, planning what things to do and how to do them, and performing the tasks. He also examined the relation of critical thinking to the internal world of the individual, the experience of the individual, and the external world of the individual.

Concerning critical thinking, Smith (1953) stated: "Now if we set about to find what a statement means and to determine whether to accept or reject it, we would be engaged in thinking which, for lack of a better term, we shall call critical thinking" (p. 130). From this concept, Ennis, Millman, and Tomko (1985) developed their definition of critical thinking. They considered critical thinking to be the reasonable reflective thinking one performs when deciding what to believe or do. Critical thinking involves both dispositions and abilities such as inference, induction, and deduction. They further felt that much depends on the thinker's interaction with other people in his/her environment.

Maintaining that critical thinking skills can be taught, deBono (1983) defined thinking as "...the operating skill with which intelligence acts upon experience" (p. 703). He further felt that certain aspects of thinking, such as lateral thinking, are more valuable to the thinker that other aspects. He also emphasized the creative nature of thinking.

To categorize the various kinds of thinking, Presseisen (1986) gave four types of cognitive processes. First were essential cognitive processes. These are the basic thinking skills that are the building blocks of thought development. The second type was

higher order processes. These are the more complex thinking skills, which may be harder to define but which are based on the essential cognitive processes. The third type was metacognitive processes. These are the learning to learn skills aimed at making thinking more conscious and the student more aware of the ways one can go about problem solving or decision making. Finally, he presented epistemic cognitive processes. These are the kinds of thinking related to particular bodies of knowledge or subject matters and particular problems addressed by these areas and the relationships among content areas.

Measurement of Critical Thinking Skills

The measurement of critical thinking skills is anything but an exact science. Sternberg (1985) stated that most tests overlap the skills they claim to measure. He further said that most are highly loaded verbally and are only marginally distinguishable from verbal intelligence tests.

Three tests were considered in this study. The first was the Watson-Glaser Critical Thinking Appraisal (1980). This test contains five subtests: Inference, Recognition of Assumptions, Deduction, Interpretation, and Evaluation of Arguments. A second test, the New Jersey Test of Reasoning Skills, was developed by Shipman (1983). This test is a 50-item inventory which is supposed to measure 22 different skill areas.

The third test, the Cornell Critical Thinking Test, Level Z, was developed by Ennis and Millman (1985). This test is available in two levels, X and Z. Level X, primarily for secondary schools, contains four sections. The first concerns the bearing

of information on a hypothesis. The second section measures the ability to judge the reliability of information. The third section measures the ability to judge whether a statement follows from its premises. The fourth section involves identification of assumptions.

Level Z contains seven sections. The test measures the ability to (1) indicate whether a statement follows from its premises, (2) detect equivocal arguments, (3) evaluate the reliability of observations, (4) judge the direction of support for a given hypothesis, (5) focus on choosing of useful predictions, (6) define terms, and (7) spot gaps in arguments. Level Z of the Cornell Critical Thinking Test was used in this study and is discussed at greater length in Chapter 3.

Writing-to-Learn Research

Several research studies have been conducted in the area of writing to learn. Many have provided evidence that writing, when used as a learning strategy, can have a positive effect on the learning of content.

Scardamalia and Bereiter (1985) explored the relationship between writing and thinking about a topic. They found that, when writing does enhance thinking, it does so because a dialectic is set up between rhetorical problems of presenting the text and the writer's understanding of the topic. They found that the use of procedures which help writers apply operational knowledge enhanced this dialectic and led to changes in writing. Their data suggested that more thinking was applied to the subject; however, they provided no evidence that writers developed more knowledge about the topic.

Lesnak (1989) conducted a study to determine the effectiveness of writing to learn

in remedial algebra classes. In two of four remedial algebra classes at Robert Morris College, he used traditional teaching techniques and methods. In the other two classes, he used these same methods, plus writing-to-learn activities. Each class had 26 students. He found that the 52 students in the writing-to-learn group completed the course with a mean average of 77.6%, while the 52 students in the control group averaged 74.5%. This difference was significant at .05 alpha level. He also observed that students in the writing-to-learn group felt that the writing activities had helped them overcome "math blocks." He concluded that writing to learn was a positive factor in learning the content in a mathematics course.

Lesnak's study was not a true experimental design: there was no mention of random selection or random assignment. As such, some variables may not have been controlled. However, it does have importance for the present study. First, the study dealt with college students rather than the secondary or elementary students of most writing studies. More importantly, it provides quantitative data showing the effectiveness of writing to learn as a means of increasing knowledge in a content area. Such evidence supports the hypothesis that writing to learn would enhance the learning of content in a college nursing course.

Soven (1989) was interested in how students perceive writing assignments and the effects of different kinds of writing assignments on learning. Her study sought to determine how students perceive their involvement in assignments that require them to present an accurate interpretation of a text. Writing assignments in two college philosophy classes were studied. Her methodology included surveys of students,

interviews with students, and examination of writing assignments. Soven reported that formal writing assignments are not necessarily more conducive to student learning than informal assignments, the writing task itself can motivate students to learn, and how students view the teacher as audience is equally important as the type of assignment in student learning. Although the methodology relies on judgement rather than empirical data, the results are important in that they indicate that writing does act as a motivating factor in learning among college students.

Givens (1990) conducted a study of writing to learn in junior-year nursing classes in order to measure its effect on the cognitive development of students. She based her work on the model delineated by Perry (1970, 1978, 1981). In one group, she used writing assignments designed to stimulate cognitive development. Another group acted as the control group. She found no statistically significant difference between the two groups in cognitive development at the end of the treatment period. The study was not a true experimental design in that the groups were not randomly selected or assigned.

Givens' study is important to the present one because it is one of the few studies dealing with nursing students and writing to learn. Also, cognitive development is one aspect of critical thinking, on which this study attempts to measure the effects of writing to learn. Even though the participants were in a four-year program, there are similarities in that the class she examined was one of their first nursing classes. The finding of no significant difference does not necessarily indicate no effect of writing, but may speak more to the difficulty in measuring growth in cognitive development. Givens' study did not in any way attempt to measure change or difference in students' achievement, as

does the present one.

Langer and Applebee (1987), in a National Council of Teachers of English research report, detailed three studies that they conducted concerning writing, learning, and thinking. In the first, they observed six high school juniors focusing on the effects of three study strategies on learning: note-taking, study questions, and essay writing. The students were asked to read two passages, then use one of the study strategies. The researchers found that, of these strategies, the greatest gain from pre-test to post-test occurred when students used essay writing.

In the second study, Langer and Applebee involved 208 randomly selected ninth and tenth graders. The researchers had the students read four passages and use one of four study tasks: normal studying, note-taking, comprehension questions, and analytic writing. The students were tested three times (before reading, immediately after reading, and four weeks after reading) with three measures (topic knowledge, passage comprehension, and application of new knowledge). Although differences were small, there was an indication that the essay task produced the best results.

The third study in the project involved 112 ninth- and eleventh-grade students. After reading two passages of reading, the students did one of four study tasks: read and study, comprehension questions, summary writing, and analytic writing. The researchers found that recall of content varied according to the degree of focused written responses on the part of the students.

Langer and Applebee's project was important for its findings concerning the relation of writing to learning. Overall, their conclusions were that the more content is

manipulated, the more likely it is to be remembered, and the more focused the writing, the greater are the effects of writing on learning. It supported theories that writing is a powerful learning tool.

Penrose (1989) examined the relative effects of writing and studying as learning aids. After reading a 1,200-word passage which served as the to-be-learned matter, 40 college freshmen each performed a writing task and a study task. Analysis indicated that the writing task led to lower scores on two of four comprehension measures, simple recall and application items. Penrose concluded that writing did not increase learning but did not hinder it either. Further analysis indicated that the types of processes involved in the tasks, such as planning and author awareness, are important variables in the relationship between writing and learning.

Writing-to-Learn Practices

Much of the literature concerning writing to learn focuses on strategies for using writing in content areas and current practices in the classroom. This review does not report on all such literature, but rather attempts to give a representative sample from various levels of instruction and various disciplines.

Myers (1984) provided a brief overview of writing-to-learn strategies in various disciplines. Of particular interest to the present study were the descriptions of activities for the sciences and health because of the possible similarities with the field of nursing. For the sciences, he recommended the use of intermittent paragraph writing and writing on controversial issues. These strategies help students in analyzing data and writing

conclusions. In the area of health, Myers suggested procedural descriptions and interview reports. Both strategies would seem useful in a nursing class. A strategy also suggested by Myers is the use of journals.

An excellent description of writing-to-learn practices and strategies was given by Self (1987). She outlined purposes, times, and forms for writing using writing to learn. (See Figures 3, 4, and 5). She also described 16 writing-to-learn strategies and suggested teacher instructions for each. These strategies served as the basis of the writing-to-learn activities used in the present study with freshman associate degree nursing students.

Much has been written on the journal as a strategy for writing to learn. Fulwiler (1982a) advocated the use of journal writing in all courses. He provided several methods for using the journal. Assignments could include the following: starting the class with a journal writing, using it to bridge the gap between what the student knows and the topic at hand; summarizing at the end of a class, pulling together information or ideas learned in class; focusing in the middle of a class, making the student actively rather than passively involved in the lesson; homework, assigning students to keep the journal outside of class; progress reports, using journals to monitor students' progress in the class; and class texts, asking students to write to each other about concerns and questions in the class. Fulwiler (1982b) further states that journals are "...a powerful means of monitoring both academic progress and personal growth...they are unique educational documents that have a role in virtually every classroom setting" (p. 23).

Stanley (1991) described the use of the journal in a variety of settings, particularly in the community college. She described it as "...a cross between a student notebook and

- To focus students' attention on subject matter
- To engage students actively with the subject matter
- To arouse students' curiosity about subject matter
- To help students discover disparate elements in subject matter
- To help students make connections between the subject matter and their lives
- To help students make their own meaning from subject matter
- To help students think aloud on paper in various ways: associating, analyzing, synthesizing, etc.
- To help students identify what they do and don't know about a subject
- To diagnose students' learning successes and problems
- To prepare students for subject matter discussions

Figure 3

Some Purposes for Using Writing to Learn

(Self, 1987, p. 15)

- At beginning of class
- When a new subject is being introduced
- *During* instruction to focus and to raise questions
- At end of class
- At end of unit of study

Figure 4

Some Appropriate Times for Writing to Learn

(Self, 1987, p. 18)

- Pre-writing
- Brief first draft writing
- Learning log entry
- Regular journal entry

Figure 5

Some Appropriate Forms for Writing to Learn

(Self, 1987, p. 18)

a writer's diary" (p. 46). She reported on its use in biology, mathematics, and orientation classes. In particular, she told of the enthusiasm that teachers and students had for the journal assignments.

Hahnemann (1986) related the use of the journal in nursing classes. She used the journal in the classroom to stimulate thought and promote critical thinking. Students were asked to write in their journals for five minutes on a particular question. She graded the journals on the basis of key questions asked during the semester. All students received at least a C, however. Other than observations about the process, she did not provide concrete evidence of its success. The article was important in that it was one of a very few that dealt with writing to learn in nursing classes. Also, the journal was an integral part of the writing-to-learn strategies used in the present study.

The learning log is a specialized type of journal, described by Glaze (1987a). The learning log is a journal which deals with the process of learning. Students write about the process of their learning. Glaze described it as a means of personalizing the curriculum, involving students in their learning. Students read journals aloud and discussed their ideas openly with their fellow students. Glaze gave several types of writings for the learning log: reading responses, process entries, research logs, unit introductions, and role writings.

Another form of writing to learn is the microtheme. Stanley (1991) defined the microtheme as a writing so short that it can be contained on a five-by-eight index card. She stated that the microtheme deemphasizes individuality and forces students to focus on a particular idea or topic. Bean, Drenk, and Lee (1982) described the use of the

microtheme in the fields of English, physics, and finance. They detailed four kinds of microtheme assignments with which they had success: the summary-writing microtheme, the thesis-supported microtheme, the data-provided microtheme, and the quandary-posing microtheme. They stated that microthemes help develop students' intellectual maturity and make students active learners. The microtheme was another major writing-to-learn strategy used in the present study.

Summary

This review of the literature concerning writing to learn has focused on the learning theories upon which the strategies are based, writing-to-learn theories, critical thinking, research studies on writing to learn, and strategies for using writing to learn.

Piaget's (1959) developmental learning model forms the basis for writing to learn. Vygotsky (1962) gave important concepts concerning the relationship between the development of speech and the development of thought. Bruner (1966, 1971) stated that the mind deals with actuality in three ways: enactive, iconic, and symbolic.

Britton et al. (1975) first described writing as a learning device as a result of his study of writing in British schools. He delineated writing in two ways, according to function or purpose (transactional, expressive, and poetic) and audience.

Emig (1977, 1983) drew upon the learning theories of Bruner and Vygotsky and the ideas of Britton to state clearly the concept of writing to learn. She described writing as involving the hand, eye, and brain, thereby causing enactive, iconic, and symbolic learning. She further said that writing uses both halves of the brain, and reinforces

learning. Haley-James (1982) described six reasons why writing promotes learning: it focuses thought, it makes thought available for inspection, it allows more complex thought, it translates mental images, it is multisensory, and it motivates communication. Odell (1974) developed a set of heuristic procedures designed to make students examine data more thoroughly, to organize their essays more effectively, and solve problems. Nostrand (1979) demonstrated how writing can generate new knowledge. Weiss and Walters (1980) found that students understood concepts more clearly when they wrote about them.

Several definitions of critical thinking emerged from the literature. Sternberg (1981, 1985); Smith (1953); and Ennis, Millman, and Tomko (1985) gave definitions that associate critical thinking with mental processes, decision making, and reflective thinking. deBono (1983) also felt that critical thinking skills could be taught. Presseisen (1986) categorized thinking into four cognitive processes: essential cognitive processes, higher order processes, metacognitive processes, and epistemic cognitive processes.

Measuring critical thinking skills is difficult. Three tests were examined for this study: the Watson-Glaser Critical Thinking Appraisal (1980), the New Jersey Test of Reasoning Skills developed by Shipman (1983), and the Cornell Critical Thinking Test, Level Z, developed by Ennis and Millman (1985). The Cornell Critical Thinking Test, Level Z, was chosen as the instrument for measuring critical thinking skills in this study.

A number of research studies concerning writing to learn have been conducted. Scardamalia and Bereiter (1985) found that writing sets a dialectic between rhetorical problems of presenting the text and the writer's understanding of the topic. Lesnak

(1989) studied the effectiveness of using writing-to-learn strategies in remedial algebra. He found that those using the strategies scored significantly higher that those not using them. Soven (1989) studied the use of writing to learn in philosophy classes. She reported that informal writing assignments are as conducive to learning as formal ones. Givens (1990) conducted a study of writing to learn in junior-year nursing classes in order to measure its effect on the cognitive development of students. Using a quasi-experimental design, she found no statistically significant difference between those using writing to learn and those who did not. Langer and Applebee (1987) detailed three studies concerning writing and learning. Each of the studies involved high school students reading passages and then performing a variety of study tasks. They found that, in general, essay writing produced the best results in learning. Penrose (1989) conducted a similar study. He found that writing did not increase learning but did not hinder it either.

Much of the literature concerning writing to learn focuses on strategies for using writing in content areas and current practices in the classroom. Myers (1984) provided a brief overview of writing-to-learn strategies in various disciplines. Self (1987) gave an excellent description of writing-to-learn practices and strategies. She outlined purposes, times, and forms for writing using writing to learn. She also described 16 writing-to-learn strategies and suggested teacher instructions for each. These strategies served as the basis for writing-to-learn activities in the present study.

Much has been written on the journal as a strategy for writing to learn. Fulwiler (1982a) advocated the use of journal writing in all courses. He provided several methods

for using the journal. Stanley (1991) described the use of the journal in a variety of settings, particularly in the community college. Hahnemann (1986) related the use of the journal in nursing classes. She used the journal in the classroom to stimulate thought and promote critical thinking. Glaze (1987a) described the learning log, which is a specialized journal dealing with the process of learning. She said that it is a means of personalizing the curriculum and involving students in their learning.

Another form of writing to learn is the microtheme. Stanley (1991) defined the microtheme as a writing so short that it can be contained on a five-by-eight index card. Bean, Drenk, and Lee (1982) described the use of the microtheme in the fields of English, physics, and finance. They detailed four kinds of microtheme assignments with which they had success. The microtheme was another major writing-to-learn strategy used in the present study.

In conclusion, this review of the literature has indicated that, although much has been written about writing to learn, there are areas that need further study. The theories have been defined, and some research has been done. Most of the research has been conducted at the elementary and secondary levels. While some research has been done into the use of writing-to-learn strategies at the college level, most of the literature reports practice rather than research. The few research studies available did not study the effects of writing to learn on learning content in an true experimental design. Also, little if any research is available concerning the use of writing to learn in community college occupational courses, including nursing. This lack clearly indicates the need to establish the efficacy of using writing-to-learn strategies in community college associate

degree nursing classes.

CHAPTER 3

METHODS OF RESEARCH

This chapter describes the design of the study, the population and sample, the treatment and instrumentation, the methods of data collection, the dependent and independent variables, and the methods for analyzing data.

Design of the Study

The design of the study was experimental. There were control and experiment groups. The subjects were randomly selected from the freshman nursing class at Wytheville Community College. They were then randomly assigned to either the control or treatment group.

Population and Sample

The population for this study was the 90 freshman nursing students enrolled at Wytheville Community College during the fall semester of 1990. The program leads to an Associate in Applied Science in Nursing degree. Following completion of the program, students are eligible to sit for the licensing examination to become Registered Nurses. The students came from a variety of backgrounds. Most had been out of high school for several years; some were recent high school graduates. Admission to the nursing curriculum is on a first-come-first-served basis; that is, a student is admitted as soon as he/she presents evidence that the entrance requirements have been met. If the class has been filled, students meeting the requirements are placed on a waiting list for

any positions in the class that become available or for the following year's class. The requirements for admission into the program include a high school diploma or the equivalent, at least a C average in high school, one high school unit each in chemistry and algebra, a physical examination that shows that the applicant is in good health, and a satisfactory score on the college's reading and writing placement tests. Students who do not have chemistry or algebra or who do not score sufficiently on the placement tests may complete these requirements through the college's developmental studies program. Students may not enter the nursing program until all developmental courses are completed.

Students in this study were enrolled in Nursing 111, Nursing I. The course is a five-credit course consisting of three hours of lecture and six hours of clinical each week. This course is team-taught by five instructors.

The sample consisted of 60 freshman nursing students randomly selected from the class at Wytheville Community College. These students were randomly assigned into either the experiment group or the control group. Although there was random selection and assignment, certain demographic information was obtained at the beginning of the semester to confirm that the two groups were equivalent. Groups were compared at both the beginning and end of the semester. The demographic information included age, gender, previous college enrollment, number of college credits earned, college grade point average, and developmental courses taken. Chi squares were obtained on the dichotomous variables as a goodness-of-fit test of equivalency (Huck, Cormier, & Bounds, 1974; Hinkle, Wiersma, & Jurs, 1979). The means of the continuous variables

were compared by means of t-tests. The results of these calculations are reported in Chapter 4.

Treatment and Instrumentation

Treatment

The treatment in this study was the use of writing-to-learn activities in the experiment group. Two types of assignments were used. In-class writings consisted of microthemes based on the strategies outlined in Appendix A. (The microtheme topics are listed in Appendix B.) These microthemes were written in each class meeting; only one assignment carried over until a second class session. The second activity was the dual-entry journal. Students were asked to record their in-class and clinical activities and then to write their reactions to these experiences. The instructors read and commented upon both the microthemes and the dual-entry journals. Other than the writing-to-learn activities, the two groups had identical instruction. The five instructors rotated among the sections. Each topic was taught by the same instructor to all classes.

Instruments

Since the design of the study called for measurements of achievement in the nursing course and of critical thinking skills, two types of instruments were used. The final grade in the nursing course was based on the total points earned on six unit tests, a mid-term examination and a final examination. The mid-term examination covered the material studied during the first half of the semester, and the final examination covered the material of the second half. Therefore, the instruments used to measure

achievement were the unit tests and the mid-term and the final examinations of the Nursing 111 course. The same tests and examinations were given to both groups of students. The tests were developed by the nursing faculty at Wytheville Community College and had been used, in part, during previous years. Since they are based on the objectives for the course, the tests are assumed to be valid measurements of achievement in the course. To measure the reliability of the tests, "odd/even" or "split/halves" correlations were obtained. Then, as suggested by Isaac and Michael (1981), the Spearman-Brown formula was applied to estimate the reliability of the tests. In addition, the Kuder-Richardson 21 formula was used to calculate a second estimation of the tests' reliability. The results of these calculations are reported in Chapter 4.

The instrument used to measure critical thinking was the Cornell Critical Thinking Test, Level Z, (Ennis and Millman, 1985). This test is a 52-item, multiple-choice test, intended to be taken within a 50-minute period. The test was developed as part of the authors' continuing research work in the area of critical thinking. The test covers several aspects of critical thinking: induction, deduction, observation, credibility, assumptions, and meaning. The test has been normed for several groups; for community college students, the mean score is 17.0 with a standard deviation of 7.0, based on a group of 261 community college students. Reliability estimates, both Spearman-Brown and Kuder-Richardson, range from .50 to .77. In determining the validity of the test, the authors reported correlations of .79 with the Watson-Glaser Critical Thinking Appraisal.

Data Collection Procedures

This study was conducted during the fall semester of 1990 at Wytheville Community College. Prior to the beginning of the study, permission to conduct the study was sought and obtained. Oral approval was given by the Wytheville Community College nursing faculty and the nursing program head. The chairman of the Allied Health Division, the Dean of Instruction, and the President of Wytheville Community College gave written approval. (See Appendix C.)

Before classes began, the sample was randomly selected, and subjects were randomly assigned to the experiment and control groups. During the first day of class, demographic information was collected from all freshman nursing students. At the first meetings of the clinical groups, the Cornell Critical Thinking Test, Level Z, was administered. During the semester, writing-to-learn activities were used in the experiment group; all other instruction was the same. Also, during the semester, the scores of the two groups on each of the tests, including the midterm and final examinations, were obtained and recorded. At the end of the semester, the Cornell Critical Thinking Test, Level Z, was again administered to both groups.

Variables

The dependent variables were the scores on the six unit tests and the midterm and final examinations of the Nursing 111 course. These variables were used as a measure of achievement in the course. The post-test scores from the Cornell Critical Thinking Test, Level Z, and the differences between the pre- and post-tests were

dependent variables in the measure of critical thinking skills. The independent variable was the group membership, experiment or control.

Method of Analysis

Demographic data were analyzed by means of Chi-square calculations for the dichotomous variables and by t-tests for the continuous variables. Results from the measurements of achievement and critical thinking were statistically compared by means of t-tests and paired t-tests.

Summary

The design of this study was experimental involving both random selection and random assignment. The population consisted of the 90 freshman nursing students at Wytheville Community College. The sample was randomly selected from the entire population; the sample was then randomly assigned to the experiment group or the control group. The treatment consisted of the use of writing-to-learn activities, both in-class mini-themes and dual-entry journals. The instruments included the six unit tests and the mid-term and final examinations developed by the faculty and the Cornell Critical Thinking Test, Level Z. The research procedures included obtaining permission to conduct the study from the nursing faculty and the appropriate administrators at Wytheville Community College (the nursing program head, the chairman of the Allied Health Division, the Dean of Instruction, and the President), administering the pre-test of the Cornell Critical Thinking Test, Level Z, using the writing-to-learn activities in the experiment groups, obtaining the scores from the various tests and examinations, and

administering the critical-thinking post-test. The data were analyzed, comparing the achievement of the two groups by means of t-tests and paired t-tests.

CHAPTER 4

FINDINGS

The purpose of this study was to determine the effects on achievement and critical thinking of the use of writing-to-learn strategies in freshman associate degree nursing classes. This chapter presents the findings from the study. The results of comparison of demographic information from the subjects are presented. Information on the writing-to-learn activities is discussed. Also, reliability data on the Nursing 111 tests and examinations are given. In addition, the results of the tests and examinations are described. Finally, the results of the critical thinking tests are presented.

Demographic Data

Original Groups

Although the subjects were selected and assigned to groups randomly, demographic data were obtained from the subjects to test for equivalency of the original groups. Table 1 presents the data concerning dichotomous variables (previously enrolled in college, took developmental chemistry, took developmental math, took developmental English, took developmental reading, and gender). Twenty-seven students in the experiment group and 29 students in the control group had previously attended college. Fourteen students in the experiment group and 14 students in the control group had taken developmental chemistry. Ten students in the experiment group and 9 students in the control group had taken developmental mathematics. Ten students in the

Table 1

Comparison of Demographic Information

for Original Groups

Variable	Group				X^2	p
	Experiment (n = 30)		Control (n = 30)			
	Yes	No	Yes	No		
Previously Enrolled in College	27	3	29	1	1.091	0.30
Took Developmental Chemistry	14	16	14	16	0.000	1.00
Took Developmental Math	10	20	9	21	0.077	0.78
Took Developmental English	10	20	18	12	4.286	0.04*
Took Developmental Reading	5	25	6	24	0.111	0.74
Gender	Male	Female	Male	Female		
	2	28	2	28	0.000	1.00

*Significant at alpha = 0.05

experiment group and 18 students in the control group had taken developmental English. Five of the students in the experiment group and 6 of the students in the control group had taken developmental reading. Twenty-eight of the students in the experiment and 28 group of the students in the control group were female. X^2 calculations indicated that the groups were equivalent in five of the variables: "previously enrolled in college," "took developmental chemistry," "took developmental math," "took developmental reading," and "gender." One of the areas, "took developmental English," produced a statistically significant X^2. An explanation for this occurrence could be simply the effects of repeated measures.

Three variables were continuous variables, "age," "credit hours taken," and "grade point average" (GPA). The mean age of the experiment group was 24.75 years; the mean age of the control group was 26.76 years. Students in the experiment group had completed an average of 35.72 credits prior to entering the nursing program; students in the control group had completed an average of 26.76 credits. Students in the experiment group had achieved a GPA of 2.910 (on a 4.000 scale); students in the control group had achieved a GPA of 2.891. The means of these variables for each original group were compared using t-tests. Table 2 presents the results of these comparisons. None of the differences were statistically significant.

Final Groups

During the course of the semester, a number of students withdrew from the nursing program. A total of 14 students, 7 in the treatment group and 7 in the control group, dropped out of the program. Although the final groups were the same size, other

Table 2

Comparison of Demographic Information

for Original Groups

Variable	Group				t	p
	Experiment (n = 30)		Control (n = 30)			
	Mean	S.D.	Mean	S.D.		
Age	24.75	6.033	26.76	6.318	1.062	0.29
Credit Hours Taken	35.72	22.47	29.73	11.33	1.130	0.26
G. P. A.	2.910	0.680	2.891	0.531	9.590	0.92

factors might have been different. To determine the effects of mortality on the experiment, the demographic data on the final participants in the project was compared. Table 3 presents the results of the comparisons of the dichotomous variables.

Twenty-two students in the experiment group and 23 students in the control group had previously attended college. Fourteen students in the experiment group and 13 students in the control group had taken developmental chemistry. Six students in the experiment group and 6 students in the control group had taken developmental mathematics. Seven students in the experiment group and 12 students in the control group had taken developmental English. Five of the students in the experiment group and 5 of the students in the control group had taken developmental reading. Twenty-two of the students in the experiment group and 22 of the students in the control group were female. None of the comparisons of these variables produced a X^2 which was statistically significant. It should be noted that the only variable which produced a significant X^2 in the original groups, took developmental English, did not produce a significant X^2 in the comparison of the final groups.

Table 4 presents the results of the comparisons of the group means of the continuous variables: age, credit hours taken, and GPA. The mean age of the experiment group was 25.91 years; the mean age of the control group was 23.39 years. Students in the experiment group had completed an average of 30.55 credits prior to entering the nursing program; students in the control group had completed an average of 39.00 credits. Students in the experiment group had achieved a GPA of 2.804; students in the control group had achieved a GPA of 2.722. None of these variables had

Table 3

Comparison of Demographic Information

for Final Groups

Variable	Group				X^2	p
	Experiment (n = 23)		Control (n = 23)			
	Yes	No	Yes	No		
Previously Enrolled in College	22	1	23	0	1.022	0.31
Took Developmental Chemistry	14	9	13	10	0.090	0.76
Took Developmental Math	6	17	6	17	0.000	1.00
Took Developmental English	7	16	12	11	2.241	0.13
Took Developmental Reading	5	18	5	18	0.000	1.00
	Male	Female	Male	Female		
Gender	1	22	1	22	0.000	1.00

Table 4

Comparison of Demographic Information

for Final Groups

Variable	Group				t	p
	Experiment (n = 23)		Control (n = 23)			
	Mean	S.D.	Mean	S.D.		
Age	25.91	5.992	23.39	6.045	0.004	0.96
Credit Hours Taken	30.55	20.74	39.00	125.29	1.229	0.23
G. P. A.	2.804	0.913	2.722	0.615	-.354	0.72

differences in means which were statistically significant.

Writing-to-Learn Activities

During the course of the semester, students in the experiment group were assigned in-class microthemes for each class meeting. Twenty writing assignments were given. These assignments are listed in Appendix B. One topic in the nursing class was taught over a two-class period. For this topic, students were assigned an out-of-class writing. Because classes were team taught, instructors' responses to the writings were often delayed. Additionally, students were asked to keep a dual-entry journal for classes and clinical experiences, in which they summarized the class and clinical activities and wrote of their reactions to or feelings about these experiences. Instructors periodically reviewed and responded to these journals.

Reliability Data

To determine an estimate of the reliability of the tests and examinations given in the Nursing 111 course, reliability coefficients for each were calculated. First, correlations between the odd- and even-numbered items were derived. Then the Spearman-Brown formula was applied to these correlations. In addition, a coefficient of reliability was derived using the Kuder-Richardson 21 formula, which is based on group means. The resulting coefficients are presented in Table 5. The Spearman-Brown coefficients ranged from a low of 0.6019 on Test 6 to a high of 0.8690 on the midterm examination. The Kuder-Richardson 21 coefficients ranged from a low of 0.6328 on Test 6 to a high of 0.8508 on Test 5. The Spearman-Brown coefficient for the aggregate

Table 5

Odd/Even Correlations

and

Spearman-Brown and Kuder-Richardson

Reliability Coefficients

of Nursing 111 Tests

Test	$r_{O\text{-}E}$	$r_{S\text{-}B}$	$r_{K\text{-}R21}$
Test 1	0.7217	0.8384	0.7487
Test 2	0.5851	0.7383	0.7267
Test 3	0.4354	0.6067	0.7721
Midterm Exam	0.7683	0.8690	0.7293
Test 4	0.6058	0.7545	0.7339
Test 5	0.6651	0.7989	0.8508
Test 6	0.4305	0.6019	0.6328
Final Exam	0.7069	0.8283	0.8066
Aggregate Semester Score	0.9902	0.9475	0.9511

semester score was 0.9475; the Kuder-Richardson 21 coefficient was 0.9511. The high coefficients for the aggregate semester score reflected the high number of items being considered. In determining which reliability coefficient is the best estimate of reliablity, it should be noted that the Kuder-Richardson 21 coefficient seems to be the better choice when the odd-even correlation is low indicating that the two halves are not parallel.

Reliability coefficients for each test were also calculated for both the control group and the experiment group. In addition, reliability coefficients were calculated for the aggregate semester scores and the critical thinking pre- and post-tests. The resulting coefficients are presented in Tables 6, 7, and 8.

For the experiment group, the Spearman-Brown coefficients ranged from a low of 0.0040 on Test 3 to a high of 0.7821 on the midterm examination; the coefficient for the aggregate semester score was 0.9892. The Kuder-Richardson 21 coefficients for this group ranged from a low of 0.4362 on Test 6 to a high of 0.6751 on the midterm examination; the coefficient for the aggregate semester score was 0.9075.

For the control group, the Spearman-Brown coefficients ranged from a low of 0.4939 on the final examination to a high of 0.8879 on Test 5; the coefficient for the aggregate semester score was 0.9096. The Kuder-Richardson 21 coefficients for this group ranged from a low of 0.3074 on Test 1 to a high of 0.7484 on Test 5; the coefficient for the aggregate semester score was 0.9173. The high coefficients for the aggregate semester score reflected the high number of items being considered.

Reliability coefficients for the Cornell Critical Thinking Test, Level Z, were also

Table 6

Odd/Even Correlations

and

Spearman-Brown and Kuder-Richardson

Reliability Coefficients

of Nursing 111 Tests

Experiment Group

Test	$r_{O\text{-}E}$	$r_{S\text{-}B}$	$r_{K\text{-}R21}$
Test 1	0.4949	0.6621	0.4710
Test 2	0.0640	0.1139	0.5206
Test 3	0.0222	0.0040	0.5920
Midterm Exam	0.6422	0.7821	0.6751
Test 4	0.6269	0.7706	0.5694
Test 5	0.2737	0.4298	0.6343
Test 6	0.3333	0.5000	0.4362
Final Exam	0.2992	0.4606	0.5351
Aggregate Semester Score	0.9787	0.9892	0.9075

Table 7

Odd/Even Correlations

and

Spearman-Brown and Kuder-Richardson

Reliability Coefficients

of Nursing 111 Tests

Control Group

Test	$r_{O\text{-}E}$	$r_{S\text{-}B}$	$r_{K\text{-}R21}$
Test 1	0.3474	0.5156	0.3074
Test 2	0.5364	0.6983	0.4767
Test 3	0.4609	0.6310	0.5318
Midterm Exam	0.7709	0.8706	0.6061
Test 4	0.6777	0.8079	0.5657
Test 5	0.7984	0.8879	0.7484
Test 6	0.3355	0.5024	0.4427
Final Exam	0.3279	0.4939	0.7424
Aggregate Semester Score	0.8342	0.9096	0.9173

Table 8

Odd/Even Correlations

and

Spearman-Brown and Kuder-Richardson

Reliability Coefficients

of Cornell Critical Thinking Test, Level Z,

for Control and Experiment Groups

Test	$r_{O\text{-}E}$	$r_{S\text{-}B}$	$r_{K\text{-}R21}$
Experiment Group Pre-test	0.4551	0.6255	0.3506
Experiment Group Post-test	0.3332	0.4999	0.0016
Control Group Pre-test	0.1614	0.2779	0.1217
Control Group Post-test	0.0269	0.0052	0.3087

calculated for both groups for the pre- and post-tests. For the experiment group, the Spearman-Brown coefficients were 0.6255 for the pre-test and 0.4999 for the post-test. The Kuder-Richardson 21 coefficients were 0.3506 for the pre-test and 0.0016 for the post-test. For the control group, the Spearman-Brown coefficients were 0.2779 for the pre-test and 0.0052 for the post-test. The Kuder-Richardson 21 coefficients were 0.1217 for the pre-test and 0.3087 for the post-test.

Achievement

A major purpose of this study was to determine the effects of using writing-to-learn strategies on the achievement of students in freshman nursing classes. To determine such effects, the mean scores for each test and examination were calculated for both the experiment and control groups. In addition, the mean aggregate semester scores were calculated. These means were then compared using t-tests. Table 9 presents the results of these comparisons.

The mean scores of students in the treatment or experiment group using writing-to-learn strategies were consistently higher than those of students in the control group. On Test 1, the mean score of the experiment group was 58.87; the mean score of the control group was 57.65. On Test 2, the mean score of the control group was 79.91; the mean score of the control group was 79.26. On Test 3, the mean score of the experiment group was 76.30; the mean score for the control group was 72.48. On the mid-term examination, which covered the material in the first half of the semester, the mean score of the experiment group was 72.30; the mean score of the control group was 70.47. On Test 4, the mean score of the experiment group was 67.57; the mean score

Table 9

Comparison of Mean Scores

on Nursing Tests and Exams

Test	Group				t	p
	Experiment (n = 23)		Control (n = 23)			
	Mean	S.D.	Mean	S. D.		
Test 1	58.87	4.18	57.65	3.82	-1.03	0.31
Test 2	79.91	4.97	79.26	4.85	-0.45	0.65
Test 3	76.30	6.61	72.48	6.49	-1.98	0.05*
Midterm	72.65	6.64	70.47	6.30	-1.14	0.26
Test 4	67.57	5.06	62.57	5.68	-3.15	0.00*
Test 5	68.52	5.13	63.78	7.04	-2.61	0.01*
Test 6	52.13	3.97	50.13	4.26	-1.65	0.11
Final	86.00	5.06	83.39	7.23	-1.42	0.16
Total	570.26	31.20	548.30	35.44	-2.23	0.03*

*Significant at alpha = 0.05

of the control group was 62.57. On Test 5, the mean score of the experiment group was 68.52; the mean score of the control group was 63.78. On Test 6, the mean score of the experiment group was 52.13; the mean score of the control group was 50.13. The mean score of the experiment group on the final examination, which covered the material covered in the second half of the semester, was 86.00; the mean score of the control group was 83.39. The mean aggregate semester score of the experiment group was 570.26; the mean aggregate semester score of the control group was 548.30. The differences in mean scores for three tests, Test 3, Test 4, and Test 5, were statistically significant. The difference between the mean aggregate semester scores of the experiment and control groups was also statistically significant.

Critical Thinking

A second purpose of this study was to determine the effects of writing-to-learn strategies on critical thinking. To determine such effects, the Cornell Critical Thinking Test, Level Z, was administered at the beginning of the semester as a pre-test. It was also administered at the end of the semester as a post-test. The mean scores of the pre- and post-tests for the control and experiment groups were obtained and compared using t-tests. Also the mean changes in test score from pre-test to post-test were compared using paired t-tests. Table 10 presents these findings.

The mean pre-test score for the experiment group was 25.65, the mean pre-test score for the control group was 26.13. The difference in mean scores for the two groups was not statistically significant. The mean post-test score for the experiment group was

Table 10

Comparison of Mean Scores on

Cornell Critical Thinking Test, Level Z

Test	Experiment		Control			
	Mean	S. D.	Mean	S. D.	Diff.	Prob
Pre-test	26.65	4.45	25.13	3.84	1.52	0.2209
Post-test	24.63	3.63	22.13	4.27	1.90	0.1932
Change	-2.56	4.54	-2.93	5.09	.37	0.8319

24.63, and the mean score for the control group was 22.73. The difference in mean scores for the two groups was not statistically significant. The mean scores of the post-test showed a decline for both groups. The mean score of the experiment group dropped 1.56 points. This drop was not statistically significant. The control group's mean score declined 3.93 points. This change in score was not statistically significant.

Summary

Demographic information concerning age, gender, previous enrollment in college, credit hours completed before beginning the nursing program, developmental classes taken, and grade point average was obtained from students participating in the research project. A comparison of data for the dichotomous variables produced a statistically significant X^2 for only one variable: "took developmental English." A comparison of the means of the continuous variables indicated that none of the differences were statistically significant.

During the course of the semester, 14 students in the study withdrew from the nursing program. Although the size of the final experiment and control groups were the same, the demographic data for the final groups were analyzed. The analysis indicated no significant X^2 statistics for any of the dichotomous variables, and no statistically significant differences between the means of the two groups for the continuous variables.

Reliability coefficients were calculated for the unit tests, mid-term and final examinations, and aggregate semester scores for all students taking the tests. The Spearman-Brown coefficients on individual tests ranged from 0.6019 to 0.8690. The

Kuder-Richardson 21 coefficients on individual tests ranged from 0.6328 to 0.8508. The Spearman-Brown coefficient for the aggregate semester score was 0.9475; the Kuder-Richardson 21 coefficient was 0.9511.

Reliability coefficients were calculated for the unit tests, mid-term and final examinations, and critical thinking pre- and post-tests for both groups. For the experiment group, the Spearman-Brown coefficients ranged from 0.0040 to 0.7821; the coefficient for the aggregate semester score was 0.9892. The Kuder-Richardson 21 coefficients for this group ranged from 0.4362 to 0.6751; the coefficient for the aggregate semester score was 0.9075. For the control group, the Spearman-Brown coefficients ranged from 0.4939 to 0.8879; the coefficient for the aggregate semester score was 0.9096. The Kuder-Richardson 21 coefficients for this group ranged from 0.3074 to 0.7484; the coefficient for the aggregate semester score was 0.9173. For the experiment group, the Spearman-Brown reliability coefficient for the pre-test of the Cornell Critical Thinking Test, Level Z, was 0.6255 and 0.4999 for the post-test. The Kuder-Richardson 21 coefficients for the experiment group were 0.3506 for the pre-test and 0.0016 for the post-test. For the control group, the Spearman-Brown coefficients were 0.2779 for the pre-test and 0.0052 for the post-test. The Kuder-Richardson 21 coefficients were 0.1217 for the pre-test and 0.3087 for the post-test.

Achievement was measured by the instructor-developed unit tests, mid-term examination, and final examination. On all tests, the mean scores of the experiment group were higher that those of the control group. Analysis of the test results indicated statistically significant differences between the experiment and control groups on Test 3,

Test 4, and Test 5. There was a statistically significant difference between the mean aggregate semester score of the experiment group and that of the control group.

The Cornell Critical Thinking Test, Level Z, was used to measure critical thinking skills. The results of the pre-test indicated no statistically significant differences between the experiment and control groups. The mean scores for both groups declined from the pre-test to the post-test. The decline for both groups was not, however, statistically significant. The differences between the means of the post-test scores of the two groups was also not statistically significant.

CHAPTER 5

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study was to determine the effects of writing-to-learn strategies on achievement and critical thinking and thereby establish the efficacy of using such strategies in community college nursing classes. To this end, an experiment was conducted using a treatment group, with which the strategies were used, and a control group. This chapter presents a summary of findings and conclusions concerning the demographic data gathered during the study, the reliability data on the instruments, the achievement of students, and the results of critical thinking tests. Also, implications concerning the study are discussed. Finally, recommendations based on the study are presented.

Demographic Data

Summary of Findings

Demographic information concerning age, gender, previous enrollment in college, hours completed before beginning the nursing program, developmental classes taken, and grade point average was obtained from students participating in the research project. A comparison of data for the dichotomous variables produced a statistically significant X^2 for only one variable: "took developmental English." A comparison of the means of these variables indicated no statistically significant differences.

During the course of the semester, 14 students in the study withdrew from the nursing program. Although the size of the final experiment and control groups were the

same, the demographic data for the final groups were analyzed. The analysis indicated no significant X^2 statistics for any of the discrete variables, and no statistically significant differences between the means of the two groups for the continuous variables.

Conclusions

Comparisons of participants' age, number of college credit hours taken, and grade point average indicated no significant differences between the group means of these variables. Analysis of the demographic data on the final groups concerning previous enrollment in college, developmental courses taken, and gender yielded no significant X^2s. Therefore, it can be concluded that, in terms of these factors, the two groups were equivalent.

It can further be concluded that, because there was random selection and random assignment of participants and because comparisons indicated no significant differences, the difference in effects can be attributed to the treatment, that is, the use of writing-to-learn strategies.

Instrument Reliability

Summary of Findings

The instruments used in this study were the Cornell Critical Thinking Test, Level Z, and the unit tests and examinations used in the freshman nursing course. To estimate the reliability of the unit tests and examinations, the Spearman-Brown and the Kuder-Richardson 21 formulas were applied. Reliability coefficients were calculated for the unit tests, mid-term and final examinations, and aggregate semester scores for all students

taking the tests. The Spearman-Brown coefficients on individual tests ranged from 0.6019 to 0.8690. The Kuder-Richardson 21 coefficients on individual tests ranged from 0.6328 to 0.8508. The Spearman-Brown coefficient for the aggregate semester score was 0.9475; the Kuder-Richardson 21 coefficient was 0.9511.

Reliability coefficients were also calculated for the unit tests, mid-term and final examinations, and critical thinking pre- and post-tests for both groups. For the experiment group, the Spearman-Brown coefficients ranged from 0.0040 to 0.7821; the coefficient for the aggregate semester score was 0.9892. The Kuder-Richardson 21 coefficients for this group ranged from 0.4362 to 0.6751; the coefficient for the aggregate semester score was 0.9075. For the control group, the Spearman-Brown coefficients ranged 0.4939 to 0.8879; the coefficient for the aggregate semester score was 0.9096. The Kuder-Richardson 21 coefficients for this group ranged from 0.3074 to 0.7484; the coefficient for the aggregate semester score was 0.9173.

The reliability of the Cornell Critical Thinking Test, Level Z, has been established through national testing, and, therefore, it was assumed to be an appropriate measure of critical thinking skills. However, during the course of this study, evidence surfaced that seemed to challenge this assumption. The assumption was not tested. Reliability coefficients for both groups on the pre- and post-tests of the Cornell Critical Thinking Test, Level Z, were calculated. For the experiment group, the Spearman-Brown reliability coefficient for the pre-test of the Cornell Critical Thinking Test, Level Z, was 0.6255 and 0.4999 for the post-test. The Kuder-Richardson 21 coefficients for the experiment group were 0.3506 for the pre-test and 0.0016 for the post-test. For the

control group, the Spearman-Brown coefficients were 0.2779 for the pre-test and 0.0052 for the post-test. The Kuder-Richardson 21 coefficients were 0.1217 for the pre-test and 0.3087 for the post-test.

Conclusions

It can be concluded that the unit tests and examinations are a reliable means of measuring the achievement of students in the freshman nursing class. The reliability of the individual tests are not very high. However, the reliability of the tests and examinations combined is very high, in fact, higher that many nationally-normed tests. These high reliability coefficients reflect the high number of items being considered.

Achievement

Summary of Findings

Achievement was measured by the instructor-developed unit tests, mid-term examination, and final examination. On all tests, the mean scores of the experiment group were higher than those of the control group. Analysis of the test results indicated statistically significant differences between the experiment and control groups on Test 3, Test 4, and Test 5. The mean aggregate semester score for the experiment group was 570.26; the mean aggregate semester score for the control group was 548.30. The difference between the mean aggregate semester score of the experiment group and that of the control group was statistically significant.

Conclusions

Comparisons of the mean scores of the treatment and control groups on the six

unit tests and the mid-term and final examinations indicated that students in the treatment group scored higher than those in control group. On three of the tests, the differences in the mean scores were statistically significant. Likewise, the mean aggregate semester score for the treatment group was statistically significantly higher than that of the control group. Since the only difference in the two groups was the use or non-use of writing-to-learn strategies, it can be concluded that writing-to-learn strategies, in particular microthemes and dual-entry journals, are an effective means of improving students' achievement.

These findings and conclusions support the theories concerning writing to learn set forth by Emig (1977), Haley-James (1982), and Odell (1974). The results are similar to those of Lesnak (1989) who found that remedial algebra students in a writing-to-learn group did significantly better than those in the control group.

Critical Thinking

Summary of Findings

The Cornell Critical Thinking Test, Level Z, was used to measure critical thinking skills. The results of the pre-test indicated no statistically significant differences between the experiment and control groups. The mean scores for both groups declined from the pre-test to the post-test. The decline for both groups was not, however, statistically significant. The difference between the means of the post-test scores of the two groups was also not statistically significant.

Conclusions

The results of the pre- and post-tests of critical thinking indicated that both mean scores of the treatment and control group declined from the pre-test to the post-test; however, these declines were not statistically significant. Furthermore, a comparison of the post-test scores indicated that the mean score of the treatment group was higher than that of the control group; however, the difference was not statistically significant. In addition, there were problems associated with the administration of the post-test, resulting in the usability of only 31 of the test scores. Therefore, no meaningful conclusions can be made concerning the effectiveness of writing-to-learn strategies on the critical thinking skills of freshman nursing students. This conclusion supports the findings of the Givens (1990) study, which found no significant improvement in cognitive development as a result of using writing-to-learn strategies in four-year nursing courses.

Implications of the Study

The most obvious implications of the findings and conclusions of this study concern the use of writing-to-learn strategies in freshman associate degree nursing classes. The strategies did work! Their use resulted in greater learning of content. The importance of this finding cannot be overstated. In the increasingly technical field of health care, much is expected of today's nurse. The nursing curriculum is already crowded and students are expected to learn more in a shorter period of time. Therefore, any learning device that results in better learning should be used in the program.

At first glance, the difference between the groups seems small even though it was

statistically significant. A question might arise concerning the value of the efforts for small results. In the associate degree nursing program at Wytheville Community College, small differences in grades can mean the success or failure of a student. Also, writing-to-learn strategies are easy for instructors to use and take very little time; therefore, even small differences are worth the time and effort.

Although no data were collected to ascertain the attitudes of students and faculty, informal comments of instructors and students indicated that both found the activities helpful and challenging. Some nursing faculty have also indicated a desire to include such strategies in future classes.

The findings concerning critical thinking did not indicate that writing-to-learn had any effect on students' skills in this area. In fact, since the mean scores for both groups declined from the pre-test to the post-test, it might seem that the nursing course had a negative effect on these skills. Such a conclusion is not warranted. There were several problems encountered with the measurement of critical thinking. Both the pre-test and the post-test were administered by the researcher. There were complaints from some of the students during the administration of the pre-test. Also, many students did not take the post-test or simply marked random answers. Perhaps, if the nursing faculty themselves had administered the test, students might have seen it as important and given it greater effort.

Furthermore, the Cornell Critical Thinking Test, Level Z, may not have been the best way of measuring critical thinking skills for this group, although the assumption that the test was appropriate was not tested. Students complained that the directions to the

test were difficult to understand. Indeed, the test, after closer inspection, did seem to test knowledge of technical skills in critical thinking processes that might have been taught in a course, rather than test the students' abilities to think critically. The test was chosen from a description and for ease of administration and purchase. This decision proved a major flaw of the study. Also, the reliability of the test was questionable. The reliability coefficients derived for the groups' testing results were extremely low and did not approach the levels of reliability published in the test manual.

Several other concerns arose as a result of the study. A major concern was the low reliability coefficients of some of the individual nursing tests. Even though the aggregate semester score proved highly reliable, some unit tests may be questionable. Faculty develop the test items on the content which they teach. Perhaps there is a need to review these tests. Another concern may have affected the writing-to-learn results. The course utilizes a team-teaching approach, thus allowing faculty to specialize in content areas. Unfortunately, this approach provides little continuity from class to class: a student does not meet with the same instructor for four to five class sessions. Writing to learn seems to be more effective when a dialogue between teacher and student is established; team teaching does not facilitate this process. Although the results in achievement were significant, perhaps a different teaching approach may have effected positive gains in critical thinking skills.

Recommendations

The most important conclusion derived from this study is that writing-to-learn

strategies are an effective method of improving students' achievement in freshman nursing classes. Therefore, the major recommendation arising from the study is that writing-to-learn strategies should be used as a teaching technique in these classes. Such strategies should also be effective in teaching other nursing classes. Indeed, such strategies may prove effective in other community college occupational/technical classes.

A concern arising from this study was the low reliability coefficients for the individual nursing tests. Therefore, it is recommended that the nursing faculty examine these tests carefully, taking into account proven testing procedures, in order to produce tests which are more reliable.

Several recommendations for future research came about as a result of this study. The study examined the effects of writing-to-learn strategies in freshman associate degree nursing courses. Research is needed to establish the efficacy of using the strategies in other occupational classes. The study only examined the overall effects on student achievement. A further research project might consider what strategies work best with various types of content.

The results concerning critical thinking were disappointing and may have been affected by the test chosen. A similar research project should be conducted using a more carefully chosen instrument with nursing faculty administering the tests. The results of such research may prove enlightening.

One of the demographic variables compared was gender. Although both the original and final groups contained that same number of males, both groups were essentially female as might be expected since nursing traditionally has been considered

a female career. A possible area of future research would be to examine the effects of gender in using writing-to-learn strategies.

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APPENDIX A

WRITING-TO-LEARN STRATEGIES

Appendix A

Writing-to-Learn Strategies

(Self, 1987 pp. 16, 17)

Writing to:

1. Discover what one does or doesn't already know
2. Assemble information by taking notes and making notes about content
3. Predict what will happen next in the text
4. Paraphrase, translate, or rephrase the text
5. Associate images, events, ideas, or personal experiences with subject matter
6. Define concepts or ideas about subject matter
7. React or respond to texts or discussions
8. Create problems to be solved with subject matter
9. Apply the subject matter to one's own life
10. Sketch or narrate observations and/or one's responses or reactions to them
11. Summarize concepts and ideas from texts or discussions
12. Question what the text or lecture means or how the parts of the topic relate
13. Talk on paper with the teacher or another student about a topic or idea
14. Invent a role or language that characterizes the subject matter or person under study
15. Analyze a topic, or one's reaction to it
16. Solve problems with the subject matter

APPENDIX B

WRITING-TO-LEARN MICROTHEMES TOPICS

Appendix B
Writing-to-Learn Microthemes Topics for Use in Nursing 111

1. Write what you expect to be learning in nursing courses.

2. Draw a line down the center of your paper. On the left side, take notes on the concepts you read in the text on emotional needs. React to, rephrase, respond to, question, or associate the ideas with something you know.

3. What are a person's basic needs? Give an example from your experience of a need that has not been met.

4. Explain how stress can aggravate an illness.

5. When you think about admitting someone to the hospital, what do you see (images, events, ideas, or even a personal experience)? Or after reading about the process of admission to a hospital, write about how you would feel as a patient being admitted to a hospital.

6. Describe the steps in the nursing process.

7. Take the last five minutes of class to write down the most important ideas for you in our discussion.

8. Briefly explain the importance of safety procedures in the clinical area.

9. Sketch out or tell in story form what happened on your first visit to your clinical site. Give your personal reactions to what happened.

10. List at least three things about nutrition that aren't clear to you.

11. Describe the urinary tract.

12. Choose a partner and together write down what you understand about and have questions about catheterization.

13. Having studied about ethics, write a statement you think a hospital administrator might release about an impending nurses strike.

14. Analyze the attached patient history chart. What does it tell you? How do you react to it?

15. How might you deal with a frightened mother and child upon the child's admission to the hospital?

16. Explain the process for moving a patient who cannot lift himself/herself from a bed.

17. Should a patient who is dying be told? Why or why not?

18. How would you try to communicate with a patient who is a visitor from a non-English-speaking country?

19. How do you think a nurse should deal with burnout?

20. Tell of an experience you have had with an elderly person (relative or friend).

21. How would you try to communicate with a deaf patient?

22. Explain the proper gloving techniques needed to prevent the spread of infection.

23. Why is the health of a patient's family important to the nurse?

APPENDIX C

LETTERS OF APPROVAL

M E M O R A N D U M

TO: Tom Ashworth

FROM: T. E. Suarez, Division Chairman
Division of Allied Health

DATE: July 30, 1990

RE: Writing-to-Learn Strategies

I have reviewed your proposal on writing-to-learn strategies in our associate degree nursing program. It appears the strategies you will be using will lead to an enhanced learning program, especially in the area of critical thinking. Critical thinking skills are becoming more and more important in the health care industry and it behooves our program to take measurable steps to include the teaching of those skills in the curriculum. I am encouraged by your efforts and the receptive attitude of our faculty. I strongly endorse your project and look forward to what I expect will be positive outcomes.

TES/gj

WYTHEVILLE COMMUNITY COLLEGE

M E M O R A N D U M

TO: Tom Ashworth

FROM: Lee Hall

DATE: July 30, 1990

SUBJECT: "Using Writing-to-Learn Strategies in Associate Degree Nursing Programs"

Your suggestion that "writing to learn" carries a different connotation from "writing across the curriculum" makes much sense to me and, as defined, lends itself to the study you propose. I fully support your working with our nursing faculty and students to conduct your research with the idea that your results will be useful to both groups and will likely be transferrable to other programs.

It is my understanding that the nursing faculty have agreed to participate in the project. I am sure you will meet with them, Ms. Compton, and Dr. Suarez to discuss the details as appropriate.

If I can be of help to you in any way as you proceed, please let me know.

tf

WYTHEVILLE COMMUNITY COLLEGE
WYTHEVILLE, VA 24382

M E M O R A N D U M

TO: Tom Ashworth

FROM: Bill Snyder

DATE: August 3, 1990

SUBJECT: REQUEST FOR RESEARCH PROJECT

I have received your request to conduct a research project entitled, "Using Writing to Learn Strategies in Associate Degree Nursing Programs." I support this project and will be interested in the results.

lvw

c: Dr. Hall
Dr. Suarez

VITA

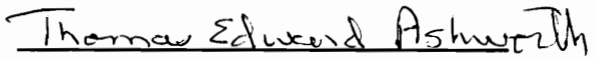
Thomas Edward Ashworth

Education

B. A.	1965	Mars Hill College, Mars Hill, NC Major: English; Minor: Education
M. A.	1972	Virginia Polytechnic Institute and State University, Blacksburg, VA Major: English
Ed. D.	1992	Virginia Polytechnic Institute and State University, Blacksburg, VA Major: Community College Education

Experience

1965 - 1967	English Teacher, John M. Morehead Senior High School, Eden, NC
1967 - 1970	English Teacher, Appomattox County High School, Appomattox, VA
1970 -1972	Graduate Teaching Assistant, English Department, Virginia Polytechnic Institute and State University, Blacksburg, VA
1972 - 1975	Instructor of English, Wytheville Community College, Wytheville, VA
1975 - 1989	Assistant Professor of English, Wytheville Community College, Wytheville, VA
1989 -	Associate Professor of English, Wytheville Community College, Wytheville, VA



Thomas Edward Ashworth