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DISSERTATION

DEMOGRAPHICS AND DISPOSITION

AS PREDICTORS OF THE APPLICATION OF CRITICAL THINKING SKILLS

IN NURSING PRACTICE

Submitted by

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School of Education

In partial fulfillment of the requirements

For the degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Fall 2000

UMI Number: 3002095

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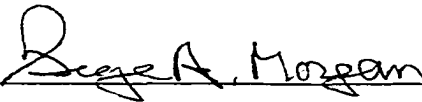
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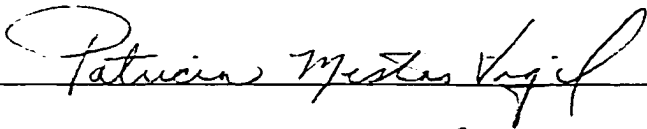
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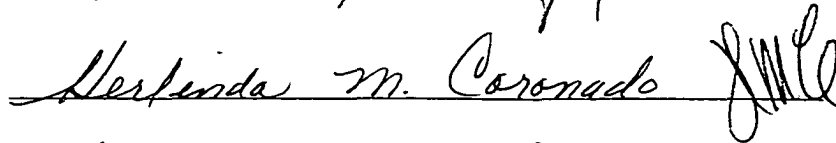
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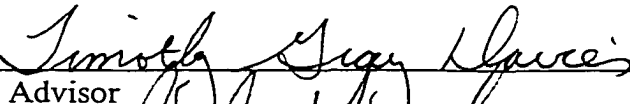
WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY GRACE C. RODRIGUEZ ENTITLED DEMOGRAPHICS AND DISPOSITION AS PREDICTORS OF THE APPLICATION OF CRITICAL THINKING SKILLS IN NURSING PRACTICE BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.


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ABSTRACT OF DISSERTATION
DEMOGRAPHICS AND DISPOSITION AS PREDICTORS
OF THE APPLICATION OF CRITICAL THINKING SKILLS IN NURSING
PRACTICE

Nurses in various care units are involved in making life and death decisions and must utilize critical thinking abilities while applying critical thinking skills for assessing human responses to actual or potential problems. Expertise in nursing practice exists when the nurse has developed the ability to use appropriate nursing knowledge and the application of critical thinking skills while delivering patient care.

The purpose of this study was to explore the variables of age, degree, career path, gender, years of clinical experience and personality as predictors for the application of critical thinking skills in nursing practice. The sample ($N=60$) was registered licensed nurses employed at a public hospital. A quantitative design was utilized with an associational approach. The California Critical Thinking Disposition Inventory (CCTDI), a demographic questionnaire, and the Observation of Critical Thinking Skills Application Tool, were selected to measure the variables.

Data were analyzed using descriptive and inferential statistics. A significance level of 0.05 was selected. None of the individual predictor variables were statistically significant. Two multiple regressions were computed to see if there was significant combination of predictor variables with the application of critical thinking skills of the nurse in nursing practice.

Pearson product moment correlation coefficients were computed to test the association or relationship between the critical thinking skills application and the CCTDI, age and experience. The *t*-test, with 2-tail tests for significance was also computed to compare gender, career paths, and degree on the critical thinking application in nursing practice on the California Critical Thinking Disposition Inventory.

Several statistically significant supplemental findings were identified by re-examining questions similar to the research questions, but with the critical thinking dispositions as the dependent variables.

Implications for further research include replication of this study in multiple clinical settings and in various hospitals. Research examining the need for real world experiences during education preparation to show relationship of clinical competence to critical thinking skills needs to be validated.

In conclusion, these data should enhance understanding of the relationships between demographics and personality emphasizing that skills and dispositions are mutually reinforced and should be taught and modeled simultaneously to develop an approach for developing nurses to enter nursing practice.

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Fall 2000

DEDICATION

This dissertation is dedicated to my family: John, my husband, who was the wind
beneath my wings.

Augustine Sanchez, my father, who developed the character of integrity, principles
and respect within me.

Eloise Rael Sanchez, my mother, who is the spirit of the wind and fire.

My children, Paul, John and Felicia, who provided the energy and the magic of
creativity to live and love real-world experiences.

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CHAPTER 1

INTRODUCTION

Expertise in nursing practice exists when the nurse has developed the ability to use appropriate nursing knowledge and skilled judgments in delivering patient care. The application of critical thinking skills in nursing practice is to assure that the nurse has the depth of knowledge necessary to immediately comprehend that nursing practice is safe, effective, and that quality nursing care is provided to the patient (Paul, 1994). With critical thinking skills, the nurse gives reasoned consideration to evidence, context, theories, methods, and criteria in order to form a purposeful judgment (Facione, 1991). Purposeful judgment requires not only that the nurse has abstract knowledge but that the nurse also has developed the intellectual capacity to contextualize and to adapt his or her own knowledge to particular cases (Paul, 1994). Nurses must learn how to evaluate new claims for knowledge and circumstances. Because complexity, uncertainty, instability, uniqueness and value conflict are perceived as central to nursing practice, the nurse has to develop responses which reflect her/his own experiences and education.

Identifying predictors that support or restrict clinical nursing students' performance early in their career is a priority concern for nurse educators (Jeffreys, 1998).

Research provides some insights on how practicing nurses acquire their critical thinking skills by examining them in work experience situations.

The significance of age, career path, degree, gender, years of clinical nursing experience and personality on applying critical thinking skills in nursing practice are not fully known. If these variables impact the application of critical thinking skills for

nursing practice then testing the relationship among age, career path, degree, gender, personality and years of clinical nursing experience is imperative to the quantitative measure of critical thinking abilities regarded to be essential elements in clinical practice.

A survey of nurse executives found that critical thinking skills were identified as essential to nursing practice (Canavan, 1996). With respect to their importance, the National League for Nursing (NLN) required critical thinking as a criterion for evaluating the effectiveness of nursing programs (NLN, 1993). It has become imperative that nursing students with varied demographic backgrounds think critically (National League for Nursing Accrediting Commission, 1996). The reform agendas of the Department of Education's National Education Goals 2000 Panel (1992a) and its post-secondary task force recommendations for achieving these goals (1992b) reflect this necessity and mandate that nursing graduates be able to think critically and to use sound clinical reasoning (Haffer & Raingruber, 1998). These mandates and studies have been the driving force promoting nursing students' ability to think critically. Nursing students are expected to think critically as they apply their nursing skills in clinical performance (Brooks & Shepherd, 1990; Holzemer & McLaughlin, 1988; Maynard, 1996).

McClure (1990) identifies several complex issues that need clarification in discussion of key variables affecting application of critical thinking skills on the factor of demonstrated clinical competence. There is a single scope of nursing practice within which two categories of nursing education are clearly differentiated. One category requires a minimum of an associate degree in nursing; the other requires a minimum of a baccalaureate degree in nursing. Both categories of nurses share certain responsibilities within the overall discipline of nursing. However, the knowledge, skill application, and

attitudes expected of a nurse in a given role are a result of the specific type of education (Primm, 1987).

Problem Statement and Context

National nursing organizations and nurses in the workplace identify critical thinking skills as essential to competent nursing practice. The changes in nursing curriculum due to rapid advances in technology and science as well as the economic impetus changing health care delivery require that nurses think critically.

The mastery of critical thinking in nursing rests upon the application of critical thinking skills for decision making in nursing practice (Case, 1994). Nursing judgment involves selecting and organizing data to support conclusions. When the nurse assesses patients and evaluates responses to care and treatment, the information is organized into meaningful patterns. These patterns may support nursing diagnoses or support the conclusion that the patient has reached the planned outcome to care and treatment (Davenport, 1994).

Research has not consistently demonstrated a strong relationship between critical thinking tests and the application of critical thinking skills. A review of the literature and this author's experience show evidence that a problem exists in predicting the critical thinking skills application in nursing practice from the attributes of the nurse.

Assessment of the clinical performance of nurses has been problematic for employers and educators in various disciplines involved in health care. The complexity of the clinical environment, the reality that nurses provide care for the patients while learning, the lack of knowledge about the characteristics of the nurse, and the lack of constant standards of performance are possible explanations for the scarcity of studies and the

sparseness of evidence about the inquiry of clinical learning and application of critical thinking skills (Brookfield, 1987).

Purpose Statement

The purpose of this study was to explore the variables of age, career path, degree, gender, years of clinical nursing experience and personality as predictors for the application of critical thinking skills in nursing practice. A quantitative design was utilized with an associational research approach. The attribute independent variables were age, career path, degree, gender, years of clinical nursing experience and personality. The dependent variable was the application of critical thinking skill in actual nursing practice. The California Critical Thinking Disposition Inventory (CCTDI), a demographic questionnaire and the Observation of Critical Thinking Skills Application Data Collection Tool measured the dependent variable.

Research Questions

What are the characteristics of the nurses that predict successful application of critical thinking skills in nursing practice? To answer this question the concept of age, degree, career path, gender, years of experience in nursing clinical experience in practice and personality are important to predict the critical thinking skills application of the nurse in nursing practice.

1. How were the nurses rated on their critical thinking skills application in nursing practice (observation rating) and was it desirable to combine these six ratings?
2. Does personality measurement (dispositions) predict critical thinking skills application of the nurse in nursing practice?

3. Does gender (male, female) predict critical thinking skills application of the nurse in nursing practice?
4. Does age predict critical thinking skills application of the nurse in nursing practice?
5. Does career path (Certified Nurse Aide/Licensed Practical Nurse before Registered Nurse directly) predict critical thinking skills application of the nurse in nursing practice?
6. Does experience (years of clinical practice and variety of units worked) predict critical thinking skills application of the nurse in nursing practice?
7. Does degree status (Associate Degree in Nursing versus Bachelor of Science Degree in Nursing) predict critical thinking skill application of the nurse in nursing practice?
8. Is there a combination of nurse characteristics, age, career path, degree, gender, years of experience in nursing clinical practice and personality that predict critical thinking skill application of the nurse in nursing practice?

Definition of Terms

The operational definitions selected for use in this study are presented in this section. Some definitions are specific to this study and many of the definitions used are definitions accepted in the literature.

Age. This term is used to describe how old the nurse is at the time of this study.

Career Path. Sequence of certification or nursing licensure to practice nursing. The provider of patient care is placed on the career path according to the nursing credential he/she has attained: Certified Nurse Aide, Licensed Practical Nurse, and Licensed Registered Nurse.

Competence. This term refers to the effective application of knowledge and skills in the work setting and has three dimensions: technical, interpersonal, and critical thinking.

Critical Thinking: Application in Practice. The repeated examination of problems, questions, issues, and situations by comparing, simplifying, synthesizing information in an analytical deliberative, evaluative, decisive way as shown in actual or true job decisions (Bandman & Bandman, 1998).

Critical Thinking Disposition. This term refers to the breadth to which a person possesses the disposition of the ideal critical thinker based on a paper and pencil inventory on the seven subscales: cognitive maturity, self-confidence, truth-seeking, open-mindedness, analyticity, systematically and inquisitiveness (Facione & Facione 1995).

Critical Thinking Skills. This term refers to the cognitive skills dimension of critical thinking based on these subscales: inductive and deductive reasoning, drawing logical inferences, evaluating and justifying inferences, and analysis and interpretation (Facione & Facione, 1995).

Experience. This term refers to the refinement of preconceived notions and theory through encounters of many actual practical situations that add shades of differences (Gadamer, 1970; Benner & Wrubel, 1982).

Novice to Expert. Benner (1984) explained that in an applied discipline such as nursing, clinical proficiency is acquired through formal knowledge by way of the educational process, then further advanced with clinical experience. Using the Dreyfus model of skill acquisition, Benner described five stages of nursing proficiency (novice, advanced beginner, competent, proficient, and expert) with critical thinking skills, pattern

recognition, intuitive thought processes, and experiential knowing being the key elements to progression through the stages.

Nurse. This term refers to an individual who provides health care, has graduated from a state-approved school of nursing, has passed the nursing state board examination, and has been granted a license to practice within a given state (Tabors, 1993).

Nursing. This term refers to nursing as a human science and art that is based on the moral ideal and value of caring. The context of nursing is humanitarian and metaphysical: the goal of nursing is to gain a higher degree of harmonizing in mind, body, and soul, which leads to self-knowledge, self-reverence, self-healing and self-care (Watson, 1988, p. 35).

Personality. The distinctive character, disposition or qualities of a person (The Oxford Dictionary and Thesaurus, 1996).

Delimitations

For the purposes of this study the following delimitations were imposed.

1. The research was restricted to nurses employed at a public hospital in the state of Colorado.
2. The data were collected on nurses employed at only one public hospital. This limited the generalizability of the results to any population outside the sample.
3. All data were collected during the Spring and Summer 2000.

Limitations

The following limitations were present in conducting this study.

1. This study was limited by the relatively small sample (60 nurses).

2. This research was limited by the use of an associational research design. As a result there was a weakness in cause and effect inferences.
3. The researcher must be aware of competing causes that might explain the results. Competing causes may be due to variations of age, career path, degree, gender, clinical work experience, and personality.

Assumptions

The following were assumptions in conducting this study.

1. This group of nurses was typical of the employed nurse in a public hospital.
2. The observation categories of the critical thinking skill application responses to be scored were defined prior to the study.
3. The observation categories scored by the researcher were accurate reflections of the nurse's application of critical thinking skills.
4. Directions for the completion of the instruments were clear in order to minimize misunderstanding.
5. Participants replied honestly to the instruments.

Significance of the Study

The nurse's ability to think critically is crucial to the provision of safe and effective patient care. Nurses in various care units are involved in making life and death decisions and must utilize critical thinking abilities while applying critical thinking skills for diagnosing human responses to actual or potential health problems. Integration of critical thinking and learning critical thinking skills application provides for high quality patient care, while promoting job enrichment, satisfaction, and competence in nursing practice. Studying the variables of age, degree, career path, gender, years of clinical nursing

experience and personality as predictors for the application of critical thinking skills in nursing practice will clarify the relationships on how nursing education, clinical competency, and experience interrelate in determining methods to add to the knowledge of nurses in nursing practice. This study will assist nurse educators in the development of curriculum that results in improved learning outcomes related to critical thinking.

CHAPTER 2

LITERATURE REVIEW

The research questions for this study revolved around the application of critical thinking skills nurses use as they provide care to their patients. In order to provide a substantial base to begin to understand the research questions a review of literature was undertaken. This review centered on: (1) History of Nursing, (2) Development of Critical Thinking in Nursing Education, (3) Critical Thinking Definitions, (4) Gender, and (5) Application of Critical Thinking Skills in Nursing Practice.

History of Nursing

To begin, a historical description of nursing was explored. Literature concerning the theoretical framework, clinical practice and academia was reviewed as relevant to the topic. Nursing has not evolved in a rigid, predictable vacuum. Since the time of the Crimean War, nursing has gone through many stages as an emerging profession. Early in the development of nursing as a profession, leaders in nursing theorized about the nature of nursing practice, the principles on which practice is based, and the proper goals and functions of nursing in society (Ashley, 1978).

Ashley (1978) stated:

The study of history gives people their identity and their philosophical reason for being. For the sake of our developing science and art within nursing, certain accepted assumptions about our role in society and its organizations must be questioned. The cultivation of ourselves as artists and scientists, self-knowledge and self-understanding are of paramount importance (p.35-36).

According to Stark and MacDonald (1860/1979), Nightingale in establishing the discipline of nursing spoke with firm conviction about the nature of nursing as a profession that could provide an avenue for women to make a meaningful contribution to society. Nightingale spent the first decade of her adult life tormented by a desire to use her productive capabilities in a way that would benefit society. She obtained formal training as a nurse and subsequently agreed to serve in the Crimean War. Nightingale wrote Notes on Nursing (1969), in which she set forth the base and articulated the proper functions of nursing. In Nightingale's view, nursing functions included making rational observations of the sick and their environment, recording observations, and developing knowledge about the factors that promote the reparative process (pp. 56-60).

Stark and MacDonald (1860/1979) state Nightingale influenced the establishment of schools of nursing in England and the United States. The first Nightingale schools were autonomous in their administration, and nurses held decision-making authority over nursing practice in institutions where students learned. Students learning in these schools emphasized the powers of observation, the necessity of recording observations, and the potential for organizing nursing knowledge gained through observation and recording. In addition, Nightingale held strong beliefs about the values that should be cultivated in nursing, and these values were reflected in the education programs of early schools. Nightingale maintained that the knowledge developed and used by nursing must be distinct from medical knowledge (pp. 52-55).

During the early 1900s, most of the Nightingale-modeled schools in the United States were brought under the control of hospitals, and nursing education and practice were transferred from the profession to the control of hospital administrators and physicians

(Ashley, 1976). In the United States, the medical care system developed as a for-profit, capitalist business. This system provided the context for technological development and a complex industrial system to support medical interventions.

Despite strong leaders who followed the Nightingale tradition and viewed nursing knowledge as unique, nursing's knowledge has not been regarded as distinct from medicine. After the Nightingale era, many forces in society emerged in opposition to Nightingale's model (Dennis & Prescott, 1985).

Consistent with the social history of women, nursing was viewed increasingly as a role supporting and supplementing medicine (Henderson, 1989). Education for women and nurses was discouraged and limited. Nurses were exploited both as students and as trained, experienced workers and were viewed as submissive, obedient, and humble women who ideally fulfilled their responsibilities to physicians without question.

During the early part of the twentieth century, nursing practice was based on rules, principles and traditions that were passed along through limited apprenticeship forms of education. Further education was not available; thus, much of what evolved as nursing knowledge was wisdom that came from years of experience (Church, 1993). The novice nurse acquired knowledge of what was right and wrong in practice by observing more experienced practitioners and by memorizing facts about the performance of nursing tasks. Nursing was viewed as a nurturing and technical art requiring apprenticeship learning and innate personality traits congruous with the art (Ashley, 1976).

Throughout the second half of the twentieth century, nurses began to reconsider the nature of nursing and the purposes for which nursing existed. Nurses began to question the ideas that were taken for granted in nursing and the traditional basis on which nursing

was practiced. Nurses wrote and published their ideas (Church, 1993). Philosophies of nursing science and nursing practice developed with growing emphasis on esthetic, ethical, and personal components of nursing knowledge. Conceptual models for nursing education and practice proliferated in the 1960s and 1970s.

Practicing nurses found a new sense of purpose and direction consistent with the basic values of nursing and a sense of the increasing effectiveness achieved through use of systematic and thoughtful forms of nursing practice. As a result, a scientific inquiry model of instruction and practice was conceived and was called the nursing process. Much progress was achieved in strengthening the orderly, systematic, and scientific basis of nursing. With the advent of the nursing process, a process based on the problem-solving models of Dewey (1938) and Dressell & Mayhew (1954), professional practice guidelines and accreditation documents incorporated criteria based on the nursing process (National League for Nursing, 1996). Curriculum designs in schools of nursing have been grounded in the nursing process model. Nursing studies have attempted to demonstrate the effect of curricula grounded in nursing process on critical thinking outcomes. Brooks & Sheppard (1990) found significant support for the impact of level of education (diploma, associate degree, baccalaureate degree, graduate degree) on critical thinking.

Recently, nursing scholars have questioned the efficacy of the nursing process to generate the critical thinking needed in nursing (Benner and Tanner, 1987).

Gordon (1994), who has fostered growth in professional judgment abilities, stated:

Many aspects of critical thinking are required in diagnostic reasoning and judgment. Clinical situations differ. It may be most useful for students to study

the components of reasoning and how these apply to the types of task they will encounter in clinical practice rather than searching for one reasoning mode.

Being aware of the cognitive operations involved will allow flexibility and broad applicability of thinking skills (p.VIII).

Development of Critical Thinking in Nursing Education

To focus education on the development of critical thinking requires helping a student to engage in thinking that is reflective, reasonable, and focused on deciding what to believe or do. Sprague (1981) views critical thinking as, “an internally organized skill that selects and guides the internal processes involved in defining and solving novel problems” (p. 24). These definitions refer to the difference between knowing “that” and knowing “how.” Learning factual information essentially is knowing “that” while learning intellectual skills is knowing “how.”

According to Sprague (1981), learning how coincides with Bloom’s (1956) higher levels of cognitive functioning. Learning objectives, teaching strategies, and evaluation strategies need to reflect his higher level of cognitive functioning. Learning should focus on process rather than content.

Educators can devise strategies that provoke this process. Knowledge cannot be transmitted. Knowledge assumes understanding and is composed of patterns that make sense, insights, and the building of cognitive structures (Bloom, 1956). Knowledge requires reason, deliberation, interpretation, insights, reflection, dialogue, and meaning-making and is generated by the self (Belenky, Clinchy, Golberger & Tarule, 1986). Through one’s own efforts, one develops a conceptual system that is always growing,

developing, expanding, and being revised. This conceptual system is used to process information.

Watson (1988) views this conceptual system as one that enables a well-educated person to take an idea, concept, thought, or insight and elaborate upon it, analyze it, take parts and bits of it, and reconstitute it until the results are substantially different from the one that triggered the process. To be well educated and to know, requires the learner to exert his or her own intellectual power to make an effort to work with the information so that it leads to insights, comprehension, understanding, meanings, and generalizations. It is this involvement with the information transformed to knowledge that finally enables one to become a critical thinker (Watson, 1988).

Some of the components of critical thinking include the ability to follow an argument, to detect ambiguity or false inferences, to organize one's time and thoughts for study, and to test guesses by summoning up contrary instances (Arons, 1985). These skills cannot be taught in a discrete course on critical thinking. Critical thinking skills need to be acquired gradually, not in any course or in any one year. Benner (1984) suggests the nurse will receive the most effective assistance in learning from a practitioner just one level above the learner on the novice-to-expert continuum.

The development of critical thinking follows a continuum through the following states: novice, advanced beginner, competent, proficient, and expert (Benner, 1984; Dreyfus & Dreyfus, 1985). Benner (1984) explained that in an applied discipline such as nursing, clinical proficiency is acquired through formal knowledge by way of the educational process, then further advanced with clinical experience. Using the Dreyfus model of skill acquisition, Benner described five stages of nursing proficiency (novice,

advanced beginner, competent, proficient, and expert) with critical thinking skills, pattern recognition, intuitive thought processes, and experiential knowing being the key elements to progression through the stages.

Benner (1984) further states that an advanced nurse can modify rules and principles for specific situations but still has difficulty prioritizing evaluation information. The competent nurse is able to adjust procedures to specific situations and perceive the relative importance of different pieces of information about a client but may still have difficulty altering the initial nursing care plans. The proficient nurse has the flexibility to alter the nursing care plans as needed in the treatment process and has a clearer sense than nurses in earlier developmental stages of the patient's total situation, including the physical, medical, and social aspects of the potential discharge situation. Expert nurses appear to be able to organize their approach to treatment more from patient cues than from preconceived plans of therapeutic action. The expert nurse can begin an initial evaluation from any data point and gather information in whatever sequence is dictated by a particular patient situation. Expert nurses are able to recognize patient problems and potentials quickly on the basis of their recognition of patterns from previous experiences (Benner, 1984).

It is not reasonable to expect nursing students to graduate as competent, proficient, or expert nurses. These levels of critical thinking require years of clinical practice and continuing education. However, it is possible for students to enter practice as novices or advanced beginners who are capable of progressing to higher levels of critical thinking if their academic preparation for clinical practice has given them an awareness of types of critical thinking they will be utilizing in practice (Benner, 1984).

Siegal (1980) when discussing the role of critical thinking in education sees critical thinking to be an educational ideal. Siegal (1980) views the important issue not to be the question of whether or not there is a generalized skill or critical thinking but inquiry surrounding the ways critical thinking manifests itself.

According to Vanetizian and Corrigan (1996), an attitude of inquiry is vital to identifying and challenging assumptions about situations and exploring alternative ways of thinking when developing critical thinking skills. The nature of student and faculty life experiences, age, level of cognitive and psychological development, and education affect attitudes. Honesty about their own perceptions and open-mindedness to the views of others reinforce a safe environment supportive of differences. Faculty members who prepare students for classroom discussions need to explain that everyone's views will be given equal consideration, even if the views are egocentric (Vanetizian and Corrigan, 1996).

Siegal (1980) identifies three imperatives for teaching critical thinking. First, to teach critical thinking is to facilitate students' self-sufficiency and autonomy and to help students to act and judge on the basis of a reasoned appraisal of the matter at hand. The second imperative is to empower students to control their destiny, to encourage them to ask questions, to look for evidence, to seek and scrutinize alternatives and to be critical of their own ideas as well as those of others. The third imperative is to promote rationality as the use of reasons.

There are, of course, great differences in the level of reasoning sophistication expected at different ages and educational levels, but these differences relate to the complexity and/or context of problems students must address, the breadth of knowledge and

experience they will be expected to incorporate into their thinking, the nuance of differentiations they must recognize, and generally the degree of overall skill expected of them in the reasoning process (Mezirow, 1991).

The National League for Nursing (1992) states that course work and clinical experiences should teach knowledge and skills, which require students to:

1. Integrate the “why,” the ability to assimilate data and question inconsistencies, and to be aware that there is a need to pursue further into a problem or issues
2. Engage in problem solving
3. Utilize clinical judgment and decision making skills
4. Identify, access, and utilize relevant information and resources
5. Access, analyze, and integrate data to alter the process of organizing and delivering health care and to support and achieve desired outcomes
6. Prioritize goals based on patient needs
7. Make timely decisions about problems, challenges, and opportunities that arise during the course of the day, particularly when a situation deviates from the original plan
8. Select and use appropriate theories, models, and principles in one’s practice
9. Begin to make independent nursing decisions appropriately
10. Evaluate nursing outcomes and revise actions and goals appropriately (p. 26).

Daloz (1986) believes that the three functions of instructors who teach critical thinking are to support, to challenge, and to provide vision to their students.

In order to see how ideas different from ours exist in their own legitimate framework, it is necessary to leap out from our shell of absolute certainty and

construct a whole new world based on some other person's ideas of "reality," other assumptions of "truth" (Daloz, 1986).

According to the American Association of Colleges of Nursing (1986), the diversity and complexity of nursing practice makes it necessary to prepare nurses who can think critically and with creativity, and who have a sound education in nursing practice, science, and the humanities. The need for this skill derives from nursing's commitment to the care of the total person, contact with persons of varying sociocultural and religious backgrounds, and the recognition that nursing is both an art and a science. Nurse educators can offer new cognitive maps, suggest new conceptual language, and serve as mirrors to help students see their actions from alternative viewpoints.

Critical Thinking Definitions

Critical thinking has been defined in numerous and varied ways in the literature, reflecting the complexity of the concept. Numerous educators and philosophers have defined critical thinking. Mathew Lipman defined critical thinking as, "skillful, responsible, thinking that facilitates good judgment because it relies upon criteria, is self-correcting, and is sensitive to context" (Lipman, 1988, p. 9). Robert Ennis defined critical thinking as, "reasonable reflective thinking focused on deciding what to believe or do" (Ennis, 1992, p. 22).

Richard Paul, a philosopher, educator, states that:

Critical thinking is disciplined, self-directed thinking which exemplifies the perfection of thinking appropriate to a particular mode or domain of thinking. It comes in two forms. If the thinking is disciplined to serve the interests of a particular individual or group, to the exclusion of other relevant persons and

groups, I call it sophistic or weak sense critical thinking. If the thinking is disciplined to take into account the interests of diverse persons or groups, I call it fair-minded or strong sense critical thinking (Paul, 1990, p. 33).

He elaborates on his definition of critical thinking by stating that:

In thinking critically we use our command of the elements of thinking to adjust our thinking successfully to the logical demands of a type or mode of thinking. As we come to habitually think critically in the strong sense we develop special traits of mind: intellectual humility, intellectual courage, intellectual perseverance, intellectual integrity, and confidence in reason. A sophistic or weak sense critical thinker develops these traits only in a restricted way, consistent with egocentric and sociocentric commitments (Paul, 1990, p. 33).

Paul's (1990) definition of critical thinking differentiates between weak and strong sense critical thinking. The implication is that the use of strong sense critical thinking requires a social conscious effort. Traits are developed only through repetitious strong sense critical thinking.

Critical thinking has been described as a multidimensional construct influenced by numerous variables over time (Sander, 1992). The descriptive research conducted by Sander (1992) resulted in five factors describing critical thinking including exploration, resolution, reasoning, understanding, and knowledge. Exploration included the variables of inquiry, information processing, and reflective thinking. Resolution included problem solving, decision making, and judgment variables. Reasoning included the variables of inductive reasoning, deductive reasoning, and hypothesis testing. Understanding encompassed analysis, synthesis, comprehension, and evaluation variables reflecting

higher levels of cognition as described by Bloom's taxonomy (Bloom, 1956).

Knowledge included the variables of concrete thinking, recall, and application. The recall and concrete thinking variables reflect lower levels of cognition on Bloom's taxonomy (Bloom, 1956).

Sander (1992) also identified five attributes of critical thinkers, including open-mindedness, perseverance, intellectual curiosity, analytical orientation, and informed skepticism. These attributes characterized critical thinking as described by Paul (1990). The perseverance and open mindedness attribute included the variables of organization, objectivity, flexibility, persistence, open mindedness, goal orientation, and precision. Intellectual curiosity included the inquiring mind, intellectual curiosity, and spirit of inquiry variables. Analytical orientation included the variables of analytic mind, valid inference recognition, knowledge of logic, and precision. Informed skepticism encompassed informed skepticism, constructive discontent, and assumption recognition variables.

Bandman and Bandman (1988) define critical thinking in nursing as "the rational examination of ideas, inferences, assumptions, principles, arguments, conclusions, issues, statements, beliefs, and actions" (p.5). Described in the preface of Critical Thinking in Nursing, Bandman and Bandman (1988) presented their definition of critical thinking as an alternative to the variety of definitions which existed in the literature. In addition, Bandman and Bandman (1988) offer fourteen functions of critical thinking for nurses:

1. Use the processes of critical thinking in all of daily living.
2. Discriminate among the uses and misuses of language in nursing.
3. Identify nursing problems.

4. Identify and formulate nursing problems.
5. Analyze meanings of terms in relation to their indication, their cause or purpose, and their significance.
6. Examine nursing assumptions.
7. Report data and cues accurately.
8. Make and check inferences based on data, making sure that the inferences are, at least, plausible.
9. Formulate and clarify beliefs.
10. Verify, corroborate, and justify claims, beliefs, conclusions, decisions, and actions.
11. Give relevant reasons for beliefs and conclusions.
12. Formulate and clarify value judgements.
13. Seek reasons, criteria, and principles that effectively justify value judgements.
14. Evaluate the soundness of conclusions (p. 5-6).

The reasoning methods commonly employed in nursing which require critical thinking are decision making, scientific reasoning, and the nursing process (Bandman and Bandman, 1988). An effective practitioner of nursing possesses the ability to use a variety of methods for scientific reasoning and critical thinking.

Gender

Historically, nursing care was a male profession, having first originated in male hospital religious orders. Florence Nightingale, however, specifically established nursing as a profession for women. Florence Nightingale considered that the attributes of a good nurse were, above all, those of a good woman (Stark and MacDonald, 1860/1979).

In an historical analysis, most medicine and healthcare throughout the colonial era and most of the nineteenth century took place within the family and the home. Nursing was often taught by mother to daughter as part of female apprenticeship or learned by a domestic servant as an additional task to her job (Reverby, 1987). In a society where deeply felt religious tenets were translated into gender virtues, the sick were to be “commended” to a “woman’s benevolent ministries” (Stark and MacDonald, 1860/1979). Nightingale felt that in order to care, a nurse’s character, tempered by the fires of training, was to be her greatest skill; thus, to “feminize” nursing.

Personality profiles of nurses gave a marked traditional female picture; high in religious orientation, advocates of the status quo, more interest in serving than in economic gains, and highly oriented to those in authority (Davis-Martin, 1984). In promoting separate organization for the nursing school, Stark and McDonald (1860/1979) defined nurses as female and used societal prohibitions on integrating the sexes to maintain independence for nurses. Describing nursing as a field for women accomplished two of Nightingale’s objectives: to create an opportunity for women outside the home and to have a measure of independence from men in the medical/hospital bureaucracy.

With the increase of men into the profession, the male is faced with many obstacles to become and remain a nurse. In nursing, men must work through many conflicts as a result of their maleness and the roles they are expected to fulfill with the nursing context (Stone, 1983).

Men within the nursing profession have stereotypically been imaged as nothing more than brawn (Holt, 1982), not smart enough to be a doctor (Vousden, 1980), or

homosexual (Startup & Wilson, 1991). Many female nurses see the male nurse as lacking empathy, understanding, compassion and caring (Holt, 1982; Kearns, 1986; Vousden, 1980). Men in nursing were considered an anomaly in an occupation synonymous with femininity.

With the advent of the feminist movement in the 1960s, women within the nursing profession came to new consciousness of themselves in relation to their environment, their own health and their position as a professional. Some of the early reformers in nursing care were closely linked with the feminist and suffrage campaign (Webb, 1982). Androgynous roles (having male and female characteristics) were dissipated within the feminist movement and men themselves were lost as to where they fit into this new role identification. Men within the profession were hypothesized as adjuncts to providing the profession with assertiveness and support to real innovations (Davis-Martin, 1984) but with the women's new role identification, this hypothesis became defunct. The traditional traits as nurses were no longer exemplified and the move toward a caring profession became the norm. The blending of the behavioral characteristics of women and men became the theoretical basis of care in nursing.

Minnigerod, Kayser-Jones and Garcia (1978) found in their study the ideal nurse was described not as stereotypically feminine, but as someone capable of displaying both feminine characteristics (i.e., warmth, understanding, gentleness, caring, helpfulness, kindness) and characteristics considered masculine (i.e., independence, competitiveness, self-confidence, decision-making). They further state that the nursing profession needs nurses who are both masculine and feminine depending on the situational appropriateness of the behaviors. According to Holtzclow (1974), the utility of considering masculinity

and femininity as polar opposites has outlived its usefulness. The well-adjusted adult is increasingly being recognized as one who has characteristics of both genders: they are androgenous. This study also found men and women nurses equally androgenous.

In a study on empathy on caregivers McDonald (1977) found male nursing students to have the highest empathy rate of all groups, while male non-nursing students had the lowest. He concluded that male nurses are uniquely different in their attitudes about caring from their male peers.

Lawrence (1978) argued that men could be gentle, nurturing, caring, tender, and sensitive. He further defends that sex-role stereotyping is becoming a moot point in a career choice for men in nursing. Lawrence's views were further reflected in a study by Johnson, Goad and Canada (1984), that nursing majors in their study disagreed with the notion that nursing means a loss of masculine characteristics and that nursing is a profession for women only.

In the absence of any logical reason for nursing to be sex-typed, it seems appropriate for the professional body to have members with equal representation of each gender. Only by eliminating the sex role stereotyping within the nursing profession will the nurses' role be defined.

Watson (1981) has managed to gender-free the stereotypical role adhered to for so long in nursing and replaced it with one based on human caring by all nurses. By redefining what it is to be a nurse, Watson (1981) has opened the door to the spirit of nursing rather than old-penned definitions of what constitutes a nurse. According to Watson (1979), the ideas and ideals associated with human caring are concerned with the spirit rather than matter, inner knowledge and power rather than circumstances; an ideal

not bordered by old concepts and definitions, but the essence of what is good for the one who is ill.

Men and women nurses enable patients to experience a fuller range of professional interventions for their human response to actual or potential problems. Hall, Stevens and Meleis (1994) assert that the future of nursing depends on the ability to meet the health care needs of the population. . Diagnosis, treatment planning, and implementation require nurses to have special skills and sensitivities to meet the health care needs of a particular gender and culture. It is critical to understand culture, gender, belief system and philosophy underlying the patient's needs and actions (Adebimpe, 1981). Academic and clinical practice must address issues as the epidemiology of illness in various cultures, gender, the process of acculturation, and the stresses it presents.

According to the American Association of Colleges of Nursing (1986), the diversity and complexity of nursing practice make it necessary to prepare nurses who can think critically and creatively, and who have a sound education in nursing, science and the humanities. The need for the skill derives from nursing's commitment to care for the total person and nursing's contact with persons of varying sociocultural backgrounds.

Chung (2000) proclaims the importance of the nursing profession is to reflect the diversity of its patient population, including gender. Critical thinking skills are developing, when nurses are aware of the diversity of values, behaviors, gender, social structures, and artistic forms in the world. Through realizing this diversity, the nursing profession is committed to identify the assumptions that underlie the ideas, beliefs, values and actions to apply critical thinking skills.

Application of Critical Thinking Skills in Nursing Practice

In nursing practice, the nurse is required to skillfully apply knowledge and experience while demonstrating the capacity to reason and the ability to contextualize the patient care situation. Nurses are asked to take theoretical information and convert it into applicable skills by performing interventions (Stark, 1995). Connecting critical thinking and the application of the skill is associated with the work of developmentalists in Cognitive Psychology where it has association with intelligence, logical thinking, problem solving and reflective judgment (Wilson, 1993).

Brown, Collins, and Duguid (1989) have demonstrated a knowing and learning “index” of the world because they are “intricately a product of the activity in which they are produced” (p. 33). In their view, learning is a process of enculturation. If we are to learn, we must become embedded in the culture in which the knowing and learning have meaning: conceptual frameworks cannot be meaningfully removed from their settings or practitioners. Learning in this respect is a cultural phenomenon because people do not learn abstract, self-contained units of knowledge that they then apply to new situations. Given the chance to observe and practice in the situation, students will imitate behavior, and gradually start to act in accordance with its norms,” (Brown, Collins, and Duguid, 1989, p. 34). Thus, learning and knowing are a process of enculturation, not simply a matter of acquisition. Problem solving and human cognitive practices are carried out in conjunction with the setting, not simply as internalized mental processes. Thus, supporters of this view offer various forms of apprenticeship as the crucial instructional mechanism for gaining the situational proficiency necessary to operate in the world

(Resnick, 1987). Cognitive apprenticeship methods try to enculturate students into authentic practices through activity and social interaction.

Schon (1987) has described the reflective practice as a way of getting at the tacit knowledge embedded in professional practice. Carr (1992) in describing the situated relation between cognition and cultural institutions, states that “learning has to happen with tools literally in hand” (p.31). This view proposes mentoring, coaching, and practice approaches to learning. Practicing nurses claim that through mentoring during their orientation to patient units that they first begin to acquire the situated experience and cultural knowledge on which they increasingly build their practice.

The application of critical thinking skills is not accomplished through one experience or lecture; skills develop over time through a variety of experiences (Obermann, 1997). Critical thinking measurement has become a focus of research in nursing.

Efforts to define, teach and measure critical thinking have intensified throughout the last quarter of the century. In 1990, under the sponsorship of the American Philosophical Association, a cross-disciplinary panel completed a two-year Delphi project which yielded a conceptualization of critical thinking understood as an outcome of college level education (Facione, 1990a). The Delphi Project characterized critical thinking as purposeful, a human cognitive process, and self-regulatory judgment. As a result of this non-linear, recursive process a person forms a judgment about what to believe or what to do in a given context. In so doing a person engaged in critical thinking uses a core of set cognitive skills: analysis, interpretation, inference, explanation, evaluation, and self-regulation, to form that judgment and to monitor and improve the quality of that judgment. Critical thinking is non linear and recursive to the extent that in thinking

critically a person is able to apply critical thinking skills to each other as well as to the problem at hand (Facione, 1990a).

Facione (1990a) provide the following definitions for their core set of cognitive skills:

1. Analysis: to comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, convention, beliefs, rules, procedures or criteria;
2. Evaluation: to assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief or opinion; and to assess the logical strength of the actual intended inferential relationships among statements, descriptions, questions, or other forms of representations;
3. Deductive Reasoning: the assumed truth of the premises purportedly necessitates the truth of conclusion;
4. Inductive Reasoning: an argument's conclusion is purportedly warranted, but not necessitated, by the assumed truth of its premise;
5. Inference: to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation (Facione, 1990a, pp.5-6).

In addition to cognitive skills, there is an overall disposition toward critical thinking, which many theorists maintain a person adept at critical thinking can be expected to have.

Facione and Facione (1992) have described the elements that increase the disposition to think critically:

1. Analyticity: use of reason and evidence to resolve problems;
2. Critical-thinking self-confidence: trust in one's own reasoning powers;
3. Cognitive maturity: recognition that some problems have more than one option;
4. Open-mindedness: tolerance of divergent views;
5. Inquisitiveness: a measure of intellectual curiosity and desire for learning;
6. Systematically: use of an orderly, focused, and diligent process in the inquiry stage;
7. Truth-seeking: honesty and objectivity with findings, even if they do not support one's own beliefs.

Recognizing the importance of the Delphi Report and understanding the role that critical thinking plays in nursing education, the Delphi consensus statement of the characteristics of the "ideal critical thinker" is highly regarded in nursing (Facione, 1990a).

Delphi consensus statement follows:

The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in selection of criteria, focused in inquiry, and persistent in seeking

results which are as precise as the subject and the circumstances of inquiry permit (Facione, 1990a, p.102).

There is consensus that a complete approach to developing college students (nurses) into good critical thinkers must include the nurturing of the disposition toward critical thinking. Cultivating the dispositions is necessary before implanting the skills, but a developmental perspective would suggest that skills and disposition are mutually reinforced and should be explicitly taught and modeled together (Facione, Sanchez, & Facione, 1995).

Ennis (1992), McPeck (1981) and Watson and Glaser (1980) approached critical thinking to characteristics, goals, processes, skill, and the importance of the discipline or domain in which it is occurring. Meyers (1986) explains that teaching critical thinking comprises more than teaching a sequence of cognitive operations. Students' critical thinking abilities depend upon their developmental level as well as their knowledge base and ability to think logically to solve discipline specific problems.

If exposed to well-structured experiences, students demonstrate gains in critical thinking abilities. Students who have advanced further along in their development demonstrate greater ease in acquiring critical thinking abilities.

Paul (1994) states integration of critical thinking and learning critical thinking skills best occurs through application and ongoing practice. Watson & Glaser (1964) assert that developing critical thinking requires a composite of attitudes, knowledge, and skills which include: (1) attitudes of inquiry that involve an ability to recognize the existence of problems and acceptance of the general need for evidence in support of what is said to be true; (2) knowledge of the nature of valid inferences, abstractions, and generalizations in

which the weight or accuracy of different kinds of evidence are logically determined; (3) skills in employing and applying the above attitudes and knowledge (p. 10).

Benner (1984) explains that nursing practice has been studied primarily from a sociological perspective. Thus, much has been learned about role relationships, socialization, and acculturation in nursing practice. However, the knowledge embedded in actual nursing practice, the knowledge that accrues over time in the practice of the nursing discipline is sparse. Such knowledge has gone uncharted and unstudied because the differences between practical and theoretical knowledge have been misunderstood. (Benner, 1984) states that this failure to record the nursing practice and clinical observations has deprived nursing theory of the uniqueness and richness of knowledge embedded in expert clinical practice.

Expertise develops when the nurse clinician tests and refines propositions, hypotheses, and principal-based expectations in actual practice situations. Experience, as it is used (Gadamer, 1970), results when preconceived notions and expectations are challenged, refined, or disconfirmed by the actual situation. Experience is, therefore, a requisite for expertise and is acquired with the application of critical thinking skills.

Summary

The profession of nursing is caught between two worlds: one exquisitely artistic and human, and one extremely scientific and technical. Historically, nurses have shifted education and practice parameters from one world to the other. To achieve a systematic and scientific basis nursing is continually examining its knowledge domain, the processes inherent in practice, and the expected outcomes.

Change in the quality of thinking behavior is predicated on a transformation of educational practices. Such a transformation requires the use of comprehensive strategies to prompt the development and maturation of critical thinking.

The National League for Nursing (1992) accreditation expectations, relative to measurement of critical thinking outcomes, provides an impetus to develop reliable and valid measures of critical thinking.

Critical thinking has been described as a multidimensional construct influenced by numerous variables over time. Since critical thinking is an abstract construct similar to creativity, self-concept, and intelligence, researchers have experienced difficulty defining critical thinking and the application of critical thinking skills.

Some researchers and authors believe that critical thinking is discipline specific or subject matter dependent (Kurfiss, 1989). For this reason expectation of critical thinking abilities may also differ, although some similarities may exist in all areas of critical thinking. Common elements of critical thinking found in all disciplines include the discovery of ideas and the justification of these ideas. These two elements, seen sequentially, involve first the identification of patterns, which provide evidence for the development of inferences, and second, the development of arguments and evidence in support of the conclusions (Kurfiss, 1989).

The definitions and application of critical thinking skills emphasized the universality of critical thinking in everyday life, as all behavior depends on what we believe and underlies human action. Scriven (1976) defines critical thinking in its exemplary form, based on universal intellectual values that transcend subject matter divisions: clarity,

accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness.

Therefore, critical thinking is skillful, responsible thinking that facilitates good judgment, is self-correcting, and is sensitive to context.

CHAPTER 3

METHODOLOGY

The parameters of this study are specified in the following headings: (1) Problem Statement and Research Questions; (2) Research Approach and Rationale; (3) Description of Participants; (4) Independent and Dependent Variables which include the description of the data collection instruments; (5) Validity and Reliability of Measures; (6) Procedure for Data Collection; (7) Analysis of Data; and (8) Summary.

Problem Statement and Research Questions

The problem statement asks the following question: What are the characteristics of the nurses that predict successful application of critical thinking skills in nursing practice?

To investigate the problem the subsequent questions will be addressed.

1. How were the nurses rated on their critical thinking skills application in nursing practice (observation rating) and was it desirable to combine these six ratings?
2. Does personality measurement (disposition inventory) predict critical thinking skills application of the nurse in nursing practice?
3. Does gender (female, male) predict critical thinking skill application of the nurse in nursing practice?
4. Does age predict critical thinking skills application of the nurse in nursing practice?
5. Does career path (Certified Nurse Assistant Aide/Licensed Practical Nurse before Registered Nurse directly) predict critical thinking skills application of the nurse in nursing practice?

6. Does experience (years of clinical practice and variety of units worked) predict critical thinking skills application of the nurse in nursing practice?
7. Does degree status (Associate Degree in Nursing versus Bachelor of Science Degree in Nursing) predict critical thinking skills application of the nurse in nursing practice?
8. Is there a combination of age, career path, degree, gender, clinical nursing experience and personality of the nurse that predict critical thinking skills applications in nursing practice?

Research Approach

The design of this study was based on the associational research approach that uses a single group of subjects to examine the relationship between independent variables and a dependent variable (Gliner & Morgan, 1999). The researcher utilizing the associational approach design predicted the application of critical thinking skills (dependent variable) from several characteristics such as age, career path, degree, gender, years of clinical nursing experience and personality (independent variables). The researcher also examined a combination of attributes to predict critical thinking skills application of the nurse in nursing practice. The purpose of this study was to explore the variables of age, degree, gender, career path, years of clinical nursing experience and personality as predictors of the critical thinking skills application of nurse in nursing practice.

There is no control over the independent variables in this design. All variables are measured as they exist, with no manipulation. This type of research does not use random assignment. Associational research studies attribute independent variables instead of active independent variables. Independent variable scores are associated with, or related

to the dependent variable and use multiple regression or correlation analysis.. This approach focuses on studying patterns of individual differences among participants (Gliner & Morgan, 1999).

This study utilized the statistical method of multiple regression. The study was based on a conceptual framework proposing that several factors might simultaneously affect a dependent variable. Multiple regression analysis provides a means of measuring the effects on several factors concurrently. According to Schroeder (1986) and Gliner & Morgan (1999) the results will indicate the effect of any given independent variable on the dependent variable while holding the effects of other independent variables constant. It is a method of recognizing that multiple factors may influence an observed process and measuring the relative effect factors may have on each other.

The design advantages are that it is to an extent generalizable, feasible, and practical. When generalizing the results to another population the researcher must recognize the limitations when reporting the results and implications (Huck & Cormier, 1996).

Participants

The participants for this study were nurses employed at a public hospital. This sample of 60 participants was drawn from a nonrandom total population of 250 nurses who may be representative of other nurses in nursing practice. This research study included nurses who have graduated with an Associate Degree in Nursing or Bachelor of Science Degree in Nursing. The nurses were registered and licensed by the state board of nursing. The demographics of the participants are discussed in Chapter Four. Participation was voluntary and confidential.

Variables and Instrumentation

The independent variables in this study were age, career path, degree, gender, years of nursing clinical experience and personality. Critical thinking skills application in nursing practice comprised the primary dependent variable measured in the study. The application of critical thinking skills in nursing practice was measured by administering the instrument, California Critical Thinking Disposition Inventory (CCTDI), ratings on the observation tool and a demographic questionnaire. Each of the instruments is described in the following paragraphs and a copy of the instruments will be found in the Appendices B, C, and D. Appendix E provides a copy of the interpretation of the CCTDI scores that were given to the participants.

The California Critical Thinking Disposition Inventory (CCTDI) is a survey of the extent to which a person possesses the disposition of the ideal critical thinker. The CCTDI defines the disposition to think critically as a “characterological profile, a constellation of attitudes, a set of intellectual virtues, ... a group of habits of the mind” (Facione, 1990b, p. 1). It consists of 75 statements and is based on 6-point Likert rating scales with response options ranging from “strongly agree” to “strongly disagree.” Each statement expresses familiar beliefs, opinions, expectations, values, and perceptions. There are eight scores, which include an overall score and seven subscale scores: truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and cognitive maturity. Each subscale is composed of between 9 and 12 items, which are embedded through the instrument. Raw points on each subscale are summed, standardized, and converted to a scale score which ranges to 60 for each subscale. The overall score was derived from mathematically equal contribution from each subscale and

ranges up to 420 (Facione, 1990b). Subscale scores below 40 indicate a weakness on that dispositional aspect, while scores above 50 indicate strength, in that dispositional aspect. An overall score of less than 210, very deficient, indicates a significant opposition toward critical thinking. An overall score between 211-280 indicates dispositional weakness. An overall score of 281-350 indicates a high strength toward critical thinking, and an overall score of 351 or more indicates an across the board very high strength toward critical thinking. The survey is intended for use at the college level and takes about 15-25 minutes to complete and it can be used to assess attitudes toward thinking logically (Facione, 1990b).

The researcher developed the data collection tool, Observation of Critical Thinking Skills Application. This tool referenced the patient classification system at the hospital targeting six various patient care units. Each of these units has a patient classification system that serves as guide in planning patient care. The patient classification system is based on a staffing assessment which describes all activities performed for patients and is based on patient care standards which determine what activities are performed and with what frequency. Because patient needs vary, levels of acuity range from categories 1-5, with 5 being the highest level of care required. Patient need determinations is performed by the registered nurse based on biophysical assessment, determination of the patient's needs for activities of daily living and discharge teaching, psycho-socio support, and technical expertise related to treatments, intravenous therapy, medications and other technical skills.

This tool was utilized to collect direct observation ratings for the six-clinical/critical thinking skills relative to the difficulty of skill application on the various work units.

Rating of the cognitive and affective domains required of the nurse in thinking through and responding to patient care standards will be used to evaluate the application critical thinking skills.

The tool is based on a 5-point Likert rating scale with rating options ranging from 5-excellent, 4-good, 3-average, 2-poor (yet safe), and 1-needs to be developed. The researcher observed and rated the critical skill application utilizing the number corresponding to the score on a Likert scale.

A demographic data questionnaire developed by the researcher was utilized to collect demographic information about the research participants. Nurses were asked to select random numbers for the purpose of converting these numbers to codes to allow for confidentiality. The questionnaire includes each participant's age, degree, gender, career path, experience (years, and number of various clinical units) in nursing practice.

Validity and Reliability of Measures

In 1990 the National Expert Consensus Statement on Critical Thinking attained construct validity of the California Critical Thinking Disposition Inventory. The instrument is made up of one overall score and seven sub-scales. The 75 Critical Thinking Disposition Inventory statement prompts express familiar beliefs, opinions, values, expectations and perceptions. Selection of this subset of 75 prompts from the original pilot pool of 150 prompts reduced the potential threat to validity. Technical studies were completed by Facione and Facione 1992) for content and construct validity, item discrimination, factor analysis, frequencies and percentile norms, divergent and convergent validity, and test-retest reliability.

Reliability of the California Critical Thinking Disposition Inventory has been demonstrated by a Cronbach's Alpha (internal consistency) of 0.90 for the overall score and Cronbach's Alpha on sub scales range from 0.72-0.82 (Facione & Facione, 1992). The instrument was field tested on an independent sample of 156 undergraduates, high-school students, and post-baccalaureates during the summer of 1992 to determine if the initial alpha reliability of .90 would hold.

Alpha reliabilities for the seven individual scales in the field sample ranged from 0.71-0.80. The alpha reliability for the overall instrument, measuring the overall disposition toward critical thinking was 0.91. The instrument was administered to two additional samples totaling 1,019 college freshman college students. The alpha levels in the later samples remained relatively stable (ranging from .60 to .78 on the scales and .90 overall), thus, empirically supporting the internal reliability of the instrument and each scale.

Cronbach's alpha for the Observation of the Critical Thinking Skills Application Tool, which was developed by the researcher, was computed to determine interitem reliability. The Cronbach's coefficient alpha measure determines whether several items that are summed to make a composite score or scale. It is based on the correlation of each item in the scale with every other item (Morgan & Griego, 1998). The Cronbach's alpha for the observation tool was .92.

Procedure for Data Collection

Prior to the initiation of the study, the project was discussed with the researcher's graduate committee and suggestions for refining the scope and process of data collection were included in the study design. The researcher sent a letter to the hospital's Internal

Review Board in February 2000 explaining the purpose of the research study and requesting permission for the researcher to utilize the hospital to conduct the research.

The Human Subjects Research Committee and the hospital's Internal Review Board (IRB) prior to collection of data approved all forms, poster and methodology.

A poster board recruiting volunteers for the research study was placed at the entrance and exit areas of the hospital. Volunteers contacted the researcher by calling her personal pager. The researcher contacted each volunteer to arrange a mutually convenient time to explain the research study. A session with the volunteer was held to give a brief verbal explanation of the research, to distribute the informed consent forms requesting his/her permission for participation in the research study and administer the demographic questionnaire. Appendix A provides a copy of the informed consent. The participating nurse was assigned a code number to be utilized by the nurse for the completion of the demographic questionnaire and the research instruments. The nurse was assured of his/her confidentiality of the demographic questionnaire, observation data and research instrument responses through use of code numbers.

Data for this research project were collected from 60 licensed registered nurses employed at a public hospital in the State of Colorado. All nurses were given the opportunity to participate in the research. Participation was on a voluntary basis, and anyone unwilling to be involved in the study was excused at any time by contacting the researcher.

The Human Subject Research Committee approved consent forms as well as the demographic questionnaire, the observation tool, and the CCTDI were explained to each

participant at a private confidential site away from the hospital. These instruments were all completed during the Spring and Summer semesters of 2000.

Permission from the hospital's IRB was granted to the researcher to complete the instruments and observation during the nurses scheduled working shift. The critical thinking skills application was observed for one hour on a clinical unit while the nurse was providing patient care.

The administration of the California Critical Thinking Disposition Inventory (CCTDI) was completed during a scheduled block of time scheduled with each nurse. The step by step instructions were explained to the participants as presented in the CCTDI test manual (California Academic Press, 2000). Nurses were allotted twenty minutes to complete the inventory.

Analysis of Data

The Statistic Department at Colorado State University (CSU) utilized the SPSS Statistical Package to analyze the quantitative and descriptive data. The results from the demographic questionnaire, observation tool and the CCTDI were coded by the researcher and entered by the statistician into a file on the computer system at CSU.

Descriptive statistics were obtained for all 60 participants, including the mean, standard deviation, variance, percentiles, frequency, range, and minimum/maximum scores on all variables. The frequency distributions illustrated the valid categories/levels/values of the participant's attributes: ethnicity, gender, career path, degree, years of experience in nursing practice and work in a variety of clinical units.

Pearson product moment correlation coefficients were computed to test the association or relationship between the critical thinking skills application and the CCTDI, age and

experience. The *t*-test, with 2-tail tests for significance, was also computed to compare genders, career paths and degree on critical thinking application in nursing practice on the California Critical Thinking Disposition Inventory. The statistical method *t*-test for the independent groups of gender, path, and degree was used to describe the mean difference, group variability, and sample size.

Multiple linear regression was used to predict the dependent variable from a combination of several interval scale and/or dichotomous predictor/independent variables. The backward elimination solution method of the multiple regression analysis was used to find the smallest group of variables that accounted for the greatest proportion of variance in the dependent variable. The Pearson's product moment is designed to examine the relationship between an independent variable and a dependent variable and is used in associational research (Gliner & Morgan, 1999; Hinkel, Wiersma & Jurs, 1994;). The Pearson correlation is a parametric statistic, which is used when both variables are at least interval scale and the results of the data analysis are listed in a table, called a correlation matrix. The matrix is examined to tell the strength with which each pair of variables is associated or related (Grimm & Yarnold, 1995).

The Pearson product moment correlation is expressed as a coefficient *r*, which gives the association or relationship between two variables. The correlation coefficient measures the degree of linear association between two variables. This means that increases in one variable will create like increases (decreases) in the other variable. The correlation coefficient always lies between the values of + 1 and - 1. When the two variables are unrelated, or have little effect on each other, the correlation coefficient will be close to zero. A positive correlation, meaning that increases in one variable are

associated with increases in the other variable, will lie somewhere between zero and + 1. The closer to +1 the coefficient approaches, the more clearly it can be associated with increases in the other variable. Negative correlation occurs when an increase in one variable is associated with a decrease in another. The correlation coefficient, in this case, would lie somewhere between zero and – 1. The correlation coefficient measures only the degree of association between two variables, and does not indicate a cause-and – effect relationship. Though the two variables may appear to affect each other, it is always possible that both could be related to a third variable that has not been considered (Gliner & Morgan, 1999; Hinkle, Wiersma and Jurs, 1994).

Multiple correlation extends this concept to include relationships between more than one independent variable (X_1 , X_2 , and so on) and one dependent variable (Y). In multiple correlation, the coefficient can range from zero to +1. There are no negative correlations because the method of the least squares is used to calculate the correlation coefficient. Multiple correlation is used to measure the relationship between a dependent variable and weighted combination of independent variables (Munro, Vistanier & Page, 1986, p. 82).

Linear regression analysis is used to test the validity of functional relationships. A functional relationship exists where one variable is thought to be affected by changes in another. Regression uses the correlation between variables to make predictions about one variable based on what is known about another (Gliner and Morgan, 1999).

Multiple linear regression analysis provides a means of measuring the “effects” of several factors concurrently. According to Gliner & Morgan (1999) the concept is the same as that of simple linear regression except that two or more independent variables are

used simultaneously to explain variations in the dependent variable. The results will indicate the effect of any given independent variable on the dependent variable while holding the effects of the other independent variables constant. It is a method of recognizing that multiple factors may influence an observed process and measuring the relative effect on each other.

Multiple linear regressions are used to predict an interval scale criterion/dependent variable from a combination of several interval scale and /or dichotomous predictor/independent variables (Gliner & Morgan, 1999). For those predictor variables included in the multiple regression equation, the significance of each is done by testing the research questions. When one or more of these research questions concur, the researcher may conclude that the corresponding predictor variables are significant contributors to the regression when used in combination with the other predictor variables (Morgan & Griego, 1998).

Because there is so much intercorrelation among variables used in behavioral research, the researcher wanted to find the smallest group of variables that accounted for the greatest proportion of variance in the dependent variable. Hinkle, Wiersman & Jurs (1994) outlined the backward elimination solution method to select the variables to predict a particular outcome. With this method the statistician starts with the overall R^2 generated by putting all of the independent variables in the equation. The R^2 describes the amount of shared variance or overlap between the independent and dependent variable. With multiple correlation, the researcher is interested not only in the significance of the overall r and thus the amount of variance accounted for (R^2) but also in the significance of each of the independent variables. Twelve independent variables (7

subscales for the CCDTI and 5-demographic) were analyzed. Then each independent variable is deleted, one at a time to evaluate whether the R^2 drops significantly. If, for any of these variables, there is a significant drop in R^2 , that variable is contributing significantly and will not be removed. If all the variables contribute significantly, the analysis would end with all twelve variables remaining in the equation. If one was not significant, there would be eleven variables left in the equation. Then each of those eleven variables would be tested to see whether the variable would contribute significantly if entered last. The analysis continues until all variables in the equation contribute significantly if entered last.

Summary

This chapter has identified the major components of the methodology that were used to complete the research. An associational approach was chosen for the research design and the rationale for the choice was discussed. A profile of the participants, the location, and the setting of the study were than presented.

The independent and dependent variables provided the rationale for the selection of instruments. The reliability and validity of the CCTDI instrument has been proven in numerous trails and research studies. The procedure and analysis were explained in this chapter. The procedure included the how and by whom the data was collected, the scoring method, and the data interpretation methods. The data was analyzed using descriptive statistics, Pearson's product moment correlation coefficients, multiple linear regression, the backward solution method, and the t - test for independent sample groups using the SPSS Package for windows.

CHAPTER IV

RESULTS

The purpose of this study was to explore the variables of age, degree, career path, gender, years of clinical nursing experience, and personality as predictors for the application of critical thinking skills in nursing practice. The population of this study consisted of 60 registered nurses employed at a public hospital. A review of empirical data and literature revealed that there was limited research on the characteristics of nurses that predict the application of critical thinking skills in nursing practice. A quantitative design was utilized with an associational research approach. The attribute independent variables were age, degree, career path, gender, years of clinical nursing experience and personality. The dependent variable was the application of critical thinking skills in actual nursing practice. The California Critical Thinking Disposition Inventory (CCTDI), a demographic questionnaire, and the Observation of Critical Thinking Skills Application Data Collection Tool measured the variable.

The informed consent and the demographic questionnaire were administered to the hospital-employed nurses at a confidential site away from the hospital. The CCTDI was completed with each nurse during an agreed upon block of time. The researcher completed a one-hour direct observation of the critical thinking skills application while the nurse was providing patient care on a medical/surgical clinical unit.

Descriptive Results

The participants for this study were registered nurses employed at a public hospital. This sample of 60 participants was drawn from total of 250 registered nurses employed

at this hospital. An analysis of the sample describes a demographic profile of a typical nurse in the study as Caucasian, female, an Associate Degree in Nursing, and experience providing patient care in various clinical units with a career path in nursing education and/or experience in nursing practice.

The career path delineated years of previous nursing experience as a certified nurse aide (CNA). The 30 nurses who had been a CNA had a mean of 3.10 years as a CNA, standard deviation ($SD=3.75$) with a maximum of 14 years and a minimum of 1 year. The 26 who had been licensed practical nurses were described with a mean of 4.73 years, ($SD=3.78$) and minimum of 1 year and maximum of 16 years. The 60 licensed registered nurses had a mean of 10.88 years, ($SD=7.55$), minimum of 1 year and maximum of 29 years of experience. The total number of years in nursing practice ranged from 3.0 years to 35 years with a mean of 14.48 years ($SD=8.07$). The age of the participants ranged from 24 years old to 66 years old with a mean of 39.55 years old ($SD=9.42$).

Furthermore, the analysis of this sample ($N=60$) showed the frequency of ethnicity: Caucasian, 35 (58.3%); Hispanic/Latino/Mexican American, 14 (23.3%); Mixed/Other, 10 (16.7%); and Native American, 1 (1.7%). Females were 48 (80%); males were 12 (20%). The most common educational level held by the registered nurse was an Associate Degree in Nursing, 39 (65%) while Bachelor of Science Degree in Nursing was 21 (35%). Nursing clinical experience in various clinical units ranged from a minimum of one unit worked to the maximum of six units worked. Eleven nurses (18.3%) had experience working the maximum number of six units; 4 (6.7%) five units; 10 (16.7%) four units; 10 (16.7%) three units; 20 (33.3%) two units; and 5

(8.3%) one unit. The descriptive variable of career path delineated that 39 registered nurses (65%) had previous experience in nursing practice as a certified nurse aide and/or a licensed practical nurse. Twenty-one, (35%) registered nurses started directly in nursing practice as a registered nurse without previous nursing experience.

A descriptive profile is illustrated in Table 1.

Table 1

Demographics of Participants (N=60)

Attribute	Value	Frequency	Percent	Cum Percent
ETHNIC				
Caucasian	2.00	35	58.3	58.3
Hispanic/Latino	4.00	14	23.3	81.7
Native American	5.00	1	1.7	83.3
Mixed/Other	6.00	<u>10</u>	<u>16.7</u>	100.0
Total		60	100.0	
GENDER				
Male	1.00	12	20.0	20.0
Female	2.00	<u>48</u>	<u>80.0</u>	100.0
Total		60	100.0	
PATH				
RN Directly	1.00	21	35.0	35.0
Other Path	2.00	<u>39</u>	<u>65.0</u>	100.0
Total		60	100.0	
DEGREE				
A.A.	1.00	39	65.0	65.0
B.S.N.	2.00	<u>21</u>	<u>35.0</u>	100.0
Total		60	100.0	
WKUNITS				
	1.00	5	8.3	8.3
	2.00	20	33.3	41.7
	3.00	10	16.7	58.3
	4.00	10	16.7	75.0
	5.00	4	6.7	81.7
	6.00	<u>11</u>	<u>18.3</u>	100.0
Total		60	100.0	

Results of the Research Questions

The California Academic Press, CAPSCORE scoring service, scored the raw scores on CCTDI. The Statistical Package for Social Science (SPSS) was utilized to analyze the raw data.

The data were analyzed using descriptive and inferential statistics. Frequencies, measures of central tendencies, independent *t*-tests, multiple regression and correlation coefficients were used to address the research questions. A significance level of 0.05 was selected. The following information addresses each research question, displays the data table, and details the analysis of data collected.

Research Question 1: How were the nurses rated on their critical thinking skill application in nursing practice (observation rating) and was it desirable to combine these six ratings?

To examine this question, the critical thinking skills application was observed for one hour on a clinical unit while the nurse was providing patient care. Each of the six critical thinking skills was rated on a Likert scale with the categories ordered excellent, good, average, poor (yet safe) and needs improvement. The rating for each category was converted to a value score of 5=excellent, 4=good, 3=average, 2=poor (yet safe) and 1=needs to be developed. The scores for each of the six critical thinking skills for the sample population ($N=60$) were correlated to determine interitem reliability, Cronbach's coefficient alpha. The Cronbach's coefficient alpha measure determines whether several items that are summed to make a composite score or scale belong together. It is based on the correlation of each item in the scale with every other item (Morgan & Griego, 1998). The Cronbach's alpha for the observation tool was .92.

Thus, it was appropriate and desirable to compute a summary score. Table 2 presents these results.

Note that the mean of the six ratings each had an average rating greater than 4.2

indicating that the average nurse provided safe patient care.

Table 2

Analysis of Reliability for the Critical Thinking Skill - Observation Tool

<u>Application of Critical Thinking Skill</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Corrected Item Total Correlation</u>	<u>Alpha if Item Deleted</u>
CT1 – Completes total care for all assigned patients with minimal direction.	4.48	.75	.816	.905
CT2 – Thoroughly assesses and documents patient care in accordance with policy/procedure and medical/legal requirements.	4.67	.57	.779	.914
CT3 – Demonstrates sound, safe, professional judgment through application of the nursing process.	4.58	.77	.879	.896
CT4 – Identifies priorities of patient care needs and fulfills responsibilities on a priority basis.	4.53	.75	.827	.903
CT5 – Functions appropriately in emergency situations.	4.38	.85	.700	.923
CT6 – Demonstrates application of theory and/or scientific principles when performing or assisting with procedures and/or skilled technical tasks.	4.28	.83	.736	.917

Reliability Coefficients

N of Cases = 60.0

N of Items = 6

Alpha = .9236

The Critical Thinking Skills Observation Tool was measured to be reliable. But since it was used only once, the validity needs to be determined. The researcher developed this tool for the purpose of this study. It should also be noted that only one type of evidence, no matter how strong, is insufficient for establishing reliability or validity.

Although Table 3 illustrates some percent variability on the ratings of the six critical thinking skills, 23 nurses had the highest possible scores on the six ratings. While this indicates that 38% of the nurses were doing their job, the tool's usefulness to measure the outcome variable was statistically reduced.

Research Question 2: Does personality measurement (disposition) predict critical thinking skill application?

To examine this question, Pearson product moment correlation coefficients were computed relating the seven disposition subscales and total to the application of critical thinking skills of the nurse in nursing practice. Table 4 presents the results.

Table 4

Pearson Product Moment Correlation Coefficients Showing the Relationship of the California Critical Thinking Disposition Inventory and the Application of Critical Thinking Skills (N=60)

Variable	Critical Thinking Skills Application	
	r	p
Truth-Seeking	-.06	.65
Open mindedness	.18	.16
Inquisitiveness	-.12	.37
Systematicity	.11	.40
Maturity	-.09	.50
Self-Confidence	-.08	.54
Analyticity	-.03	.83
Total	-.02	.90

$p < .05$

As illustrated on Table 4, there was no statistically significant correlation at the .05 level of confidence between the California Critical Thinking Disposition Inventory and the application of the application of critical thinking skills in nursing practice.

Research Question 3: Does gender (male, female) predict critical thinking skill application of the nurse in nursing practice?

The statistical method *t*-test was computed to interpret the significance of the difference between the two groups for the independent samples of gender to determine if males and females differ significantly on the application of critical thinking skill in nursing practice. Table 5 illustrates the *t*-test findings. The table also illustrates the Levene's test for equality of variances using the *F* distribution. Like the *t* distribution, the *F* distribution is a family of distributions. The specific *F* distribution is determined by two degrees of freedom values, one associated with each of the variance estimates for the two groups. If the *F* test is not significant, the assumption is not violated and one uses the "equal variance assumed" line for the *t* test and related statistics. However, if Levene's *F* is statistically significant ($\text{sig.} \leq .05$), then variances are significantly different and the assumption of equal variances is violated. In that case, the "equal variance not assumed" line is used to get the *t*-value, degrees of freedom (*df*), and *p*. The requirement for a valid *t*-test interpretation is that the groups that were compared are similar in their variances. This is related to the assumption implied that the groups are from a single population. This assumption is referred to as the requirement of homogeneity of variance. Comparing the variances of the two groups with the *F* test, prior to calculating the *t* ratio tests the assumption (Gliner & Morgan, 1999). Table 5

presents the results showing that the Levene's Test was not significant ($p=.522$), so the assumption of equal variance was not violated.

Table 5

Independent Samples *t*-Test Comparing Genders on the Critical Thinking Skills Application ($N=60$)

Variable	Critical Thinking Skills Application				
	Number of Cases	Mean	SD	Mean Diff	Levene's Test <i>F</i> <i>p</i>
Male	12	4.31	.731		
Female	48	4.53	.619		
				.229	.416 .522

<i>t</i> -Test for Equality of Means			
Variiances	<i>t</i> -Value	<i>df</i>	2-Tail Sig
Equal	-1.11	58	.273

The research question addressed the difference between males and females on the application of critical thinking skills. The statistics of interest illustrating the results of the *t*-test for equality of means are on the line beginning with Equal. The unequal line may be ignored as the variances were about the same. The statistics are: *t*-value -1.11 , *p*-value was $.273$ on the 2-tail test for significance. This is defined as a 27 % chance that the difference occurred randomly. These statistics revealed no significance difference between the males and females on the application of critical thinking skill of the nurse in nursing clinical practice.

Research Question 4: Does age predict critical thinking skill application of the nurse in nursing practice?

To examine this question, the Pearson product moment correlation coefficient was computed relating age and the application of critical thinking skill in nursing practice.

The correlation between age and critical thinking skill application in nursing practice was ($r = .08$) with a probability of .56. Thus, there was no statistically significant correlation at the .05 level of confidence between age and the application of critical skills.

Research Question 5: Does career path (Certified Nurse Aide, or Licensed Practical Nurse before RN versus Registered Nurse directly) predict critical thinking skill application of the nurse in nursing practice?

To examine this question, the statistical method *t*-test was computed to interpret the significance of the difference between the two groups, RN path and other career path, for the independent sample of path. To determine if registered nurse path (RN) and other path (CNA/LPN before RN) differ significantly on the application of the critical thinking skill in nursing practice an additional statistical test, the Levene's Test for Equality of Variances, was done prior to the *t*-test. (See Table 6.)

Table 6

Independent Samples *t*-Test Comparing Path on the Critical Thinking Skill Application ($N=60$)

Variable	Critical Thinking Skills Application					
	Number of Cases	Mean	<i>SD</i>	Mean Diff	Levene's Test <i>F</i>	<i>p</i>
RN Directly	21	4.36	.790			
Other Path	39	4.55	.548			
				-.191	6.777	.012

<i>t</i> -Test for Equality of Means			
Variances	<i>t</i> -Value	<i>df</i>	2-Tail Sig
Unequal	-.98	30.62	.332

Using the unequal variances line, because the Levene's test was significant, the *t*-test for equality of means produced a *t*-test value of -.98. The *p*-value was .332 on the 2-tail test for significance. This is defined as a 32 % chance that the difference occurred

randomly. These statistics revealed no statistically significant difference between the RN Path and Other Path on the application of critical thinking skills in nursing practice.

Research Question 6: Do years of experience (clinical practice and various units worked) predict critical thinking skill application of the nurse in nursing practice?

To examine this question, the Pearson product moment correlation coefficient was computed relating years of experience and application of the critical thinking skill. The correlation between years of experience and critical thinking skill application was ($r=.20$) with a probability of .135. Thus, there was no statistical significance at the .05 level of confidence between years of experience and the critical thinking skill application in nursing practice.

Research Question 7: Does degree status (Associate of Degree in Nursing, versus Bachelor of Science Degree in Nursing) predict critical thinking skill application in nursing practice?

To examine this question the t -test was computed to interpret the significance of the difference between the Associate Degree in Nursing and Bachelor of Science Degree in Nursing for the independent samples of degree. To determine if the ADN or BSN degree differ on the application of critical thinking skill in nursing practice the t -test and Levene's test for equality of variances were applied and are presented in Table 7.

Table 7Independent Samples *t*-Test Comparing Degree on Critical Thinking Skills Application (*N*=60)

Variable	Critical Thinking Skills Application				
	Number of Cases	Mean	<i>SD</i>	Mean Diff	Levene's Test <i>F</i> <i>p</i>
A.D.N.	39	4.53	.592		
B.S.N.	21	4.42	.739		
				.105	1.758 .190
<i>t</i> -Test for Equality of Means					
Variiances	<i>t</i> -Value	<i>df</i>	2-Tail Sig		
Equal	.60	58	.551		

There is no statistically significant difference found between the ADN and BSN degrees on the application of critical thinking skill application in nursing practice.

Research Question 8: Is there a combination of nurse characteristics (age, degree, career path, gender, years of experience in nursing clinical practice, and personality) that predict critical thinking skill application in nursing practice?

To examine this question, two multiple regressions were computed to measure the multiple correlations between the group of predictor variables on the application of critical thinking skill of the nurse in nursing practice. Utilizing the backward elimination solution method, the overall (R^2) was generated by putting all of the independent variables in the equation. For the first multiple regression, the CCTDI scales were placed in the equation. Table 8 presents these results.

Table 8

Multiple Regression: Prediction of Critical Thinking Application from the California Critical Thinking Disposition Inventory Scores (N=60)

Excluded Variable	<i>B</i>	<i>SE B</i>	β	<i>T</i>	<i>Sig T</i>
Truth Seeking	-.020	.019	-.164	-1.035	.305
Open Mindedness	.036	.018	.300	2.030	.048
Inquisitiveness	-.017	.021	-.132	-.819	.417
Systematicity	.025	.017	.238	1.500	.140
Maturity	-.015	.016	-.144	-.952	.346
Self-Confidence	-.015	.019	-.137	-.810	.422
Analyticity	-.004	.021	-.031	-.196	.845
(Constant)	5.043	1.129		4.466	.000
Multiple R	.36414				
R Square	.13260				
Adjusted R Square	.01584				
Standard Error	.63773				

When the CCTDI subscales were used with the backward elimination solution method and the adjusted (R^2) to predict the application of critical thinking skills in nursing practice, an adjusted R^2 of .016 was found. This is a non-significant prediction from the California Critical Thinking Disposition Inventory to the application of critical thinking skills in nursing practice. No statistical significance was found ($F=1.14$, $df=7,52$, $p=.36$).

Second, the demographic (dichotomous) variables of age, gender, degree, years of experience, and path were included along with the CCTDI scales and placed in the equation. Then, each variable was deleted, one at a time, to see whether the (R^2) dropped significantly. Each variable was tested, therefore, to see what would happen if it were the last one entered into the equation. Table 9 presents these results.

Table 9

Multiple Regression: Prediction of Critical Thinking Application from California Critical Thinking Disposition Inventory and Demographics (N=60)

Excluded Variable	<i>B</i>	<i>SE B</i>	β	<i>T</i>	<i>Sig T</i>
Truth Seeking	-.013	.022	-.105	-.601	.550
Open Mindedness	.034	.019	.278	1.730	.090
Inquisitiveness	-.007	.024	-.053	-.288	.775
Systematicity	.019	.018	.183	1.086	.283
Maturity	-.022	.018	-.211	-1.224	.227
Self-Confidence	-.015	.019	-.133	-.749	.457
Analyticity	-.005	.021	-.041	-.249	.804
Age	-.009	.015	-.141	-.639	.526
Gender	.241	.261	.151	.924	.360
Degree	-.083	.001	-.026	-.175	.862
Years of Experience	.016	.017	.196	.905	.370
Path	.077	.207	.058	.372	.712
(Constant)	4.620	1.465		3.154	.003
Multiple R	.41852				
R Square	.17516				
Adjusted R Square	-.03544				
Standard Error	.65413				

When the CCTDI subscales and the demographic (dichotomous) variables of gender, degree, years of experience and path were used with the backward elimination

solution method, the adjusted (R^2) to predict the application of critical nursing skills of the nurse in nursing practice was -.035. The result was not statistically significant ($F=.832, df=12,47, p=.618$) indicating that none of the variables were significant.

Supplemental Findings

Analysis of the data also provided supplemental results utilizing the SPSS Statistical package for questions similar to research question 3, 4, 5, 6 and 7, but with the critical thinking dispositions as the dependent variables.

To re-examine question 3 to determine if males and females differ significantly on the CCTDI subscales and total, scores for each group were compared. Table 10 presents the supplemental findings.

Table 10

Gender Differences on the California Critical Thinking Disposition Inventory (N=60)

Variable	Males (n=12)		Females (n=48)		t-value
	Mean	SD	Mean	SD	
Truth Seeking	42.00	7.72	41.08	4.41	.55
Open Mindedness	43.75	5.50	42.96	5.32	.46
Inquisitiveness	53.50	4.66	50.31	4.87	2.04*
Systematicity	45.00	8.09	46.46	5.37	-.59
Maturity	44.42	6.61	48.04	5.83	-1.88
Self-Confidence	46.50	6.05	45.10	5.75	.74
Analyticity	44.58	5.99	45.25	4.74	-.41
Total	319.75	27.94	319.21	23.71	.07

* $p < .05$

The CCTDI subscales and total were compared for males and females. The only statistically significant difference was for inquisitiveness, with males scoring higher.

The Pearson product moment correlation coefficient was computed relating age and the California Critical Thinking Disposition Inventory subscales and total to re-examine question four. Table 11 presents the supplemental findings.

Table 11

Pearson Product Movement Correlation Coefficient Showing the Relationship of the California Critical Thinking Disposition Inventory and Age (N=60)

Variable	Age	
	<i>r</i>	<i>P</i>
Truth-Seeking	.20	.12
Open Mindedness	.31	.02
Inquisitiveness	.04	.74
Systematicity	.18	.16
Maturity	.38	.00
Self-Confidence	-.01	.94
Analyticity	.01	.93
Total	.26	.05

p <.05

The variable of age did show statistically significant correlations at the .05 level of confidence related to the CCTDI subscales of open- mindedness ($r=.31$); maturity ($r=.38$); and total ($r=.26$). Thus, older nurses rated themselves as more open-minded, mature, and higher overall on critical thinking dispositions.

To re-examine question 5 the registered nurse path (RN) and other path (CNA/LPN before RN) were compared on the CCTDI subscales and total scores. Table 12 presents the supplemental findings.

Table 12Path Differences on the California Critical Thinking Disposition Inventory (N=60)

Variable	R.N. (n=21)		Other Path (n=39)		t-value
	Mean	SD	Mean	SD	
Truth Seeking	40.81	4.71	41.51	5.45	-.50
Open Mindedness	42.48	5.17	43.46	5.43	-.68
Inquisitiveness	52.24	4.31	50.26	5.20	1.49
Systematicity	45.14	5.80	46.72	6.04	-.98
Maturity	47.33	6.50	47.31	5.98	.02
Self-Confidence	45.48	5.35	45.33	6.07	.09
Analyticity	45.09	4.32	45.13	5.33	-.02
Total	318.57	24.55	319.72	24.57	-.17

When the CCTDI subscales and total score were compared on the RN Path and Other Path, no statistically significant difference was found.

Pearson product moment correlation coefficients were computed relating the CCTDI and years of experience to further examine question 6. The supplemental findings are presented on Table 13.

Table 13Pearson Product Moment Correlation Coefficient Matrix Showing Relationship of the California Critical Thinking Disposition Inventory, Years of Experience

Variable	Years of Experience	
	r	p
Truth-Seeking	.08	.54
Open mindedness	.31	.02
Inquisitiveness	.05	.68
Systematicity	.21	.11
Maturity	.32	.01
Self-Confidence	.05	.69
Analyticity	.09	.47
Total	.26	.04

p <.05

Statistically significant (at the .05 level of confidence) correlations between years of experience and the CCTDI subscales were found for open-mindedness ($r=.31$); maturity ($r=.32$); and total ($r=.26$). Thus, as with age more experienced nurses rated themselves as open-minded, mature, and higher overall on critical thinking dispositions.

To determine if the ADN and BSN differ on the CCTDI subscales and total scores the *t*-tests were computed to further examine question 7. The supplemental findings are presented on Table 14.

Table 14

Degree Differences on the California Critical Thinking Disposition Inventory (N=60)

Variable	A.D.N. (n=39)		B.S.N. (n=21)		t-value
	Mean	SD	Mean	SD	
Truth Seeking	40.77	5.03	42.19	5.44	-1.02
Open Mindedness	43.49	5.84	42.43	4.23	.73
Inquisitiveness	50.56	4.88	51.67	5.15	-.82
Systematicity	45.85	5.99	46.76	5.99	-.56
Maturity	48.08	4.79	45.90	7.96	1.14
Self-Confidence	44.64	5.95	46.76	5.33	1.36
Analyticity	44.74	5.24	45.81	4.45	.79
Total	318.13	24.25	321.52	25.00	.51

The statistics examined the CCTDI subscale and total scores. No statistical significance was found.

Characterological Clusters

The correlation showing the interrelationships of the California Critical Thinking Disposition Inventory scales present a characterological profile showing that the sample had several related dispositions. (See Appendix F for the correlation matrix). The continuous variables of the CCTDI scales showing statistically significant correlation coefficient presented a generalized profile of the sample similar to Facione & Facione, (1992). Almost all of the seven subscales are correlated statistically significant with each other. However, they seem to break down into three clusters showing the generalized profile of the sample.

The three clusters showing the profile of the sample are:

Cluster One: Truth-seeking, Systematicity, Maturity

Cluster Two: Inquisitiveness, Self-confidence, Analyticity

Cluster Three: Openmindedness

Frequency Distribution of the Critical Thinking Disposition Overall Scores

Analysis of the sample ($N=60$) total scores on the California Critical Thinking Inventory indicated a mean of 319.75. Facione & Facione (1992) use an overall CCTDI total score of less than 280 as a cut-off indicator of the overall deficiency in the disposition toward critical thinking. Scores between 210 and 280 fall in the overall deficient ambivalent range, and scores below 210 indicate a significant opposition toward critical thinking. Scores between 281 and 350 are in the acceptable strength toward critical thinking. Similarly, an overall score of 350 or more could be used as a general indication of across the board strength in the

disposition toward critical thinking. Table 15 presents the results showing strength on the overall disposition scores toward critical thinking. .

Table 15

Distribution of Frequency of the California Critical Thinking Disposition Inventory Overall Scores (N=60)

<u>Facione & Facione Indicators</u>	<u>Value</u>	<u>Frequency</u>	<u>Percent</u>
Very Deficient – Significant opposition toward critical thinking	<210	0	0.0%
Overall Deficient – Ambivalent range toward critical thinking	210-280	2	3.3%
High Strength – toward critical thinking	281-350	50	83.4%
Very High Strength – Overall score of 350 or more indicates across the board strength toward critical thinking.	>350	<u>8</u>	<u>13.3%</u>
Total		60	100.0%

The analysis of the participants on the California Critical Thinking Disposition Inventory overall scores utilizing the Facione and Facione, (1992) indicators for strength of the disposition scores toward critical thinking showed the frequency to be: significant opposition toward critical thinking (0%); ambivalent range, overall deficient toward critical thinking (3.3%); high strength toward critical thinking (83.4%); very high strength toward critical thinking (13.3%). The high strength indicator toward critical thinking was the most common indicator of the overall general indication toward critical thinking of this sample. This is also consistent with the characterological profile of the nurses in this study. None of the participants showed a significant opposition toward critical thinking.

As might be expected, an overall score of 350 or more is relatively rare. People tend to have both strengths and weaknesses. The overall score is useful for generalized comparisons, but it may obscure important individual or group strengths or deficiencies (Facione and Facione, (1992). However, each scale addresses an individual and essential component of the critical thinker's habits of mind, and no individual disposition can be dismissed as less important to nurture. It should not be presumed that an individual who scores well on any given CCTDI scale could be predicted to have strong scores across all seven CCTDI scales. Individuals frequently show significant strength on several of the individual scales and significant weakness on several of the individual scales (Facione and Facione, 1992).

Summary

Critical thinking skill application in nursing practice requires the interrelationships among cognitive constructs, critical thinking, dispositions, and competence. This study presented the characterological profile, disposition and knowledge describing the sample of the study.

The descriptive analysis of the sample presents a demographic profile of a nurse in the study as Caucasian, female, with an Associate Degree in Nursing, and about 15 years experience providing patient care in various clinical units with a career path delineating prior education and/or experience in nursing practice. No statistically significant findings of the anticipated independent variables of age, career path, degree, gender, and years of experience were found to predict the critical thinking skills application in nursing practice. However, several statistically significant supplemental findings were identified by re-examining

questions similar to the research questions but with the critical thinking dispositions as the dependent variables. Males were more inquisitive than females. This conclusion was evidenced by males scoring higher on the subscale of the CCTDI scale of open-mindedness. The male nurse had experiences working in a variety of units including the emergency room, trauma unit, and the critical care unit. To provide patient care in these units means to be open to the fullness of experience of the value of life and quality of death as perceived by the patient.

The open-mindedness scale (Facione, 1990a) targets the disposition of being open to and tolerant of the expression of divergent points of view with sensitivity to the possibility of one's own bias. The open-minded person respects the rights of others to hold differing opinions. This scale refines and focuses the Delphi characteristics of understanding on the opinion of others regarding divergent world views.

Another significant finding showed that older and more experienced nurses scored higher on the CCTDI subscales of maturity, open-mindedness and the overall critical thinking dispositions. This variable of age showed statistically significant correlations at the .05 level of confidence related to the CCTDI subscales of open-mindedness ($r=.31$); maturity ($r=.38$); and total ($r=.26$).

The frequency distribution of the overall California Critical Thinking Disposition Inventory scores showed 83.4% of the participants possessed a high strength indicator toward critical thinking. None of the participants showed a significant opposition toward critical thinking.

CHAPTER V

DISCUSSION

The nurse's ability to think critically is crucial to the provision of safe and effective patient care. Nurses in various care units are involved in making life and death decisions and must utilize critical thinking abilities while applying critical thinking skills for diagnosing human responses to actual or potential health problems. Integration of critical thinking and learning critical thinking skills application provides for high quality patient care, while promoting job enrichment, satisfaction, and competence in nursing practice. Studying the variables of age, career path, degree, gender, years of clinical nursing experience and personality as predictors for the application of critical thinking skills in nursing practice enhanced understanding of how nursing education, clinical competency, and experience interrelate in determining methods to add to the knowledge of nurses in nursing practice.

The researcher recommends the California Critical Thinking Disposition Inventory (CCTDI) as an assessment tool to assist nursing educators to build on the student's weaknesses toward critical thinking strengths during the second semester of nursing education. Students' scores on the disposition subscales and totals that indicate weaknesses in critical thinking would provide the nursing educator an opportunity to undertake systematic processes with the goal of achieving progressive critical thinking skills from one course to another.

The researcher's experience as a nursing educator proposes that continuous assessment for checking students' progress toward critical thinking be applied using the

following guidelines: (1) identify areas in which the student needs improvement; (2) give positive as well as negative feedback; (3) indicate respect for the student as an individual; (4) direct students' attention toward desirable practices and the criteria for effective writing for a particular assignment; (5) help students reduce errors without causing them to fear comments or the writing process; and (6) keep students informed of their progress.

This study should assist nurse educators in the development of curriculum that results in improved learning outcomes related to critical thinking. In addition, an organization can determine how to provide nurturing of the educational outcome by empowering critical thinking and recognize the nurses who enhance clinical judgments with the application of critical thinking skills. Furthermore, affective development is implied as significant for the culture of the institution to continue nurturing critical thinking in nursing practice. This includes development of personal characteristics such as maturity, open-mindedness, truth-seeking, and inquisitiveness.

To focus education on the development of critical thinking requires helping a student to engage in thinking that is reflective, reasonable, and focused on deciding what to do. Sprague (1981) views critical thinking as, "an internally organized skill that selects and guides the internal processes involved in defining and solving novel problems," (p.24). These definitions refer to the difference between knowing "that," and knowing "how." Learning factual information essentially is knowing "that," while learning intellectual skills is knowing "how."

Knowledge assumes understanding and is composed of patterns that make sense, insights, and the building of cognitive structures (Bloom, 1956). Knowledge requires reason, deliberation, interpretation, insights, reflection, dialogue, and meaning-making

and is generated by the self (Belenky, Clinchy, Golberger & Tarule, 1986). Through one's own efforts, one develops a conceptual system that is always growing, developing, expanding, and being revised. This conceptual system is used to process information.

There is consensus that a complete approach to developing students (nurses) into good critical thinkers must include the nurturing of the disposition toward critical thinking. Cultivating the dispositions is necessary before implanting the skills, but a developmental perspective would suggest that skills and dispositions are mutually reinforced and should be explicitly taught and modeled together (Facione, Sanchez, & Facione, 1995).

These skills cannot be taught in a discrete course on critical thinking. Critical thinking skills need to be acquired gradually, not in any course or in any one year. It is not reasonable to expect nursing students to graduate as competent, proficient, or expert nurses. These levels of critical thinking require years of clinical practice and continuing education. However, it is possible for the nurses to enter practice as novices or advanced beginners who are capable of progressing to higher levels of critical thinking if their academic preparation for clinical practice has given them an awareness of types of critical thinking they will be utilizing in practice (Benner, 1984).

Knowledge base is the foundation of critical thinking yet experience influences the results. If exposed to well-structured experiences, nurses demonstrate gains in the application of critical thinking skills. This study identified that experience working in various clinical units resulted in an average observed critical thinking application score greater than 4.2 on a Likert scale, which had the highest possible score as 5.

The researcher's observation was based on experience in actual nursing practice and as a nursing educator as well as perceptions, which attempted to express organized evaluation of critical thinking skills in nursing practice. Personal knowledge in nursing concerns the inner experience of the awareness of self. It is through knowing the self that one is able to know another human being as a person (Hagan, 1990). Full awareness of the self, the moment, and the content of interaction make possible the meaning of the shared human experience. The value of the research was equally shared for both the researcher and the participant as evidenced by their personality, behavior, and performance of skills during the direct observation portion of this study. However, this one-hour observation did not describe or provide insight of the multiple experiences of the nurses having worked in multiple units. The development of the knowledge to apply the critical thinking skills to assist in forming sound decision-making was centered on the one unit observation, which is not reflective of the experience gained over time. The demographics of the participants showed evidence that 11 nurses (18.3%) had experience working the maximum of six units; 4 nurses (6.7%) had experience working on five units; 10 nurses (16.7%) had experience working on three units; 20 nurses (33.3%) had experience working on two units; and 5 nurses (8.3%) had experience working on one unit.

Working in each unit implies that nurses bring progressive knowledge to higher levels of critical thinking to another clinical unit. The hospital advocates novice nurses being assigned to units which are generalized medical/surgical units prior to being assigned to specialized care units, such as the critical care unit. However, if the nurse is below average on the clinical competence on a higher level unit, he/she will be returned to the

generalized medical/surgical unit to continue progressive development of clinical competence and critical thinking skills application.

Nurses are challenged to develop clinical competence and critical thinking mastery that result in sound judgement impacting positive patient outcomes. Chickering (1976) wrote that students are presented with a series of developmental tasks which he called “vector” or “stages” which students must master in somewhat of a sequential order. Mental, emotional, and social development occurs as students are challenged by and mastering of these vectors. Regression to pass vectors and concentration on impending vectors also occur as students are challenged to new experiences. Also, the researcher Benner (1984) states the acquisition and development of a skill the nurse acquires must pass through five levels of proficiency: novice; advanced beginner; competent; proficient; and expert. These different levels reflect changes in three general aspects of skilled performance according to Benner (1984).

One is a movement from reliance on abstract principles to the use of past concrete experience as paradigms. The second is a change in the learner’s perception of the demand situation, in which the situation is seen less and less as a compilation of equally relevant bits, and more and more as a complete whole in which only certain parts are relevant. The third is a passage from *detached* observer to *involved* performer. The performer no longer stands outside the situation but is now engaged in the situation (p. 13).

Each nurse gains knowledge about nursing practice in such a way that every clinical experience becomes a lesson that influences the next clinical experience in nursing practice. The experience in various clinical units develops the ability of the nurse to

think critically about knowledge required for patient care and the knowledge that they bring to the specific nursing care situation. Paul (1994) encourages nursing instructors to prepare nurses to make astute clinical judgments, to make accurate and relevant observations, to draw inferences from those observations, and to determine appropriate nursing actions.

The participants in the current study were observed for one hour each on the clinical unit scheduled for their assigned shift. The observational data for the application of critical thinking skills in nursing practice did not show statistical significance. The researcher recognizes the need for a longer observation duration and direct observation on the various units where the nurse had previous experience.

The recommendations of the panel of experts as reported by Facione (1990a), presented several methods by which a person can be judged proficient in a given critical thinking skill:

1. Observe a person over time performing those activities, procedures, or processes generally regarded as presupposing that skill for proper implementation. A judgment is then made regarding the degree to which the person possesses the general skill in question.
2. Outcomes from implementing a given skill could be compared against some set of criteria.
3. Query persons who have exercised a particular skill regarding descriptions of the procedure and judgements they used.

4. Compare the outcomes that result from performing another task against some set of criteria, where the performance of that previous task has been shown to correlate strongly with exercising the skill of interest.

The researcher had a positive experience with the California Critical Thinking Disposition Inventory. This instrument assessed whether the nurses possessed the dispositions of a critical thinker. The results of this study found that any given CCTDI scale does not predict the application of the critical thinking skill in nursing practice. In spite of the fact that the correlation coefficients were not statistically significant for the prediction of the critical thinking skills application in nursing practice the relationships between the dispositions and the characteristics of age and experience presented a generalized profile of the sample possessing dispositions toward critical thinking. Hence, the hospital and the teaching institutions, which provided the educational preparation of the sample, seem to be nurturing the critical thinking skill application in nursing practice.

Because of the abstractness of the concept of the critical thinking skill in nursing practice, there is no clear equation to predict this application as it applies to the discipline of nursing. Recognizing the complexity of clinical reasoning ability needed to apply the critical thinking skills in nursing practice, the standardized measurements of the clinical skills did not provide comprehensive data pertaining to the proficiency of the critical thinking skills. Alpha reliability of the California Critical Thinking Disposition Inventory and the Critical Thinking Skill-Observation Tool has been judged to be appropriate and desirable for the measurement of the variables in the study. It is important to note given the highly individualized nature of the variables, that these variables are not easily operationalized and measured. (See Appendix G.) From a

measurement perspective, it is essential that critical thinking abilities be defined more clearly in order to facilitate their precise measurement.

Analysis of the *t*-test to determine whether there was a difference in the application of critical thinking skills for the independent variables of gender, degree, or path, revealed no statistically significant differences were obtained when comparing the independent samples. This outcome is supportive of the hospital's policy on equal employment opportunity. In order to provide equal employment and advancement opportunities to all individuals at this hospital, employment decisions are based on merit, qualifications, and abilities. The hospital does not discriminate in employment opportunities or practice on the basis of race, color, religion, sex, national origin, age, disability, or any other characteristic protected by law.

Limitations

There were several limitations inherent in the study.

First, since this was a convenience sample, it may have resulted in a selection bias and a sample not representative of nurses employed at other institutions. The convenience sample limits generalizability.

Second, some nurses were anxious taking the California Critical Thinking Disposition Inventory due to their self-imposed pressure to return to their patient care assignment. Some nurses admitted taking the test very seriously in the context of curriculum requirements, others were eager and enjoyed the opportunity to take the CCTDI.

Third, the one hour duration allotted for direct observation of the application of the critical thinking skills on one clinical unit limited the data for a comprehensive analysis of varied clinical experience of the nurse in nursing practice.

Conclusion

The application of critical thinking application skills in nursing practice is clinical knowledge gained over time. Expertise develops when the clinician tests and refines principal-based expectations in actual practice (Dreyfus, & Dreyfus 1985). There were statistically significant correlations between years of experience and the California Critical Thinking Disposition Inventory subscales of open-mindedness, maturity, and the overall critical thinking disposition. These subscales reflect the epistemic development of the sample acquiring the clinical knowledge over time.

Critical thinking skill application in nursing practice requires the interrelationships between cognitive constructs, critical thinking, dispositions and competence. The multidimensional construct of critical thinking skill application is influenced by numerous variables over time. The study should enhance understanding of the relationships between demographic characteristics and personality.

Recommendations for Further Study

The following recommendations are made grounded on the literature review, findings, and discussion presented in this study. Based on the link between definitions of critical thinking and the identified needs of the nursing profession, the researcher sought evidence for the prediction of the application of critical thinking skills of the nurse in nursing practice. Analysis of the data at the .05 level of confidence presented no statistical significance for the prediction of the critical thinking skills application in nursing practice. Supplemental findings did show relationships between the California Critical Thinking Disposition Inventory with age, gender and years of experience. In view of the findings, evidence on individual cognitive differences and the highly

individualized nature of the dispositions of the sample, further research is recommended to identify how nurses learn and use critical thinking in actual clinical situations. The research needs to be completed over time to collect and interpret the data to assess continuing competence. Brief measures at one point in time fail to capture the complexities involved when applying the application of critical thinking skills in nursing practice.

Implications for further research include replication of this study in multiple clinical settings and in various hospitals. Research examining the need for real world experiences during education preparation to show the relationship of clinical competence to critical thinking skills needs to be validated.

This researcher recommends changes in nursing education requiring a progression from the Associate Degree in Nursing program to a one-year internship as a novice nurse, followed by advanced educational preparation at the university level with a focus on specialty training. The graduate ADN nurse would be able to enhance clinical competence during the internship in actual nursing practice. After completing the internship the nurse should continue his/her education at the university setting with a goal of completing the Bachelor of Science Degree in Nursing. The university setting would provide the nurse additional study in morale, ethical, legal, and leadership roles as well as an opportunity to specialize in advanced nursing practice with the goal of becoming an expert nurse.

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APPENDIX A

Informed Consent to Participate in a Research Project

**COLORADO STATE UNIVERSITY
INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT**

TITLE OF PROJECT: Demographics and Disposition As Predictors of the Application of Critical Thinking Skills in Nursing Practice.

NAME OF PRINCIPAL INVESTIGATOR: Timothy G. Davies, Ph.D., School of Education, Colorado State University

NAME OF CO-INVESTIGATOR: Grace C. Rodriguez, R.N., M.S., C.N.S., Ph.D.C.

CONTACT NAME AND PHONE NUMBER FOR QUESTIONS/PROBLEMS:
Grace C. Rodriguez (719-547-4178)

SPONSOR OF PROJECT: NONE

PURPOSE OF THE RESEARCH:

The purpose of this study is to explore the variables of age, degree, disposition, gender, pathway, and years of experience in clinical nursing practice as predictors of the application critical thinking skills in nursing practice.

PROCEDURES/METHODS TO BE USED:

At the beginning of the study a consent form will be reviewed, signed, and dated by the participant and researcher. A signed copy will be given to each participant. The participant will be asked to take the inventory: California Critical Thinking Disposition Inventory (CCTDI). The CCTDI is a survey consisting of 75 statements based on 6-point Likert rating scales with response options ranging from "strongly agree" to "strongly disagree." Each statement expresses familiar beliefs, opinions, expectations, values, and perceptions. The survey is used to assess attitudes toward thinking logically. It will take 30 minutes to complete. In addition the participant will provide a brief demographic questionnaire requesting information of age, degree, gender, pathway, and years of nursing clinical experience. Also, the participant will agree to be observed for approximately one hour on his/her assigned work unit. The observation tool, Demographics and Disposition Observation of Critical Thinking Skills Application, is a means to record observations of the intertwining of thinking and doing in nursing practice. The participant's application of critical thinking skills application as identified by the nursing process will be observed. The nursing process assists with the means of identifying patient strengths, responses to health, or illness situations. During the observation of the nurse's critical thinking skills application, the utmost care will be taken to protect patient privacy; maintain confidentiality; and comply with existing laws, hospital standards, and policy/procedures and regulations.

Page 1 of 3

Subjects Initial _____ Date _____

RISKS INHERENT IN THE PROCEDURES:

There are no known risks. It is not possible to identify all potential risks in an experimental procedure, but the researchers (s) have taken reasonable safeguards to minimize any known and the potential, but unknown, risks.

BENEFITS:

This study has no known direct benefits to the participant. The results of the data will be shared with the hospital and nursing education to analyze this new knowledge and to assist the educator and employer with the ability to educate and provide nurses with appropriate nursing knowledge and skilled judgments for delivering patient care.

CONFIDENTIALITY:

Confidentiality of each participant will be protected. The participants will be known only by the Investigator and the Co-Investigator and all materials relating to the study will be kept in locked confidential files and accessible to the Investigator and Co-Investigator. Instead of using the participant's name on the data collected, I will assign a sequential number and enter that on all information related to you. Once all data have been collected and linked, the master list connecting your name and number will be destroyed, so no one will be able to tell whose responses are whose. It is possible that someone familiar with our hospital could deduce identities from the information I collect, but I will attempt to prevent this where possible by not including unnecessary specific details. Upon completion of the dissertation, the participant's original signed informed consent, the completed Critical Thinking Disposition Inventory, the Demographics and Disposition Observation of Critical Thinking skills Application observation tool, and the demographic questionnaire will be forwarded to the principal investigator for his permanent files. Reports generated from the research will not reveal the identity of any individual or the specific data from a given person.

LIABILITY:

The Colorado Government Immunity Act determines and may limit Colorado State University's legal responsibility if an injury happens because of this study. Claims against the University must be filed within 180 days of the injury. Questions concerning treatment of subjects' rights may be directed to Celia S. Walker, Regulatory Compliance, Colorado State University, 970-491-1563.

Page 2 of 3

Subject's Initials

Date:

PARTICIPATION:

Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled. The researcher has zero authority to hire, terminate, transfer, and/or request promotion or transfer to another unit. Therefore, the researcher can observe, process information without bias to a nurse's employment standing. Your signature also acknowledges that you have read the information stated and willingly signed this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing 3 pages.

Participant name (printed)

Participant signature

Date:

Investigator or co-Investigator

Date:

Page 3 of 3

Subject's Initials

APPENDIX B

The California Critical Thinking Disposition Inventory

Disclaimer:

Because this instrument is copyrighted, partial copies are provided as examples.



CCTDI

A Disposition Inventory

Dr. Peter A. Facione
Santa Clara University

Dr. Noreen C. Facione
University of California, San Francisco

Wait for the instruction to begin.

(c) 1992; Peter A. Facione, Noreen C. Facione, and The California Academic Press; Millbrae, California. All rights reserved.

(PAF47:FCJ-2:020694)

CCTDI

DIRECTIONS:

1. Carefully separate the last page (ANSWER SHEET) from this test booklet.
2. Put your name on the answer sheet and on the test booklet.
3. Indicate how much you agree or disagree with each numbered statement by filling in the appropriate place on the answer sheet. Read the two examples first.

EXAMPLE A: **The best things in life are free.**

EXAMPLE B: **I'm always doing more than my share of the work.**

The answer sheet shows the responses of someone who
STRONGLY DISAGREES with **EXAMPLE A**
and **LESS STRONGLY AGREES** with **EXAMPLE B**.

Begin with statement number 1 and continue through number 75. Mark your response on the answer sheet in the place with the corresponding number. If you erase a response, be sure the erasure is clean.

4. After you have responded to the 75 statements, fill in the information items printed at the bottom of page 5.
-

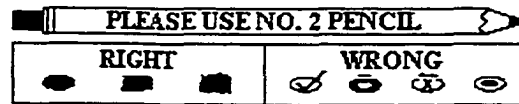
1. **Considering all the alternatives is a luxury I can't afford.**
2. **Studying new things all my life would be wonderful.**
3. **The best argument for an idea is how you feel about it at the moment.**
4. **My trouble is that I'm easily distracted.**
5. **It's never easy to decide between competing points of view.**
6. **It bothers me when people rely on weak arguments to defend good ideas.**

CCTDI

CAPSCORE Answer Sheet
The California Academic Press

Respond by filling bubble with a solid dark mark using a #2 soft lead pencil. These response forms are computer scored; make sure all your erasures are complete. **DO NOT USE A PEN!**

Name _____
Date _____



Identification Number									

Group	

- | | | | |
|---------------------------------|------------------------------------|---|---|
| Gender | College Students Only | Graduate Students Only | How do you identify yourself? |
| <input type="checkbox"/> Male | <input type="checkbox"/> Freshman | <input type="checkbox"/> Credential Student | <input type="checkbox"/> African American |
| <input type="checkbox"/> Female | <input type="checkbox"/> Sophomore | <input type="checkbox"/> Master's Student | <input type="checkbox"/> Anglo American, Caucasian |
| | <input type="checkbox"/> Junior | <input type="checkbox"/> Doctoral Student | <input type="checkbox"/> Asian American/Pacific Islander |
| | <input type="checkbox"/> Senior | | <input type="checkbox"/> Hispanic, Latino, Mexican American |
| | | | <input type="checkbox"/> Native American |
| | | | <input type="checkbox"/> Mixed/Other |

Agree Strongly

Disagree Strongly

Eg. A ○ ○ ○ ○ ○ ●

Eg. B ○ ● ○ ○ ○ ○ ○

1. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	26. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	51. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly
2. ○ ○ ○ ○ ○	27. ○ ○ ○ ○ ○	52. ○ ○ ○ ○ ○
3. ○ ○ ○ ○ ○	28. ○ ○ ○ ○ ○	53. ○ ○ ○ ○ ○
4. ○ ○ ○ ○ ○	29. ○ ○ ○ ○ ○	54. ○ ○ ○ ○ ○
5. ○ ○ ○ ○ ○	30. ○ ○ ○ ○ ○	55. ○ ○ ○ ○ ○
6. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	31. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	56. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly
7. ○ ○ ○ ○ ○	32. ○ ○ ○ ○ ○	57. ○ ○ ○ ○ ○
8. ○ ○ ○ ○ ○	33. ○ ○ ○ ○ ○	58. ○ ○ ○ ○ ○
9. ○ ○ ○ ○ ○	34. ○ ○ ○ ○ ○	59. ○ ○ ○ ○ ○
10. ○ ○ ○ ○ ○	35. ○ ○ ○ ○ ○	60. ○ ○ ○ ○ ○
11. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	36. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	61. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly
12. ○ ○ ○ ○ ○	37. ○ ○ ○ ○ ○	62. ○ ○ ○ ○ ○
13. ○ ○ ○ ○ ○	38. ○ ○ ○ ○ ○	63. ○ ○ ○ ○ ○
14. ○ ○ ○ ○ ○	39. ○ ○ ○ ○ ○	64. ○ ○ ○ ○ ○
15. ○ ○ ○ ○ ○	40. ○ ○ ○ ○ ○	65. ○ ○ ○ ○ ○
16. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	41. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	66. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly
17. ○ ○ ○ ○ ○	42. ○ ○ ○ ○ ○	67. ○ ○ ○ ○ ○
18. ○ ○ ○ ○ ○	43. ○ ○ ○ ○ ○	68. ○ ○ ○ ○ ○
19. ○ ○ ○ ○ ○	44. ○ ○ ○ ○ ○	69. ○ ○ ○ ○ ○
20. ○ ○ ○ ○ ○	45. ○ ○ ○ ○ ○	70. ○ ○ ○ ○ ○
21. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	46. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly	71. Agree Strongly ○ ○ ○ ○ ○ Disagree Strongly
22. ○ ○ ○ ○ ○	47. ○ ○ ○ ○ ○	72. ○ ○ ○ ○ ○
23. ○ ○ ○ ○ ○	48. ○ ○ ○ ○ ○	73. ○ ○ ○ ○ ○
24. ○ ○ ○ ○ ○	49. ○ ○ ○ ○ ○	74. ○ ○ ○ ○ ○
25. ○ ○ ○ ○ ○	50. ○ ○ ○ ○ ○	75. ○ ○ ○ ○ ○

APPENDIX C

Data Collection Tool

Observation of Critical Thinking Skill Application

Demographic and Personality Dissertation

Observation of Critical Thinking Skills Application

Data Collection Tool

TITLE OF PROGRAM: _____

Investigator: Grace Rodriguez, RN., MS., C.N.S. **LOCATION:** _____

DATE: _____ **CONTACT HOURS:** _____

Application of Critical Thinking Skill

Score: 5-Excellent 4-Good 3-Average
2-Poor, Yet Safe 1-Needs to be Developed

Clinical Skills

1	Completes total care for all assigned patients with Minimal direction	5	4	3	2	1
2	Thoroughly assesses and documents patient care in Accordance with policy/procedure and medical/legal Requirements	5	4	3	2	1
3	Demonstrates sound, safe, professional judgement through application of the nursing process	5	4	3	2	1
4	Identifies priorities of patient care needs and fulfills responsibilities on a priority basis	5	4	3	2	1
5	Functions appropriately in emergency situations	5	4	3	2	1
6	Demonstrates application of theory and /or scientific principles when performing or assisting with procedures and or/skilled technical tasks.	5	4	3	2	1

Comments:

APPENDIX D
Demographic Tool

Demographic Questionnaire

Age: (Years Old) _____

Degree: A.D.N or B.S.N. (Circle One)

Gender: Male Female (Circle One)

Pathway: Career Path: C.N.A./L.P.N. or directly to R.N. (Circle One)

State number of year's experience in each career path:

C.N.A./L.P.N.: _____

R.N.: _____

Years of Experience in Clinical Nursing Practice: Number of years in actual nursing practice: _____

Also, please document number of various clinical units worked with a brief description of the unit i.e. (1) Medical; (2) Surgical; (3) Trauma/Emergency Services; (4) Maternal Care (OB/GYN/Nursery); (5) Pediatrics; (6) Critical Care (ICU/NICU)

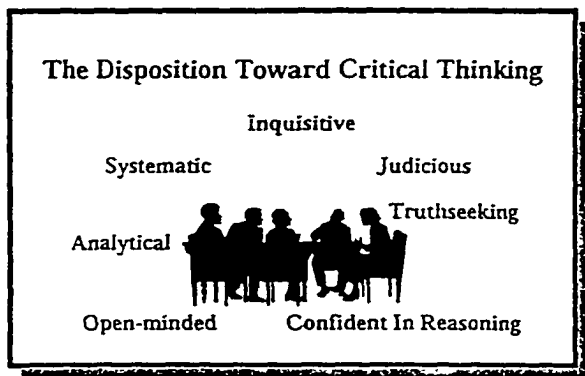
APPENDIX E

Interpretation of Critical Thinking Scores That Were Given to Participants

honest and objective about pursuing inquiry even if the findings do not support one's interests or one's preconceived opinions. The truth-seeker would rather pursue the truth than win the argument. This scale refines, focuses, and extends the Delphi characteristics "willingness to reconsider and revise one's views where honest reflection suggests that change is warranted," "reasonableness in selecting and applying criteria," and "flexibility in considering alternatives and opinions."⁶

The **Open-Mindedness** scale (the **O** - scale) targets the disposition of being open-minded and tolerant of divergent views with sensitivity to the possibility of one's own bias. The open-minded person respects the rights of others to hold differing opinions. This scale refines and focuses the Delphi characteristics of "understanding of the opinions of others," "open-mindedness regarding divergent world views." Open-mindedness differs from Truth-seeking in that the truth-seeking person is inclined to pursue knowledge with the purpose of learning what the best information and ideas might be, regardless of whether learning these things might require questioning, or perhaps abandoning, his or her current opinions or beliefs. Open-mindedness is concerned more with tolerance, in other words, with acknowledging the rights of others to hold their opinions. Open-mindedness in this sense is easy for the relativist who might consider such tolerance as general permission for people, including herself or himself, to hold whatever opinions they might wish. In other words, a

Scale Descriptions



The Seven CCTDI Scales

The **Truth-Seeking** scale (the **T** - scale) targets the disposition of being eager to seek the truth, courageous about asking questions, and

⁴(Dewey, 1933; Passmore, 1972; Scheffler, 1973; Paul, 1984; Ennis, 1985; Glaser, 1985; Meyers, 1986; Ennis, 1987; Kurfiss, 1988; Meleis, 1988; Siegel, 1988; Browne & Keeley, 1990; Paul, 1990; Carter-Wells, 1992; Chaffee, 1992; Oxman-Michelli, 1992; Gray, 1993; Jones, 1993; Mayfield, 1993; Wade and Tavris, 1993; Facione, et.al. 1994; Facione, et.al. 1995).

⁵New Directions in Higher Education (1996) E. Jones (Editor) Preparing Competent College Graduates pp 67-79.

⁶This list of characteristics, and those that appear with each of the other six sub-scales is derived from The Delphi Report, op. cit. See Table 5 of that document. Each Delphi characteristic is accounted for in the CCTDI. The characteristics listed in that Report are intended to be a collectively comprehensive description of the dispositions of the ideal critical thinker. However the Delphi list included items which were not intended to be taken as necessarily discreet. The integrity and internal consistency of the CCTDI sub-scales has the support of conceptual refinement aimed at discriminating and clarifying its seven factors. Alpha reliability and factor analytic statistical analysis of responses to the pilot CCTDI instrument further support the existence of seven common (but not necessarily discrete) factors. A review of the content of the questions which loaded under each permitted the association of the statistical findings with the conceptual analysis. In an important respect the CCTDI refines and extends the conceptualization of CT expressed in the Delphi Report.

person can be open-minded but not truth-seeking, or truth-seeking but not open-minded.

The **Analyticity** scale (the **A** - scale) targets the disposition of being alert to potentially problematic situations, anticipating possible results or consequences, and prizing the application of reason and the use of evidence even if the problem at hand turns out to be challenging or difficult. The analytically inclined person is alert to potential difficulties, either conceptual or behavioral, and consistently looks to anticipatory intervention, reason-giving and fact-finding as effective ways to resolve matters. This scale is closely related to the Delphi characteristics of "alertness to opportunities to use CT," "trust in the processes of reasoned inquiry," "clarity in stating the question or concern," and "persistence though difficulties are encountered."

The **Systematicity** scale (the **S** -scale) targets the disposition toward organized, orderly, focused, and diligent inquiry. No particular kind of organization, e.g. linear or non-linear, is given priority on the CCTDI. The systematic person strives to approach specific issues, questions or problems in an orderly, focused, and diligent way, however that might be accomplished. The systematicity scale is closely related to the Delphi characteristics of using "orderliness in working with complexity," "diligence in seeking relevant information," and "care in focusing attention on the concern at hand."⁷

⁷The CCTDI scales are intended to advance the analysis of the disposition toward CT. The Delphi lists of characteristics was meant to be complete, but it was not developed with the kind of conceptual distinctions in mind that would permit sharp delineations between each of its items, e.g. between "clarity in stating the question or concern," and "care in focusing attention on the concern at hand." However, factor analysis of responses to the CCTDI pilot administrations indicates that two distinct factors are at work, one has been named *analyticity*, and the other *systematicity*. The two are not the same. A person, or a computer, for example, might be able to conduct a systematic search for something by examining every object in a file, but not be able to be at all analytic about doing so. Thus the computer includes extra steps, looks at categories that it need not consider, and makes no attempt to analyze the intended activity to see if it can be done more efficiently. But then, computers are valued because they are so thorough and quick. A human can analyze a situation, anticipate problems, define what needs to happen to avoid or respond to those problems, and yet may fail to be systematic or well-organized about executing the steps that lead to a satisfactory solution.

The **CT Self-Confidence** (the **C** - scale) refers to the level of trust one places in one's own reasoning processes. CT self-confident persons trust themselves to make good judgments and believe that others trust them as well, since they believe others look to them to resolve problems, decide what to do, and bring reasonable closure to inquiry.⁸ The CT self-confidence scale starts with and extends the Delphi characteristic of "self-confidence in one's own ability to reason."

The **Inquisitiveness** scale (the **I** - scale) on the CCTDI measures one's of intellectual curiosity. The inquisitive person is one who values being well-informed, wants to know how things work, and values learning even if the immediate payoff is not directly evident. The inquisitiveness scale targets the Delphi characteristics of "inquisitiveness with regard to a wide range of issues," "concern to become and remain generally well-informed."

The **Maturity** scale (the **M** - scale) targets how disposed a person is to make reflective judgments. The maturity scale addresses *cognitive* maturity and *epistemic* development. CCTDI scoring gives preference to those disposed to approach problems, inquiry, and decision making with a sense that some problems are ill-structured, some situations admit of more than one plausible option, and many times judgments based on standards, contexts and evidence which preclude certainty must be made. The maturity scale refines and extends the Delphi findings. It includes and goes beyond the characteristics "fair-mindedness in appraising reasoning," "prudence in suspending, making or altering judgments," and "precision to the degree permitted by the subject and the circumstances."

⁸Whether a person's level of CT self-confidence is well-founded is another matter. Clear positive within group relationships of self-reported CT confidence with CT skills have been found. (Facione, "Technical Report #3, Gender, Ethnicity, Major, CT Self-Esteem and the CCTST," ERIC Doc. No. ED 326 584, The California Academic Press, 1990.) This indicates that persons with stronger CT skills are generally more confident in their reasoning ability than are those with weaker skills. It remains to be determined if the level of confidence displayed is higher or lower than warranted. CT self-confidence may also be a function of one's stage of cognitive development such that when firmly in a given state one might exhibit higher levels of CT self-confidence than when one is experiencing the kind of cognitive dissonance which would evoke a transition into a different stage of epistemic development.

APPENDIX F

Correlation Coefficient Matrix Showing Relationship of the California Critical Thinking Disposition Inventory

Correlation Coefficient Matrix Showing Relationship of the California Critical Thinking Disposition Inventory (N=60)

	TRUTH	OPENMIND	INQUIZ	SYSTEM	MATURE	CONFID	ANALYT	TOTAL
TRUTH	1.0000 (60) P= .	.3516 (60) P=.006	.2910 (60) P=.024	.4114 (60) P=.001	.4104 (60) P=.001	-.0035 (60) P=.979	.0746 (60) P=.571	.5665 (60) P=.000
OPENMIN	.3516 (60) P=.006	1.0000 (60) P=.	.3058 (60) P=.017	.3148 (60) P=.014	.3183 (60) P=.013	.2832 (60) P=.028	.2517 (60) P=.052	.6308 (60) P=.000
INQUIZ	.2910 (60) P=.024	.3058 (60) P=.017	1.0000 (60) P=.	.3683 (60) P=.004	.2849 (60) P=.027	.4931 (60) P=.000	.3215 (60) P=.012	.6765 (60) P=.000
SYSTEM	.4114 (60) P=.001	.3148 (60) P=.014	.3683 (60) P=.004	1.0000 (60) P=.	.3717 (60) P=.003	.2843 (60) P=.028	.3769 (60) P=.003	.7134 (60) P=.000
MATURE	.4104 (60) P=.001	.3183 (60) P=.013	.2849 (60) P=.027	.3717 (60) P=.003	1.0000 (60) P=.	.1178 (60) P=.370	.2730 (60) P=.035	.6402 (60) P=.000
CONFID	-.0035 (60) P=.979	.2832 (60) P=.028	.4931 (60) P=.000	.2843 (60) P=.028	.1178 (60) P=.370	1.0000 (60) P=.	.5019 (60) P=.000	.6004 (60) P=.000
ANALYT	.0746 (60) P=.571	.2517 (60) P=.052	.3215 (60) P=.012	.3769 (60) P=.003	.2730 (60) P=.035	.5019 (60) P=.000	1.0000 (60) P=.	.6200 (60) P=.000
TOTAL	.5665 (60) P=.000	.6308 (60) P=.000	.6765 (60) P=.000	.7134 (60) P=.000	.6402 (60) P=.000	.6004 (60) P=.000	.6200 (60) P=.000	1.0000 (60) P=.

(Coefficient / (Cases) / 2-tailed Significance)
 * . * is printed if a coefficient cannot be computed.

APPENDIX G

Pearson Product Moment Correlation Coefficient Matrix Showing Relationship of the California Critical Thinking Disposition Inventory and the Application of Critical Thinking Skills

Pearson Product Moment Correlation Coefficient Matrix Showing Relationship of the California
Critical Thinking Disposition Inventory and the Application of Critical Thinking Skills (N=60)

	CRIT	TRUTH	OPENMIND	INQUIZ	SYSTEM	MATURE	CONFID	ANALYT	TOTAL	AGE	YRSEXP
CRIT	1.0000 (60) P= .	-.0602 (60) P=.648	.1846 (60) P=.158	-.1188 (60) P=.366	.1119 (60) P=.395	-.0897 (60) P=.496	-.0816 (60) P=.535	-.0288 (60) P=.827	-.0171 (60) P=.827	.0761 (60) P=.563	.1954 (60) P=.135
TRUTH	-.0602 (60) P=.648	1.0000 (60) P=.	.3516 (60) P=.006	.2910 (60) P=.024	-.4114 (60) P=.001	.4104 (60) P=.001	-.0035 (60) P=.979	-.0746 (60) P=.571	.5665 (60) P=.000	.2044 (60) P=.117	.0809 (60) P=.539
OPENMIN	.1846 (60) P=.158	.3516 (60) P=.006	1.0000 (60) P=.	.3058 (60) P=.017	-.3148 (60) P=.014	.3183 (60) P=.013	-.2832 (60) P=.028	.2517 (60) P=.052	.6308 (60) P=.000	.3063 (60) P=.017	.3136 (60) P=.015
INQUIZ	-.1188 (60) P=.366	.2910 (60) P=.024	.3058 (60) P=.017	1.0000 (60) P=.	.3683 (60) P=.004	.2849 (60) P=.027	.4931 (60) P=.000	.3215 (60) P=.012	.6765 (60) P=.000	.0434 (60) P=.742	.0548 (60) P=.678
SYSTEM	.1119 (60) P=.395	-.4114 (60) P=.001	-.3148 (60) P=.014	.3683 (60) P=.004	1.0000 (60) P=.	.3717 (60) P=.003	-.2843 (60) P=.028	-.3769 (60) P=.003	.7134 (60) P=.000	.1828 (60) P=.162	.2112 (60) P=.105
MATURE	-.0897 (60) P=.496	.4104 (60) P=.001	.3183 (60) P=.013	.2849 (60) P=.027	.3717 (60) P=.003	1.0000 (60) P=.	.1178 (60) P=.370	-.2730 (60) P=.035	.6402 (60) P=.000	.3832 (60) P=.003	.3225 (60) P=.012
CONFID	-.0816 (60) P=.535	-.0035 (60) P=.979	-.2832 (60) P=.028	.4931 (60) P=.000	-.2843 (60) P=.028	.1178 (60) P=.370	1.0000 (60) P=.	.5019 (60) P=.000	.6004 (60) P=.000	-.0105 (60) P=.937	.0533 (60) P=.686
ANALYT	-.0288 (60) P=.827	.0746 (60) P=.571	.2517 (60) P=.052	.3215 (60) P=.012	-.3769 (60) P=.003	.2730 (60) P=.035	.5019 (60) P=.000	1.0000 (60) P=.	.6200 (60) P=.000	.0113 (60) P=.932	.0946 (60) P=.472
TOTAL	-.0171 (60) P=.897	.5665 (60) P=.000	.6308 (60) P=.000	.6765 (60) P=.000	.7134 (60) P=.000	.6402 (60) P=.000	.6004 (60) P=.000	.6200 (60) P=.000	1.0000 (60) P=.	.2598 (60) P=.045	.2614 (60) P=.044
AGE	.0761 (60) P=.563	.2044 (60) P=.117	.3063 (60) P=.017	.0434 (60) P=.742	.1828 (60) P=.162	.3832 (60) P=.003	-.0105 (60) P=.937	.0113 (60) P=.932	.2598 (60) P=.045	1.0000 (60) P=.	.7324 (60) P=.000
YRSEXP	.1954 (60) P=.135	.0809 (60) P=.539	.3136 (60) P=.015	.0548 (60) P=.678	.2112 (60) P=.105	.3225 (60) P=.012	.0533 (60) P=.686	.0946 (60) P=.472	.2614 (60) P=.044	.7324 (60) P=.000	1.0000 (60) P=.

(Coefficient / (Cases) / 2-tailed Significance)

* . * is printed if a coefficient cannot be computed.