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Critical Thinking Attributes of Undergraduate Nursing Faculty

Julie A. Coon
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CRITICAL THINKING ATTRIBUTES OF UNDERGRADUATE NURSING FACULTY

by

Julie A. Coon

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Education
Department of Educational Leadership

Western Michigan University
Kalamazoo, Michigan
December 1997
The purpose of this study was to examine the critical thinking skills of undergraduate nursing faculty to determine how these skills compared with the established critical thinking skill norms for undergraduate nursing students and if the critical thinking skills of nursing faculty were related to the type of program they teach in, their years of experience in nursing education, their level of formal education, their preferred methods of instruction, and their level of formal training in critical thinking. Nursing faculty from 17 Associate Degree Nursing (ADN) programs and 11 Bachelor of Science in Nursing (BSN) programs in the State of Michigan volunteered to participate as subjects in the study.

The California Critical Thinking Skills Test (CCTST) (P. A. Facione, 1994) was administered to the 120 undergraduate nursing faculty participating in the study. The CCTST composite scores as well as the analysis, evaluation, and inference subscores were compared to national norms for student nurses (N. C. Facione, 1995). The findings of the study demonstrated that nursing faculty scored consistently higher than nursing students in all areas. In addition, when ADN faculty ($n = 70$) scores were compared to BSN faculty ($n = 50$) scores, BSN faculty demonstrated higher critical thinking skills than ADN faculty in the cognitive areas of analysis and evaluation.
The remaining findings of the study did not support the relationship between critical thinking skills as measured by the CCTST and the variables of years of experience in nursing education, educational level, preferred teaching method, or level of formal training in critical thinking among faculty who participated in the study.

The study was intended to examine critical thinking within the role of the instructor, who serves as an intervening variable in the development of critical thinking in nursing students. The study demonstrated that nursing faculty have critical thinking ability that exceeds that of their students, thus lending encouragement to the modeling of these skills in the didactic and clinical areas. The study also raises ongoing questions in regard to how the acquisition of critical thinking skills actually occurs.
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To my mother, Reba Mitchell Reynolds

She was my first and most influential nursing role model. With her unconditional love and support, she helped me to always believe in myself and my ability to achieve any personal or professional goal. Throughout her life, she has never tired of discovering new ideas or trying new experiences. In the true spirit of critical thinking, she was the first to communicate to me that the unexamined life is not worth living.
I wish to express appreciation and gratitude to those who have accompanied me on this scholarly expedition culminating with my doctoral dissertation. This is not a solitary journey and without the support of family, friends, colleagues, and Western Michigan University faculty, the final goal would not have been reached.

First, to the WMU community. A very special thank you to my advisor and committee chair, Dr. Uldis Smidchens. He is a gifted educator who exemplifies critical thinking through his gentle guidance that required me to consistently maintain accountability for my scholarly work. Furthermore, his personal commitment to uphold the highest standards of the research process while actively facilitating my progress stands as a testimony to the Educational Leadership Department at WMU.

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Thanks go out to my wonderful family, without whose support and understanding this journey would never have been possible. For my husband, Rick, I appreciate his patience with my voracious desire for higher education. I know that he
Acknowledgments—Continued

shares my hope that my experience will serve as a model for our own children, Dan and Kate, as they embark upon their own educational expeditions. I would also like to acknowledge the Ferris Nursing Department faculty and staff, who were always my most enthusiastic cheering section. Finally, it is with the deepest gratitude that I acknowledge my dear friend, Mary Cairy. She is the only one who can truly understand the trials and tribulations I have encountered because we weathered them together, every step of the way. Without Mary and the “buddy system” we came to rely upon, I would never have reached this final summit.

Julie A. Coon
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CHAPTER I

INTRODUCTION

The purpose of this study was to examine the critical thinking skills of undergraduate nursing faculty to determine how these skills compared with the established critical thinking skill norms for undergraduate nursing students and if the critical thinking skills of nursing faculty were related to the type of program they teach in, their level of educational preparation, their level of experience as a nurse educator, their preferred methods of instruction, and their level of formal training in critical thinking. This study was intended to examine critical thinking within the context of the role of the nursing instructor, who serves as an intervening variable in the development of critical thinking in nursing students. There is minimal empirical data available to support the assumption that nursing educators have critical thinking skills which are superior to those of their students and consequently that they influence the critical thinking skill development of their students.

Statement of the Problem

It has been recognized for many years that one of the primary aims of education, especially at the college level, is to foster students' ability to think critically, to reason, and to use judgment effectively in decision making. Richard Paul (1992a), who is considered to be one of the foremost experts on critical thinking, articulates this position:
Critical thinking has long been recognized by well-educated people to be a powerful tool for learning, ever since it was fruitfully developed into an art by Socrates of ancient Greece. The student who asks probing questions, who seeks to figure out the logic of things, who examines assumptions, analyzes concepts, scrutinizes evidence, tests implications and consequences has always had an enormous advantage over the learner who memorizes bits and pieces of information as if they were so many BBs in a bag. (p. 3)

Brookfield (1987) supports Paul's assertion that critical thinking is a way of life:

Critical thinking can be recognized in the contexts of our personal relationships, work activities, and political involvements. This activity entails much more than the skills of logical analysis taught in so many college courses on critical thinking. It involves calling into question the assumptions underlying our customary, habitual ways of thinking and acting and then being ready to think and act differently on the basis of this critical questioning. . . . Being a critical thinker is part of what it means to be a developing person, and fostering critical thinking is critical to creating and maintaining a healthy democracy. (p. 1)

This perspective suggests that conclusive evidence exists that critical thinking skills can be learned and are transferable (Brigham, 1993; Brookfield, 1987; Chaffee, 1990; Heaslip, 1994; Norris, 1985; Paul, 1992a, 1992b).

The relationship between critical thinking and higher education might seem a bit obvious, and indeed, most would agree that “being in favor of critical thinking in our schools is a bit like favoring freedom . . . it meets with general approval from the outset” (McPeck, 1981, p. 1). As Hawkins (1992) so aptly states:

There are few who would argue the value of thinking skills to our students and their intrinsic importance to student development. Yet, we do not go so far as to become outright teachers of this specific thinking skill, but rather just champions of the quality student that critical thinking produces. (p. 38)

The domain of nursing education is equally enthusiastic about critical thinking. In nursing, critical thinking has been equated to clinical practice judgment. Making sound clinical nursing judgments is central to the practice of nursing, and critical thinking skills are considered to be essential to making clinical judgments. In addition, the accrediting body for nursing education, the National League for Nursing
(NLN), requires documentation of student critical thinking skill level as an outcome for the purpose of program evaluation. For the baccalaureate programs the criteria is stated as “This outcome [critical thinking] reflects students’ skills in reasoning, analysis, research or decision making relevant to the discipline of nursing” (NLN, 1991, p. 26). For the associate degree nursing programs the criteria is stated as “The practice of a graduate from an associate degree nursing program is characterized by critical thinking” (NLN, 1990, p. 3). Graduates of both types of programs are eligible to write the same national licensure exam, the National Council Licensure Examination for Registered Nurses (NCLEX-RN). The NCLEX-RN is designed to measure clinical judgment as a requisite for licensed nursing practice.

In the 1995 position statement of Nursing Education’s Agenda for the 21st Century (American Association of Colleges of Nursing, 1995) there is a call for nursing faculty to reaffirm the need for pedagogical research in the learning environment. It is also noted that:

Nursing education is occurring within the context of rapidly changing technologies and dramatically expanding knowledge. Students must learn to acquire, apply, and evaluate new knowledge. Therefore, curricular processes and outcomes should be emphasized as well as curricular content in preparing nurses for meaningful roles in future health care systems. Curricular processes involve the teaching-learning interchange and include such important aspects as role modeling, collaborative problem-solving and professional socialization. These processes are of critical importance in the student’s development of the following essential cognitive and interpersonal abilities: critical thinking, ethical decision-making, information seeking, sorting and selection . . . (American Association of Colleges of Nursing, 1995, p. 6)

These perspectives serve as powerful catalysts for nurse educators to seek ways to impact their own critical thinking ability and that of their students. As a result, nursing educators have focused considerable attention on the study of teaching critical thinking in an attempt to identify methods which will result in the desired outcome: increased critical thinking ability in nursing graduates.
One variable that would seem to be directly linked to the critical thinking phenomenon in education is the instructor. If the faculty member does not possess at least a minimal level of critical thinking ability or even philosophically embrace the idea of critical thinking, it would seem less probable that critical thinking would be learned by students. If critical thinking is not practiced and taught by faculty, it may explain why many studies have demonstrated that critical thinking is not consistently enhanced in students during the educational experience (Hickman, 1993; Kintgen-Andrews, 1991). The investigation of critical thinking ability among nursing faculty was the focus of this study. The following questions were explored:

1. Is there a difference between the critical thinking ability of undergraduate nursing faculty and the critical thinking ability of the average undergraduate nursing student?

2. Is there a difference in critical thinking ability among nursing faculty in Associate Degree Nursing (ADN) and Bachelor of Science Nursing (BSN) programs?

3. Is there a relationship between the critical thinking ability of nursing faculty and the number of years of experience as a nurse educator?

4. Is there a relationship between the critical thinking ability of nursing faculty and their level of formal education?

5. Is there a relationship between the critical thinking ability of nursing faculty and their preferred methods of instruction?

6. Is there a relationship between the critical thinking ability of nursing faculty and their level of formal training in critical thinking?
Significance of the Study

"For we who nurse, our nursing is a thing which, unless in it we are making progress every year, every month, every week, take my word for it we are going back" (Florence Nightingale, cited in Abel-Smith, 1960). This prophetic statement by the founder of modern nursing reflects the challenges which the discipline of nursing has historically addressed to maintain the viability of the profession. Changes in nursing practice have been paralleled by changes in the arena of nursing education. Nursing education expert Carol Lindeman ("Emerging Environment," 1995) observed that for the last two decades, nursing education has emphasized researched-based knowledge as the key to excellence. In the past, relying on a needs-based model of nursing practice, classrooms became gathering places for students to acquire correct content. Critical thinking requires knowledge, but is more than the acquisition and regurgitation of known facts, concepts and theories. It involves the ability to analyze arguments, construct meaning, use knowledge as a context, and critically reflect on one's thoughts and actions. It is the ability to use knowledge in situations of ambiguity and risk.

The realization among nursing educators that the goal of teaching a finite body of knowledge is no longer possible nor desirable for the preparation of nurses who must function in a rapidly changing and increasingly complex health care environment has led to a paradigm shift away from the some of the traditional methods which promote passive learning among students. Overwhelmingly, educators are encouraged to make critical thinking a primary goal in all instruction. In this vein, the discipline of nursing within higher education has actively embraced the critical thinking movement as reflected in the ongoing dialogue concerning
construct definition, attempts at instructional methodologies which may promote better critical thinking skills, and the newly emerging question of assessment methods and evaluation of critical thinking as an educational outcome.

When examining the critical thinking literature, in both nursing and higher education in general, it became evident that in both fields, the research has been disproportionately focused on general assessment of critical thinking, as opposed to the evaluation of interventions directed to promote critical thinking. Most attention to the areas of intervention were discussed in a conceptual manner, with little or no empirical evidence to support the effectiveness or goal attainment of critical thinking as an outcome. This focus on descriptive rather than experimental research results in limited practical application of the findings in most cases.

Another interesting finding was that the nursing literature reflects significantly more actual research in the area of critical thinking than does higher education in general. Unfortunately, most of that research has been operationalized in the areas of construct definition as it relates to the context of nursing practice, and descriptive assessment from a very general perspective. As Videbeck (1997b) observed, this practice can perhaps be explained by the National League for Nursing accreditation criterion which provides much flexibility for individual programs to uniquely define and measure critical thinking as an outcome. There is no requirement from the NLN to demonstrate how the critical thinking outcomes are attained. This has resulted in the absence of a consensus among nursing educators in terms of how critical thinking is conceptualized, developed or measured.

The studies in nursing education presented both longitudinal and cross-sectional data which has provided mixed findings regarding the impact of nursing education on critical thinking. In two comprehensive reviews of critical thinking
research in nursing, Hickman (1993) and Kintgen-Andrews (1991) both conclude that there is not a strong research base supporting a relationship between nursing curricula and critical thinking. The focus on baccalaureate nursing education has suggested that nurse educators may perceive the acquisition of critical thinking ability to be developmentally determined.

The intervention focus for critical thinking research has been almost nonexistent for both nursing and higher education in general. Although many authors espouse teaching methodologies, tactics or even complex models (Cholowski & Chan, 1995; Dexter et al., 1997; Elliott, 1996; Facione & Facione, 1996; Kataoka-Yahiro & Saylor, 1994; Mackie & Grahm, 1996; Malek, 1986; Martin, 1996; Videbeck, 1997a) that are intended to promote critical thinking in students, there have been very few studies that have actually measured critical thinking after experimental intervention. Instead, individual methods or approaches are endorsed based upon an intuitive sense that it makes a difference, rather than upon empirical data. These studies and educational essays lead to the question of what variables really facilitate the acquisition of critical thinking skills in nursing students.

The nursing educator or faculty member would seem to be the most integral variable to impact upon the student nurse's educational experience. The nurse educator has contact with nursing students in both the classroom and clinical settings, providing multiple opportunities for the stimulation of critical thinking. This person is perhaps the most influential component of the nursing education experience, yet the least studied in regard to critical thinking skills.

It would seem that within the nursing education community it may be assumed that nursing faculty are consistently superior critical thinkers and that their expertise will result in teaching methodologies that are collaborative and student
focused. Such methods are assumed to be the most effective in fostering critical
tinking ability in students. These assumptions have never been questioned or tested
to determine their validity. A study to determine if these assumptions are valid would
provide the nursing education community with valuable data related to the issue of
faculty development. If it was determined that nursing faculty do not have critical
thinking skills which exceed those of most undergraduate students, the implications
are very serious because the critical thinking literature consistently conveys the
message that students must have critical thinking role models if critical thinking skill
is to be cultivated.

Operational Definition of Critical Thinking

The plethora of literature on critical thinking indicates that the interest in
critical thinking as an educational goal crosses several disciplinary lines in higher
education. Considerable attention has been given to a philosophical discussion of
what critical thinking actually is. Several critical thinking experts have offered a
variety of critical thinking definitions—Watson and Glaser (1980), Ennis (1985,
LeFevre (1995)—but none has been generally accepted. However, a landmark
development occurred with the Delphi Report by the American Philosophical
Association (APA). This panel of North American critical thinking experts
participated in research that lasted two years and resulted in a consensus regarding a
definition of critical thinking: “Critical thinking is the process of purposeful, self-
regulatory judgment. This process gives reasoned consideration to evidence,
contexts, conceptualizations, methods and criteria” (P. A. Facione, 1991).
This consensus definition provides an excellent framework for further study in the realm of critical thinking, finally allowing researchers to leave the issue of concept definition behind to engage in the assessment of critical thinking skill and active interventions which can be demonstrated to improve critical thinking ability. For this reason, the Delphi consensus definition served as the operational definition of critical thinking for this study.

This development is particularly significant to the nursing profession because it is suggested by Facione, Facione, and Sanchez (1994) that the Delphi description of the attributes of a critical thinker, upon scrutiny, also describes the attributes of a nurse with ideal clinical judgment:

The ideal critical thinker is habitually inquisitive, well informed, trustful of reason, open-minded, flexible, fairminded 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 the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and circumstances permit. (p. 345)

Consistent with the APA Delphi definition, a new assessment instrument has emerged with great promise for critical thinking research. This assessment instrument is the California Critical Thinking Skills Test (CCTST) (P. A. Facione, 1994). The CCTST is the first instrument to derive construct validity from the Delphi project definition of critical thinking (P. A. Facione, 1991) which provides an excellent opportunity to more effectively assess critical thinking within the context of nursing. Previous critical thinking instruments have been called into question in terms of their appropriateness for the discipline of nursing (Hickman, 1993; Kintgen-Andrews, 1991). For the purpose of this study the APA Delphi definition was utilized, along with the CCTST, to measure critical thinking skills in nursing faculty.
Summary

This chapter has provided an introduction to the proposed study through a statement of the critical thinking problem in nursing education which identified the research questions to be explored. The significance of the study was also discussed, specifically from the perspectives of the current status of critical thinking assessment in nursing education and critical thinking from a nursing faculty perspective. The Delphi consensus definition of critical thinking was identified as the operational definition of critical thinking for this study. The following chapter will explore the empirical and conceptual support for the study. The remaining chapters will describe the methodology, the results and the discussion of the findings of the study.
CHAPTER II

EMPIRICAL AND CONCEPTUAL SUPPORT FOR THE STUDY

The purpose of this study was to examine the critical thinking skills of undergraduate nursing faculty to determine how these skills compared with the established critical thinking skill norms for undergraduate nursing students and if the critical thinking skills of nursing faculty were related to the type of program they teach in, their years of experience as a nurse educator, their level of formal educational preparation, their preferred methods of instruction and their level of formal training in critical thinking.

The professional literature related to critical thinking was reviewed in the general arena of higher education and more specifically in the field of nursing education. The majority of the published literature on critical thinking in higher education was conceptual in nature. The published nursing literature revealed proportionately more empirical research related to critical thinking than was evident in the educational literature at all levels. However, the most prolific source of empirical research for both fields was dissertation abstracts, most of which were not published in educational journals. It was also noted that there are minimal studies which have focused on the faculty member as an intervening variable in the acquisition of critical thinking skills in students. These findings raise some concerns specific to the question of how the higher education community can expect to make a significant impact in the area of critical thinking among college students, both inside and outside the discipline of nursing.
Each of the preliminary research questions identified in Chapter I was explored to determine the extent of empirical support for this study. The specific areas examined include (a) studies of the general impact of the undergraduate college experience on critical thinking ability, (b) studies of the critical thinking ability in nursing students, (c) studies of faculty variables as related to critical thinking, (d) studies of teaching methods which are intended to promote critical thinking, and (e) general assessment issues in critical thinking.

The Undergraduate Experience and Critical Thinking

The notion that the college educational experience results in a positive impact upon critical thinking has been an underlying assumption of most educators. This assumption is supported by the fact that the higher education literature is replete with philosophical tenets about critical thinking. These essays debate such issues as the best strategies to impact upon student’s critical thinking (Beckett, 1997; Chaffee, 1992; Kaplan, 1991; Kloss, 1994; Paul, 1992a, 1992b, 1994, 1995; Rykiel, 1996; Sirotnik, 1983; Sternberg, 1985; Thayer-Bacon, 1993), how best to assess critical thinking (Ennis, 1989; Norris & Ennis, 1989), how to help teachers develop their own critical thinking ability (Fogarty & McTighe, 1993; Hart, 1990; Kurfiss, 1988), and whether the critical thinking movement is really the answer to the educational woes of the nation (Frisby, 1991; Walters, 1986). However, actual empirical research in terms of how the college experience actually impacts upon critical thinking is sparse.

The critical thinking research synthesis by Norris (1985) and the review by McMillan (1987) were key resources in the effort to draw conclusions about the impact of the college experience on critical thinking. Norris (1985) concludes that
critical thinking ability is not widespread among high school and college students and that critical thinking is extremely sensitive to context. Brown and Keeley (1988) support this perspective in regard to college students as well. McMillan (1987), on the other hand, found some limited support to conclude that college attendance improves critical thinking, as did Steward and Al-Abdulla (1989).

Educators have historically raised questions about what variables can be identified to predict academic success in students. A great deal of the research reflects this quest in the area of critical thinking. Critical thinking skills were studied in relationship to a variety of cognitive and noncognitive skills, with many contradictory and inconclusive results. Although some positive relationships were noted between critical thinking skill scores as measured by various critical thinking skill instruments and variables such as grade point average (Daiek, 1993), cognitive development (Peterson, 1995) and moral reasoning (Anderson, 1995; Hill 1995; Rykiel, 1996), there were also many inconclusive results in similar studies (Cabrera, 1994; Green, 1993). Haggerty (1989) found that cognitive processes vary as a function of academic major in a study of women enrolled in more traditional majors such as nursing and education as compared to women who enrolled in the more nontraditional business major.

Considering the number of decades that the issue of critical thinking has been discussed, dating back to Dewey (1933), empirical evidence to support educational approaches to critical thinking in higher education outside of nursing is meager. Norris (1985) and McMillan (1987) are the most recent resources which represent comprehensive reviews of critical thinking research in higher education. The last decade reflects a glaring absence of empirical research in critical thinking from a general higher education perspective, with the exception of a recent study by Paul,
Elder, and Bartell (1997) which specifically explored the preparation for instruction in critical thinking of California teachers. This study raised some serious concerns regarding the effectiveness of teaching for critical thinking at all levels, to include primary, secondary and post-secondary educational settings. This study is reflective of the educational mandates regarding critical thinking in the state of California.

According to P. A. Facione (1991), a critical thinking course is now a college requirement of every curriculum in the states of New Jersey and California. Even in view of these limited advancements in the promotion of critical thinking it is still difficult to draw conclusions when studies are so few in number and often yield contradictory or inconclusive results. In spite of these observations, there is evidence, although guarded, to suggest that critical thinking can be taught, nurtured and evaluated (Beckett, 1997; McMillan, 1987; Norris, 1985; Paul, 1995; Rykiel, 1996). If the higher education community endorses the critical thinking cause as a vital link to the success of the college experience, much more research is certainly warranted, especially in view of the changing educational demographics, methods of instruction, and critical thinking instruments which have evolved over the last decade.

Studies on the Critical Thinking Ability of Nursing Students

The concept of critical thinking is not a new and innovative trend in nursing education. The sheer volume of the published and unpublished research on critical thinking in nursing attests to this conclusion. The clinical practice arena is demanding nurses who can use critical thinking skills to make sound clinical judgments (Heaslip, 1994; Miller, 1989; Schank, 1990; Snyder, 1993). Nursing education has attempted to respond to this demand through various curricular approaches designed to enhance critical thinking ability in nursing students. Heaslip (1994) notes:
Clearly, it is evident to nurse educators that curricula reform must include infusing critical thinking in the classroom and practice settings to ensure quality client care. Excellence in nursing requires an ability to reason through complex clinical problems, often under stressful conditions, from a variety of competing perspectives. Few occupations involve such life threatening results as when critical thinking is not present in the nurse’s practice decisions. (p. 32)

In spite of these concerted efforts, nursing education is falling short of the desired goal to produce graduates who demonstrate excellence in critical thinking (Pitts, 1985). This perspective regarding the divergence between desired and actual educational outcomes in nursing, can perhaps be explained by examining the traditional perceptions about nursing education. Burnard (1988) and Alexander (1993) both reflect upon the dichotomy between perceptions about education and training as it relates to the acquisition of the nursing role. Nursing has historically been conceptualized as a vocational training process (i.e., “nurses’ training”) as opposed to the professional educational experience for which contemporary nurse educators strive. Burnard (1988) observes that

education suggests an evolving critical process which enables the learner to make decisions for herself through the exercise of rational thought. Training, on the other hand, suggests rote learning and the blind absorption of other people’s thoughts, beliefs, and skills. (p. 271)

Training in this sense is restrictive, whereas education is liberating. Glaser (1962) concurs that training is concerned with minimizing individual differences, whereas education is concerned with maximizing individual differences. This dichotomy regarding the perceptions about nursing education may help explain the many inconsistencies which are evident in the extensive research on critical thinking in nursing students. Training has often predominated the preparation of nurses, from both the faculty and student perspective. Faculty have perpetuated this practice in the area of psychomotor skill performance, which is perceived to require predictability,
uniformity and precision. Students have also reinforced this behavior. Comments such as “just tell me what to do, just tell me the right way” is a plea educators have all heard from students (Alexander, 1993). Research will help nursing faculty to move away from these perspectives and will guide the promotion of a critical thinking spirit among students.

Most of the nursing education critical thinking research, which spans from 1979 to the present, has focused on descriptive longitudinal and cross-sectional studies of nursing students. Until very recently there was minimal attention afforded to critical thinking intervention strategies or experimental research with nursing students. In the same vein an increase in qualitative research has been noted as well. Another noted trend in the literature is the increased focus on the study of associate degree nursing programs in relation to critical thinking. Historically, the primary focus had been on baccalaureate and higher nursing education. The following synopsis of nursing education research on critical thinking serves to illustrate the many perplexities which exist in this domain.

Several longitudinal studies have examined the impact of the nursing education experience on critical thinking with pre-post testing at entry and exit points. The studies which supported the premise that the nursing education experience would result in increased critical thinking ability in baccalaureate nursing students were conducted by M. A. Miller (1987, 1992), Berger (1984), and Kokinda (1989). Similar studies which did not substantiate this premise included those by Sullivan (1987), Bauwens and Gerhard (1987), Saucier (1995), Patterson (1994), and Brigham (1989). Only Toth (1997) examined critical thinking skills to assess instructional strategies with associate degree nursing students.
Cross-sectional studies were also frequently cited. These studies were primarily based on the premise that critical thinking is developmental and therefore students in baccalaureate or higher nursing programs would demonstrate critical thinking skills which were superior to those of students in associate degree nursing programs (Brooks & Shepherd, 1990, 1992; del Bueno, 1990; Dungan, 1985; N. C. Facione, 1995; Gross, Takazawa, & Rose, 1987; Itano, 1989; Jones, 1984; Kintgen-Andrews, 1988; Lynch, 1988; Murphy, 1990; Notarianni, 1991; Pardue, 1987; Poole, 1989; Saint Clair, 1994; Sedlak, 1997). Similarly, some studies examined a cross section of students within a baccalaureate or associate degree program at different levels, on the assumption that differences in critical thinking would be evident (Bingaman, 1993; Bower, 1995; Brigham, 1989; Gross et al., 1987; Kokinda, 1989; Notarianni, 1991; Pepa, Brown, & Alverson, 1997). The studies which demonstrated differences in critical thinking skills among different levels of students were conducted by Kokinda (1989), Bingaman (1993), Pardue (1987), Brooks and Shepherd (1990, 1992), del Bueno (1990), Itano (1989), Lynch (1988), Murphy (1990), and Pepa et al. (1997). These studies, with results supportive of the positive impact of nursing education on critical thinking, are essentially equal in number to those studies which failed to support this perspective (Bower, 1995; Brigham, 1989; Dungan, 1985; Gross et al., 1987; Jones, 1984; Notarianni, 1991; Poole, 1989; Saint Clair, 1994).

A large number of studies which examined potential relationships between critical thinking skill level and a variety of academic, cognitive and demographic variables reflected divergent findings as did the longitudinal and cross-sectional studies. These studies reflect the difficulty that nursing and the rest of the higher education community have encountered in regard to operationalizing critical thinking.
Although most of the research reveals that critical thinking is an educational ideal, widespread disparity still exists in terms of construct definition, teaching methods that most effectively promote critical thinking and assessment approaches (Kintgen-Andrews, 1991; McMillan, 1987; Norris, 1985; Paul et al., 1997; Videbeck, 1995). The attempt to link critical thinking as a construct with variables that are easier to measure, such as grade point average (GPA), ACT or SAT scores, performance on the National Council Licensure Examination-Registered Nurse (NCLEX-RN), age and years of education has proven to be a rather simplistic approach to the critical thinking dilemma, again, with inconclusive results.

A few studies did find a relationship between critical thinking and GPA (N. C. Facione, 1995; Ircink, 1989; Kokinda, 1989; Kuykendall, 1995; Miller, 1992; Tiessen, 1983). Conversely, Berger (1984), Miller (1987), and Gross et al. (1987) found no relationship between critical thinking and GPA. There were no conclusive studies which demonstrated a relationship between ACT or SAT scores and critical thinking skill. Three studies examined critical thinking scores as measured by the Watson Glaser Critical Thinking Appraisal (WGCTA) on the premise that the WGCTA scores would predict success on the NCLEX-RN. Rachel (1989) and Lee (1980) found a positive relationship between WGCTA scores and success on the NCLEX-RN, but Gross et al. (1987) did not produce findings to support this premise. N. C. Facione (1995) found that the California Critical Thinking Skills Test (CCTST) mean scores were higher for nursing graduates who passed the NCLEX-RN the first time.

Studies which examined the demographic variables of age, gender and years of educational experience also reveal mixed results. Rachel (1989) found no relationship between critical thinking skill and age at graduation or previous
educational experience. Opposite findings were reported by Sullivan (1987) who found that students who had more years of nursing experience before entering an upper division BSN program had higher critical thinking scores and Clocklin (1995), who found that students who were over the age of 40 years had higher composite WGCTA scores than those students who were under 40 years of age. In regard to the CCTST, N. C. Facione (1995) found no relationship between age or gender and scores on the CCTST. Doas (1997) confirmed these findings in a study of generic students and registered nurses enrolled in a BSN program. She examined age and gender, plus variables of marital status, years of professional nursing experience, membership in professional or student organizations, number of formal critical thinking courses taken and other earned degrees. There was no relationship between any of these variables and critical thinking skills scores as measured by the CCTST.

The meta-analysis project for nursing and allied health aggregate analyses of the CCTST (N. C. Facione, 1995) included data from 23 programs using the CCTST. This encompassed 1,992 nursing students nationwide. This was the only study which examined geographic location as a demographic variable to be compared with critical thinking ability. This study found that the average CCTST scores for subjects in urban settings were lower than those of subjects in suburban or rural settings.

As early research failed to establish a relationship between critical thinking and concrete demographic and academic variables, more studies emerged which attempted to identify relationships between critical thinking and other cognitive processes. These studies are encouraging in the domain of nursing, as nurse educators strive to work with students in such a way that they become self-determining, independent thinkers. Unfortunately, the results of many of these
studies have all too often served to emphasize the disparities which exist between desired and actual cognitive function in nursing students.

The studies which have focused on the more complex cognitive processes have examined critical thinking as it is related to cognitive development and learning style. Cognitive development was found to be related to critical thinking in a study by S. J. Jones (1993) with a focus on problem-solving ability. Smith (1996) concluded that reading and math abilities were most effective in predicting critical thinking abilities. These skills were followed by G.P.A. and learning and study strategies. McGovern (1995) concluded that there was no statistically significant relationship between cognitive ability and critical thinking skills as measured by WGCTA.

Studies which explored the relationship of learning style to critical thinking to determine if certain learning styles reflect higher critical thinking skills were undertaken by Clocklin (1995) and Patterson (1994). Both studies used the WGCTA to measure critical thinking skills and the Kolb Learning Style Inventory to determine learning style preference. Clocklin’s study demonstrated that WGCTA composite scores were lowest in students who were classified as divergent or imaginative learners and highest in students who were classified as convergent or practical learners. Patterson found no relationship between the variables of critical thinking and learning style.

Although the studies which have focused on nursing students’ critical thinking abilities are much more numerous than those of students in the general higher education arena, the general inconclusiveness of the findings is the same. No conclusions can be drawn from the examination of these nursing studies beyond the fact that additional research is needed. This is especially significant with the APA consensus definition and improved measurement tools now available. The focus of
the vast majority of studies in critical thinking has been the student as the outcome or product. Unfortunately very few studies in higher education have critically examined the process of the educational experience in an effort to determine what process variables might be related to the attainment of critical thinking skills in students. One very obvious variable would seem to be the instructor.

Faculty Variables Related to Critical Thinking

Nursing programs have been scrutinized by the National League for Nursing (NLN) for critical thinking focus for the last two decades (McDermott, 1980; Videbeck, 1995). However, the lack of consensus about how critical thinking is operationally defined and measured has resulted in a great diversity of approaches toward the goal of improving critical thinking of nursing students.

The first research question identified for this study asks: Is there a difference between the critical thinking ability of undergraduate nursing faculty and the critical thinking ability of the average undergraduate nursing student?

Five studies were found which actually measured the critical thinking skill level of nursing faculty. These studies tested the assumption that if exposure to faculty is a major influence on critical thinking ability, faculty must be assumed to be superior in these characteristics; therefore, students exposed to faculty in the nursing program can be expected to demonstrate improved critical thinking as a result of progression through the program. In addition, it would be assumed that faculty would demonstrate higher critical thinking skills than those demonstrated by nursing students at any point in the program.

Once again, the results of these studies are mixed. Studies by Hartley (1992) and by Hartley and Aukamp (1994) measured critical thinking skills of baccalaureate
nursing faculty and students, using the WGCTA. Both studies found faculty to have higher scores than students. In contrast, studies by M. Jones (1992) with baccalaureate nursing faculty and students and by Saarman, Freitas, Rapps, and Riegel (1992) where nurses and nursing students of diverse levels of education were tested with the Cornell Critical Thinking Test (CCTT) and the WGCTA, respectively, did not find faculty having higher scores. In fact, Saarman et al. (1992), who compared ADN and BSN prepared nurses, sophomore nursing students, and nursing faculty had some very disturbing results related to faculty performance. This study was based on the assumption that the BSN prepared nurses would have higher critical thinking scores than the ADN nurses due to their longer exposure to nursing faculty in the undergraduate program. Not only did these two groups score essentially the same on the WGCTA, but the nursing faculty did not score significantly higher than the sophomore nursing students, when controlled for age. M. Jones (1992) found similar results among baccalaureate nursing faculty and students using the Cornell Critical Thinking Test (CCTT).

The only study involving faculty which used the California Critical Thinking Skills Test (CCTST) was conducted by Lacey (1996). This study compared the critical thinking ability of ADN students, BSN students and nursing faculty. This study revealed that although the differences between ADN and BSN students were not evident, faculty did score significantly higher than either student group on the CCTST.

These contradictory results regarding the critical thinking ability of nursing faculty raise many serious concerns. Based on the findings of many of the studies cited, the possibility exists that nursing faculty do not consistently possess high levels of critical thinking ability that have been assumed to be necessary to produce the
desired results in students through instructional methods, role modeling or evaluation of student mastery of critical thinking skills. This conclusion further supports the research questions raised by this study. The variables cited in the original research questions have been studied in a very limited manner and have produced inconclusive results.

The limited, yet diverse research findings reviewed support the first research question and lead to the first conceptual hypothesis: There is a difference between the critical thinking skills of undergraduate nursing faculty and the critical thinking skills of the average undergraduate nursing student.

Research questions two through five raise the question of relationships between critical thinking ability of nursing faculty and variables such as the type of program they teach in, the number of years of experience as a nurse educator, the level of formal education and their preferred methods of instruction. A review of the studies which have been conducted in an attempt to link nursing faculty variables and critical thinking demonstrates that some studies, although limited, have begun to address these variables.

The majority of the studies which have recently emerged in the literature have been comprised of surveys which have been designed to explore faculty perceptions and attitudes about critical thinking. The respondents to most of these surveys were found to lack clarity about the fullest expression of the mechanisms and operations of critical thinking processes and applications (P. C. Baker, 1992; Christie, 1992; J. M. Gordon, 1997; C. J. Green, 1995; Jones & Brown, 1991; Koch-Parrish, 1992; Marshall, 1995; Ruest, 1993).

Gordon (1997) found that baccalaureate nurse educators perceived critical thinking as a rational linear process congruent with the nursing process, decision-
making, diagnostic reasoning and the research process. She also noted that despite their assertion that nurse educators do not perceive critical thinking abilities differently than experts in other disciplines, it is evident that nurse educators’ view of critical thinking is not congruent with that of critical thinking experts. This finding was also supported in regard to the higher education professors studied by Paul et al. (1997), suggesting that this phenomenon is not limited to the discipline of nursing.

There was also minimal congruence among nurse educators regarding their perceptions about methods of teaching and evaluating critical thinking. Marshall (1995) found that associate degree nursing faculty viewed the nursing process and care plan more positively in regard to problem solving than did baccalaureate faculty. C. J. Green (1995) found that although both ADN and BSN faculty used critical thinking methods for clinical and didactic courses on an occasional basis only, the BSN faculty used more critical thinking methods in the didactic setting. Gordon (1997) noted that there were some differences in regard to some items included in her questionnaire regarding how faculty conceptualize critical thinking that were based on faculty rank, type of courses they taught, years of teaching experience and educational background. Gordon’s study (1997) was the only one which demonstrated any relationship between how nursing faculty perceived critical thinking and the number of years of teaching experience and their level of educational preparation. However, none of these studies examined how actual critical thinking skill level of nursing faculty might be related to the educational or experiential variables noted, nor the type of program they teach in.

Koch-Parrish (1992) found that there were minimal differences between faculty and student perceptions about critical thinking. In addition, she noted that most faculty respondents reported that they had received no formal instruction on the
methods to best promote critical thinking. Tate (1996) conducted a study to examine the relationship between formal educational level of nursing faculty and the level of professional development in critical thinking. No relationships were demonstrated.

The findings of these survey studies reflect a great deal of inconsistency among nurse educators in terms of how critical thinking is conceptualized, taught and evaluated. In addition, some degree of uncertainty about their own ability to effectively promote critical thinking skills in nursing students is inferred by these findings.

Research question number two asks: Is there a difference in critical thinking ability among nursing faculty in Associate Degree Nursing (ADN) and Bachelor of Science Nursing (BSN) Programs? Although studies among students at these two levels of education are inconclusive, there is some evidence to suggest that critical thinking may be more of a focus at the baccalaureate level than at the associate degree level. This inference supports the second conceptual hypothesis: There is a difference between the critical thinking skills of associate degree nursing (ADN) faculty and the critical thinking skills of bachelor of science degree nursing (BSN) faculty.

Research question number three asks: Is there a relationship between the critical thinking ability in nursing faculty and the number of years of experience as a nurse educator? In a similar theme, question number four asks: Is there a relationship between the critical thinking ability of nursing faculty and their level of formal education? Although the few faculty studies conducted did not support a difference in critical thinking ability in faculty according to experience or formal educational level, Benner's (1984) research would suggest that critical thinking is developmental and related to experience and maturity. In an academic context, both years of teaching
experience and formal education would be considered to be factors related to developmental growth. The earlier studies cited by Norris (1985) and McMillan (1987) suggest that the college experience has the potential to impact on critical thinking ability. These observations suggest that there is some theoretical support for the third and fourth conceptual hypotheses: There is a relationship between the critical thinking skills of nursing faculty and their years of nursing education experience; There is a relationship between the critical thinking skills of nursing faculty and their years of formal education.

Perhaps not surprisingly, the findings in studies that have focused on the measurement of students' critical thinking parallel those few that have been directed toward the critical thinking ability of faculty. These findings suggest that some nursing programs seem to be successful in promoting critical thinking ability among their students while others are not. Jacobs, Ott, Sullivan, Ulrich, and Short (1997) noted that the experiential process undertaken by nursing faculty to define and measure critical thinking in the undergraduate curriculum has the positive outcome of a deeper understanding of critical thinking by both faculty and students. Studies which have focused on the examination of program characteristics are perhaps the most promising in view of the need to begin to identify what unique qualities exist in programs which are successful in facilitating nursing students' acquisition of critical thinking ability. Perhaps an important program characteristic which needs further examination in the arena of critical thinking is the instructional methods nursing faculty utilize with the intention of promoting critical thinking in students.
Studies on Methods of Instruction Related to Critical Thinking

Nursing educators who desire to improve their teaching methodologies relative to the promotion of critical thinking ability in their students do not lack for available resources. The higher education arena boasts a voluminous collection of texts and journal articles by noted authors which are designed to assist the college instructor to teach critical thinking skills (Baron & Sternberg, 1987; Belenkey, Clinchy, Goldberger, & Tarule, 1986; Bernstein, 1995; Beyer, 1987; Brookfield, 1987; Brown & Keeley, 1990; Chaffee, 1990; de Sanchez, 1995; Dewey, 1933; Fogarty & McTighe, 1993; Kelly, 1988; Kloss, 1994; Lockhead & Clement, 1979; McPeck, 1981; Meyers, 1986; Moore & Parker, 1989; Nickerson, Perkins, & Smith, 1985; Paul, 1992a, 1992b, 1995; Perry, 1970; Ruggiero, 1996; Toulmin, Rieke, & Janik, 1984). In addition, the recent appearance of nursing texts on critical thinking (Alfaro-LeFevre, 1995; Bandman & Bandman, 1995; Rubenfeld & Scheffer, 1995; Wilkinson, 1996) provides a wide theoretical and pragmatic base to begin teaching for critical thinking.

Advocates of critical thinking have criticized the traditional curriculum and established teaching practices as inadequate and have called for a major emphasis on the development of critical thinking and a new teaching paradigm consistent with this aim. A major reform movement taking place in nursing education calls for diminishing the excessive reliance on the rational-technical model in teaching nursing and for increasing teaching approaches which foster critical and creative abilities. A review of the literature reflects that many teaching methodologies are being advocated and tested for their effectiveness in promoting critical thinking among college students (Dixon, 1991; Kurfiss, 1987; Oxman-Michelli, 1991; Potts, 1994;
M. M. Young, 1994). A comprehensive framework for teaching and evaluating critical thinking has been proposed by nursing faculty at Indiana University (Dexter et al., 1997). This framework is significant for the nursing education community because it outlines an approach which reflects a developmental taxonomy for critical thinking skills at the associate, baccalaureate, masters, and doctoral levels in nursing education. In addition, these authors advocate the use of the California Critical Thinking Skills Test as appropriate for the assessment of the critical thinking skills at each level as well as for the purpose of program evaluation. In addition to endorsing the APA Delphi conceptualization of critical thinking (P. A. Facione, 1991), this framework utilizes the critical thinking model developed by Paul (1995) which is based on specific elements of reasoning and intellectual standards.

The teaching methods cited in the general higher education literature are fairly consistent with those cited in the nursing literature. A general premise that underlies any discussion about critical thinking instruction is that traditional didactic instruction through lecture and passive student involvement is neither desired nor helpful in the promotion of critical thinking skill among students (Barr & Tagg, 1995; Bayard, 1994; Beckett, 1997; Bevis, 1993; Glaser, 1984; Kaplan, 1991; Klaassens, 1988; Kurfiss, 1988; Paul, 1992a, 1992b, 1995; Pond, Bradshaw, & Turner, 1991; Reiter, 1993; Sirotnik, 1983; Sternberg, 1985; Thayer-Bacon, 1993; Walters, 1986; West, 1994; White, Beardslee, Peters, & Supples, 1990). These authors advocate for classroom techniques which require the student to be actively involved in his or her own learning and which provide the student with the opportunities to practice the cognitive processes of critical thinking.

In higher education current critical thinking models and approaches have been described by Kurfiss (1988), who synthesized the current critical thinking theory.
research, and practice, Hart (1990) and Edgerton (1992) who profile the very successful Alverno College thinking skills model, as well as McDonald (1993) and Ouzts (1992) who describe an adult learning model for critical thinking and a causal inference structural model of critical thinking respectively. In addition, some of the classic cognitive theories of Piaget (1970) and the Perry (1970) scheme have been cited frequently as a framework for any approach to cognitive instruction. The critical thinking intervention studies by Eason (1986) with critical thinking assignments, Bayard (1994) with problem-based learning, Reiter (1993) with dialogical instruction on critical thinking and West (1994) with argumentation instruction all demonstrated favorable results.

Previously cited studies of nursing faculty found that for the most part, nursing educational methods and the teaching of the nursing process were not successful in promoting high cognitive thinking (C. J. Green, 1995; McGovern & Valiga, 1997; McNeely-Greene, 1991; Poole, 1989; Wetzel, 1994). However, some studies have been conducted which have reflected positive critical thinking skills outcomes in nursing students. Faculty questioning skills were assessed after an intervention strategy and were found to increase student cognitive level in studies by Craig and Page (1981) and Wink (1992). Computer assisted instruction and simulations and interactive video were also found to be very positive by Perciful and Nester (1996) and Burger (1995), yet Tilson (1986) and Yuill (1991) found no significant differences in control and experimental groups with these methods. Petrosky (1992) found significant results with the use of case study analysis and Montpass (1992) found that the use of stress reduction techniques such as humor and exercise increased scores on the WGCTA. Guice (1992) found that instruction on concept analysis had little impact on critical thinking skills. A very encouraging
approach was described by Young (1994) as cognitive reengineering which focuses on changing the thinking process of women who are considered to be products of a consistent cognitive socialization process in nursing education.

The recent results of the meta-analysis project for nursing and allied health (N. C. Facione, 1995) reveal some encouraging data to support a critical thinking focus in the nursing curriculum. In response to the question asking if there was a focus on critical thinking in the curriculum, there was a trend toward increased CCTST mean scores in student samples where the response was “yes” when compared to where the response was “no” (N. C. Facione, 1995, p. 6). More explicit data were gathered in regard to whether or not faculty were discussing the meaning of critical thinking in the classroom setting. Thirty-seven of the CCTST samples were gathered at settings where this discourse was occurring and 18 of the samples where it is reported as not occurring. The average sample mean for the CCTST where the faculty were discussing the meaning of critical thinking was higher than where faculty were not so engaged. More specifically, subscores in evaluation and inference both showed higher levels, whereas the subscores of analysis were not statistically different. Although this finding does not demonstrate conclusively that faculty engagement in critical thinking causes student skill in critical thinking to improve, it does reflect an area where further research would be useful to explore this potential relationship.

Several studies surveyed nursing faculty regarding their opinions about teaching and learning strategies which promote critical thinking skills. Sander (1992), Harrington (1992), Toth (1997), McCaffrey (1993), and Tate (1996) all found faculty to report that they believed that the use of techniques where the student was actively involved in learning such as simulations, critiques, interactive activities, case studies,
small group discussions, brainstorming, scenarios or role play, self-study exercises, inductive reasoning techniques, teacher role-modeling, and reflective writing were most likely to promote critical thinking skills. The interesting finding was that although faculty endorsed these techniques, they often admitted that they usually do not utilize them, citing time constraints, class size, and the amount of content to be covered as the most common deterrents.

The studies on faculty and critical thinking are fairly consistent in higher education, both inside and outside the discipline of nursing. The abundance of "how to" books and articles on critical thinking certainly attests to the interest educators have in critical thinking. In addition, many recent articles have appeared in nursing journals which promote new and creative methods intended to promote critical thinking in nursing students (Dexter et al., 1997; Elliott, 1996; Glen, 1995; Hiebert, 1996; Mackie & Grahm, 1996; Sedlak & Ludwick, 1996; Smith, 1996; Vanetzian & Corrigan, 1996; Witucki, Hodson, & Malm, 1996). Unfortunately, these modalities are not research based.

However, it soon becomes apparent when reviewing the studies which do provide empirical data on critical thinking that there is no consensus among faculty related to operationalization of the construct within either a discipline specific or general context. Nor is there clarity regarding how to assess and evaluate learning within the context of critical thinking. Although experimental studies which focused on teaching methodologies as interventions for critical thinking had some mixed results both inside and outside of nursing, evidence was presented which would indicate that certain methods can be related to the acquisition of critical thinking skills. These findings reinforce the notion that critical thinking skills can be taught and are transferrable (Brigham, 1993; Brookfield, 1987; Chaffee, 1990; Heaslip, 1994;
Norris, 1985; Paul, 1992a, 1992b, 1995). The methods cited most often were those which required students to be active and reflective in their learning experience. Unfortunately, most nursing faculty reported that active and reflective teaching and learning methods are used only occasionally, with perceived constraints on time, class size and content volume cited as the most common reasons for a heavy reliance on traditional methods such as lecture and objective testing.

In conclusion, there seems to be general agreement that passive learning is ineffective in teaching critical thinking, yet faculty are uncertain about the best alternative methods. An additional area needing exploration is whether methodologies of instruction change with the critical thinking skill level of the nursing faculty member. Question number five queried: Is there a relationship between the critical thinking ability of nursing faculty and their preferred methods of instruction? In the review of faculty studies in critical thinking, none were found to address a potential relationship of this nature. Although the studies did conclude that faculty perceived that active learning as opposed to passive learning stimulated critical thinking, there was no conclusive evidence to suggest that faculty perception and practice are congruent. Furthermore, the link between the faculty member's critical thinking ability level and the selection of teaching methods has not been explored. The inference that is suggested from the literature is that faculty members who demonstrate higher critical thinking skills themselves would select and utilize teaching methods which promote active student learning, thus lending support for the fifth conceptual hypothesis: There is a relationship between the critical thinking skills of nursing faculty and their preferred teaching methods.

Finally, research question number six asks: Is there a relationship between critical thinking ability of nursing faculty and their level of formal training in critical
thinking? This issue of faculty accountability for their own professional growth in the
domain of critical thinking is also noted in light of Benner's (1984) work and the
cited studies which suggest that faculty may have deficits in critical thinking ability.
There is little documentation about how faculty have prepared themselves to be
critical thinking models for students, if at all. The recent study by Paul et al. (1997)
did suggest that higher education faculty who participated in critical thinking
professional development were able to both articulate and demonstrate teaching
methods which were viewed as effective strategies in the cultivation of critical
thinking skills in students. In regard to nursing faculty, only one study by Koch-
Parrish (1992) noted that most nursing faculty she surveyed had not received any
formal instruction on critical thinking. It would seem logical that nursing faculty who
are interested in critical thinking and strategies to promote it would seek professional
development in this area. The inference could also be made that this professional
development would potentially result in increased critical thinking ability of these
same nursing faculty. This domain of professional development is, therefore identified
as an area for study as well, resulting in the sixth conceptual hypothesis: There is a
relationship between critical thinking skills of nursing faculty and their level of formal
training in critical thinking.

General Assessment Issues in Critical Thinking

The selection of an instrument for a measure of critical thinking demands that
the currently available instruments be reviewed for their appropriateness to a study of
this nature. It was noted when reviewing critical thinking studies in higher education
that a number of different instruments were cited in the studies. These instruments
include the Watson Glaser Critical Thinking Appraisal (WGCTA), the Cornell
Critical Thinking Tests (CCTT) and the most recently developed instrument the California Critical Thinking Skills Test (CCTST) (Norris & Ennis, 1989; Rane-Szostak & Robertson, 1996; Tanner, 1996).

The review of the critical thinking literature which precedes this section is replete with references to the Watson Glaser Critical Thinking Appraisal (Watson & Glaser, 1980). The WGCTA has undoubtedly been the most commonly utilized instrument for critical thinking assessment in cross discipline domains. The well documented reasons for the popularity of this instrument include the fact that there are two forms, which allow for pre-post testing purposes, the multiple choice format which provides for more efficient scoring, as opposed to the Ennis-Wehr Critical Thinking Essay Test, and of course the stability of the scores with various normalized groups over time (Rane-Szostak & Robertson, 1996). However, the WGCTA has recently been challenged in terms of its accuracy in measuring critical thinking ability in nursing students (Hickman, 1993; Kintgen-Andrews, 1991). As Rane-Szostak and Robertson (1996) point out, the WGCTA tests a fairly narrow construct of critical thinking and it is not clear that it is a valid measure of the critical thinking skills considered to be important for nursing practice. This could explain some of the rather perplexing results of the nursing studies cited earlier.

The Cornell Critical Thinking Test (CCTT) was cited in a very limited number of the studies reviewed. This instrument is based upon Ennis’ (1985) concept of critical thinking skills. The correlations from split-half reliability testing for Level Z or college level range from .55 to .76. These results, usually considered low for an ability measure, are considered by some evaluators to be adequate for measuring this complex skill. Rane-Szostak and Robertson (1996) feel this is another test which may
better serve as a teaching tool, the most strongly recommended use by the test authors.

The Ennis-Wehr Critical Thinking Essay Test was not cited in the nursing research studies examined for this study. Although essay tests of critical thinking are considered to be the most comprehensive and accurate measures of critical thinking ability (Ennis, 1985), the stringent requirements for scoring such an instrument are not conducive to this study.

One of the most promising instruments for critical thinking research is the recently available California Critical Thinking Skills Test: College Level (P. A. Facione, 1994). The California Critical Thinking Skills Test (CCTST) was first copyrighted in 1992, with revisions occurring in 1993 and 1994. The CCTST has undergone extensive evaluation including Kuder-Richardson 20 internal consistency reliability measures. This is the first instrument to derive its construct validity from the American Philosophical Association (APA) Delphi project definition of critical thinking (P. A. Facione, 1991). The CCTST has not been cited extensively in the literature in view of its very recent development. The CCTST has been piloted with subjects ranging from high school to undergraduate to graduate levels. The target population, however, is the undergraduate student. The CCTST is composed of 34 multiple-choice items which can be hand or machine scored and requires about 45 minutes to complete. The results of the CCTST include a composite score and subscores in the areas of analysis, evaluation and inference. Reference norms are provided (P. A. Facione, 1994). In an analysis of all the major critical thinking tests, Rane-Szostak and Robertson (1996) describe the CCTST as the most sophisticated of the forms available and identify the strengths of the CCTST in terms of the availability of alternate forms (A and B) for pre-post testing purposes and the fact
that it is derived from a current theory base. McMorris and Michael (1995), reviewers of the CCTST for the *Twelfth Mental Measurements Yearbook* both agree that the content validity is high for the CCTST. One reviewer notes that “This test does not have the history, the reliability or the variety of norm groups of a test like the WGCTA. The CCTST is a bit shorter, however, and already has a creative, developing and somewhat supportive program for validation” (McMorris & Michael, 1995, p. 146). Reviewer Michael (McMorris & Michael, 1995) concurs, noting that “the potential of the CCTST is great” (p. 146).

Additional support for the use of the CCTST is the recently available meta-analysis study conducted by N. C. Facione (1995), which studied nursing and allied health students nationwide to determine CCTST scores at different collegiate levels as well as how the CCTST is currently being utilized in associate degree and baccalaureate nursing programs. This collective data yielded CCTST results from 1,992 undergraduate nursing students, which was reported according to means for aggregates related to sophomore, junior or senior year in college. These national norms provide an excellent comparison for scores obtained from nursing faculty on the CCTST.

Further support for the CCTST is apparent as P. A. Facione and N. C. Facione (1994) have proposed that the APA consensus construct for critical thinking is congruent with the National League for Nursing (NLN, 1991) criterion which requires the documentation of a critical thinking definition. This suggests that the CCTST may hold great promise for the assessment of critical thinking skills desired in nursing students and graduates. Further support for the CCTST is also evident in the Indiana University faculty group (Dexter et al., 1997) who have identified the
CCTST as the recommended instrument for the assessment of critical thinking skills at all levels of nursing education.

In view of the concerns that have been raised with the historically favored critical thinking tests, the WGCTA and the CCTT, the most appropriate instrument for this study is deemed to be the California Critical Thinking Skills Test. If this instrument has the potential for measuring the critical thinking skills of nurses and nursing students that is purported by the author (P. A. Facione, 1994), the data measuring the critical thinking skills of nursing faculty will provide valuable insights into the challenges facing nursing faculty members who wish to teach critical thinking.

Summary

This chapter has reviewed the empirical and conceptual data in the area of critical thinking related to nursing and other students in higher education. The volume of available resources attests to the interest in this subject, especially within the discipline of nursing. The findings of the studies in critical thinking are perplexing at best and indicate that this domain remains one of struggle and frustration for faculty, students, and researchers. The findings of the studies examined in relation to critical thinking in the higher education and nursing education arenas have served to reinforce the need for further study in the areas of the educational process variables which influence the acquisition of critical thinking skills. The recent studies which have examined nursing educators in terms of their perceptions about and their responses to the demand for critical thinking in the nursing curriculum also support the need to address the research questions raised by this study.
This study has attempted to describe a critical thinking profile of nursing faculty in the state of Michigan. This study addressed the following conceptual hypotheses:

1. There is a difference between the critical thinking skills of undergraduate nursing faculty and the critical thinking skills of the average undergraduate nursing student.

2. There is a difference between the critical thinking skills of associate degree nursing (ADN) faculty and the critical thinking skills of bachelor of science degree nursing (BSN) faculty.

3. There is a relationship between the critical thinking skills of nursing faculty and their years of nursing education experience.

4. There is a relationship between the critical thinking skills of nursing faculty and their level of formal education.

5. There is a relationship between the critical thinking skills of nursing faculty and their preferred teaching methods.

6. There is a relationship between the critical thinking skills of nursing faculty and their level of formal training in critical thinking.

The next chapter will discuss the design and methodology of the study.
CHAPTER III

DESIGN AND METHODOLOGY OF THE STUDY

The purpose of this study was to examine the critical thinking skills of undergraduate nursing faculty to determine how these skills compared with the established critical thinking skill norms for undergraduate students and if the critical thinking skills of nursing faculty were related to the type of program they teach in, their years of experience as a nurse educator, their level of formal educational preparation, their preferred methods of instructing and their level of formal training in critical thinking. An extensive review of the current research in nursing education failed to document that these critical thinking attributes of nursing faculty had been extensively explored.

Population

The target population for this study was full time nursing faculty who have responsibility for didactic instruction in either an associate degree nursing (ADN) or a bachelor of science in nursing degree (BSN) program in the State of Michigan. There are 32 programs in the State of Michigan which offer an associate degree in nursing. Twenty-four of these programs offer a program which allows the student to complete a practical nursing (PN) program as the foundation for the upper level ADN program. The remaining 8 programs offer a generic two-year ADN only. The ADN is the minimal degree necessary for eligibility to write the National Council Licensure Examination (NCLEX-RN) in the State of Michigan. There are 16 BSN programs in
the State of Michigan. One of those programs is an upper division only program which provides an option for Registered Nurses to attain a BSN in a program especially designed for nurses who have previously completed either a diploma or ADN program. The remaining 15 programs are primarily four-year BSN programs, with some offering the upper division option for RNs as well. The graduate of a four-year BSN program is also eligible to write the NCLEX-RN for licensure as a registered nurse in the State of Michigan. It is estimated that there are approximately 400 ADN and 340 BSN full-time didactic faculty in the State of Michigan.

Sampling for the study was accomplished through the cluster method (Borg & Gall, 1989). The clusters were determined by geographic regions in the State of Michigan, as well as the type of program. A random sampling of each cluster was made to attain a minimum of 50% of the Michigan nursing programs. This sampling method yielded 11 BSN programs and 17 ADN programs for the study.

Instrumentation

Two instruments of measure were used in this study, the California Critical Thinking Skills Test (CCTST) and a researcher-designed demographic data questionnaire. These instruments are described below.

California Critical Thinking Skills Test (CCTST)

The California Critical Thinking Skills Test: College Level (P. A. Facione, 1994), is a standardized 34-item, multiple-choice test which targets those core critical thinking skills regarded to be essential elements in a college education. The CCTST has undergone extensive evaluation including Kuder-Richardson (KR) 20 internal
consistency reliability measures. The internal consistency of the published version of the CCTST, Form A is KR-20 is .70 (P. A. Facione, 1994).

This is the first and only instrument to derive its construct validity from the American Philosophical Association Delphi project definition of critical thinking (P. A. Facione, 1991). One reviewer for the Twelfth Mental Measurements Yearbook (McMorris & Michael, 1995) determined the content validity to be considerable, yet noted that additional efforts should be directed to obtain evidence regarding the empirical validity of the constructs, to provide reliability estimates of scores on the total scale and subscales, and to present more comprehensive normative data.

The CCTST has not been cited extensively in the literature in view of its very recent development. The CCTST can be hand or machine scored and requires about 45 minutes to complete. The results of the CCTST include a composite score and subscores in the areas of analysis, evaluation and inference. Reference norms are provided (P. A. Facione, 1994). In an analysis of all the major critical thinking tests, Rane-Szostak & Robertson (1996) identified three strengths of the CCTST. These included the perception that the CCTST is the most sophisticated of the critical thinking test forms available, the fact that alternate forms (A and B) are available for pre-post testing, and the fact that it is derived from a current theory base.

There are very few critical thinking instruments in general. Those that exist are based on somewhat dissimilar theoretical constructs. As stated previously, the CCTST is the only critical thinking skills test based on the Delphi expert consensus conceptualization of critical thinking. The Watson Glaser Critical Thinking Appraisal (WGCTA) (Watson & Glaser, 1980) and the Cornell Critical Thinking Tests (CCTT) (Ennis, 1985) use older much less robust concepts of critical thinking.
The selection of the CCTST for this study involving nursing faculty was based upon rationale that was substantiated by the literature. Four of the five studies found which did measure critical thinking skills of nursing faculty used the WGCTA (Hartley, 1992; Hartley & Aukamp, 1994; Saarman et al., 1992) or the CCTT (M. Jones, 1992) with relatively unremarkable results. These results raised the question of the validity of currently used critical thinking skills instruments in terms of measuring nurses' critical thinking ability. Only one study, conducted by Lacey (1996) used the CCTST to compare nursing faculty to both BSN and ADN students.

Another consideration, in view of the minimal use of the instrument as evidenced by the literature, is that this study was very timely, as it provided an excellent opportunity to test critical thinking skills of nursing faculty using an instrument which was more likely to be unfamiliar to them as educators. At this time, only two nursing programs in the State of Michigan are cited in the Meta-Analysis Study for Nursing and Allied Health Project which is being conducted by Noreen Facione. These two programs are Ferris State University and Oakland University.

The availability of the CCTST had considerable implications for this study. If this instrument proved to be as useful for measuring the critical thinking skills of nurses and nursing students as the author believes (P. A. Facione, 1994; Facione & Facione, 1994), the data collected in the form of measuring the critical thinking skills of nursing faculty would provide valuable insights into the challenges facing the nursing education community related to the teaching of critical thinking. In view of the concerns raised about the historically favored critical thinking tests (P. A. Facione, 1994; Hickman, 1993; Kintgen-Andrews, 1991; Rane-Szostak & Robertson, 1996), the CCTST provided a reasonable alternative which served the purpose of this study.
As noted previously, the CCTST will provide four scores, to include a composite or total score, as well as subscores in the areas of analysis, evaluation, and inference. P. A. Facione (1995) describes analysis as the ability to “identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgment, experiences, reasons, information, or opinions” (p. 4). The cognitive skill of evaluation as defined by P. A. Facione (1995) is 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 or intended inferential relationships among statements, descriptions, questions or other forms of representation. (p. 4)

Finally, the cognitive skill of inference as defined by P. A. Facione (1995) is to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to deduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation. (p. 5)

**Demographic Data Questionnaire**

The researcher-developed questionnaire (Appendix A) provided information related to the other variables under consideration in the study. These variables included the type of program the faculty teach in, the years of nursing education experience, the formal educational level, the preferred methods of didactic instruction and the level of formal training in critical thinking.

**Data Collection Procedures**

After obtaining approval from the Human Subjects Institutional Review Board at Western Michigan University (Appendix B), the BSN and ADN program
directors or deans of the programs randomly selected for the study were contacted by phone to solicit their permission to approach their faculty for participation in the study. The researcher provided the program administrator with two options for data collection. The first option was for the researcher to travel to the program site to meet with faculty, explain the study to the faculty and administer the instruments to faculty who agreed to participate. Some of the administrators were very willing to provide the researcher with time to meet with faculty to explain the study and request participation. However, they were unable to provide the one-hour time frame necessary for testing at that time. Therefore, the researcher opted to leave the instruments with faculty who were willing to participate and provided self-addressed, stamped envelopes for return mailings, either individually or as a group with a faculty member taking responsibility for collecting the completed instruments and returning them to the researcher by a predetermined deadline.

The second option, which was selected by most administrators, was to identify a faculty member who had a special interest in either critical thinking or general research who might be willing to function as a liaison to his or her faculty peer group for the purpose of data collection for the study. This person was then contacted by phone by the researcher. The faculty liaison was provided with an overview of the study (Appendix C) as well as with directions which specified how to distribute the instruments, collect the instruments, and mail them back to the researcher.

With both options, a faculty member was utilized as a contact person for follow-up if the instruments were not returned by the predetermined deadline. This provided the researcher with a mechanism to remind faculty of the study and encourage them to participate if they had not done so. This mechanism was very
useful, as all faculty members who were approached to function in this capacity were very cooperative and a 100% return rate was achieved at the program level.

Participation in the study was voluntary, as faculty were solicited by the researcher or a faculty representative, as opposed to their program director or dean. A letter of direction was given to each participant (Appendix D). This letter indicated that participation in the study was voluntary and that completion of the instruments would be interpreted as consent to participate. It was estimated that completion of all instruments would require a maximum time allotment of 60 minutes, however, no time limits were imposed, as faculty completed the instruments on their own time. This is consistent with the guidelines of the CCTST (P. A. Facione, 1994).

Scoring of the CCTST

The completed CCTST was machine scored, using a statistical analysis program. The composite scores can range from 0 to 34. The subscores utilized for this study, which are consistent with the APA Delphi conceptualization of critical thinking were analysis, evaluation and inference. Analysis scores can range from 0 to 9, evaluation scores can range from 0 to 14, and inference scores can range from 0 to 11. The undergraduate nursing student mean norms which were established by the meta-analysis study (N. C. Facione, 1995) for composite and subscores were used for comparison to the faculty composite and subscores.

Hypotheses

Six conceptual hypotheses with corresponding null hypotheses were developed from the research questions presented in Chapter I. An alpha level of .05
was used to test all of the null hypotheses. Listed below are the six research questions of the study with hypotheses proposed to answer each of the questions.

Question 1 asked: Is there a difference between the critical thinking ability of nursing faculty and the critical thinking ability of the average undergraduate nursing student? Critical thinking ability is conceptualized as specific critical thinking skills. Critical thinking skills were operationalized as the components of the California Critical Thinking Skills Test (P. A. Facione, 1994), which include a composite score and subscores in the areas of analysis, evaluation, and inference. Nursing faculty were categorized as either ADN or BSN. The nursing student mean scores were conceptualized according to collegiate year as either sophomore (ADN) or senior (BSN) derived from the norm reference groups of the meta-analysis study by N. C. Facione (1995). Faculty were compared to the level of student consistent with the type of program they taught in. Thus, ADN faculty were compared to sophomore nursing students and BSN faculty were compared to senior nursing students. The conceptual hypothesis of a difference between the critical thinking skills of nursing faculty and the critical thinking skills of the average undergraduate student is reflected in the following research hypotheses:

\( H1a \): The mean CCTST composite score for ADN nursing faculty is different from the mean CCTST composite score of 15.6 for the sophomore nursing student norm reference group.

\( H1b \): The mean CCTST composite score for BSN nursing faculty is different from the mean CCTST composite score of 16.7 for the senior nursing student norm reference group.
$H1c$: The mean CCTST analysis score for ADN nursing faculty is different from the mean CCTST analysis score of 4.3 for the sophomore nursing student norm reference group.

$H1d$: The mean CCTST analysis score for BSN nursing faculty is different from the mean CCTST analysis score of 4.7 for the senior nursing student norm reference group.

$H1e$: The mean CCTST evaluation score for ADN nursing faculty is different from the mean CCTST evaluation score of 5.7 for the sophomore nursing student norm reference group.

$H1f$: The mean CCTST evaluation score for BSN nursing faculty is different from the mean CCTST evaluation score of 6.0 for the senior nursing student norm reference group.

$H1g$: The mean CCTST inference score for ADN nursing faculty is different from the mean CCTST inference score of 5.5 for the sophomore nursing student norm reference group.

$H1h$: The mean CCTST inference score for BSN nursing faculty is different from the mean CCTST inference score of 6.2 for the senior nursing student norm reference group.

Question 2 asked: Is there a difference in critical thinking ability among nursing faculty in Associate Degree Nursing (ADN) and Bachelor of Science in Nursing (BSN) programs? Associate Degree Nursing programs are operationalized as either two-year RN programs or programs designed for the practical nurse to become an RN, with the graduate eligible to write the NCLEX-RN. Baccalaureate in Nursing Degree programs are operationalized as either four-year programs which result in eligibility to write the NCLEX-RN, or programs designed for associate
degree RNs or diploma RNs to earn a baccalaureate degree in nursing. ADN faculty must hold a minimum of a masters degree in nursing to teach in the didactic area; however, the State Board of Nursing will sometimes make an exception and allow a baccalaureate prepared faculty member to teach didactic on a temporary basis. This is common when the faculty member is currently pursuing a masters degree and no other qualified faculty are available to teach in the didactic area. BSN faculty must hold a minimum of a masters degree in nursing for both classroom and clinical instruction. The conceptual hypothesis of a difference between the critical thinking skills of ADN faculty and the critical thinking skills of BSN faculty was reflected in the following research hypotheses:

\[ H2a \]: There is a difference between the mean CCTST composite score of ADN faculty and the mean CCTST composite score of BSN faculty.

\[ H2b \]: There is a difference between the mean CCTST analysis score of ADN faculty and the mean CCTST analysis score of BSN faculty.

\[ H2c \]: There is a difference between the mean CCTST evaluation score of ADN faculty and the mean CCTST evaluation score of BSN faculty.

\[ H2d \]: There is a difference between the mean CCTST inference score of ADN faculty and the mean CCTST inference score of BSN faculty.

Question 3 asked: Is there a relationship between the critical thinking ability of nursing faculty and the number of years of experience as a nurse educator? The faculty participating in this study were full-time didactic nursing faculty. The number of years of experience were operationalized as one of five ranges: 1–5 years, 6–10 years, 11–15 years, 16–20 years, and more than 20 years. The conceptual hypothesis of a relationship between critical thinking skills of nursing faculty and the number of
years of nursing education experience was reflected in the following research hypotheses:

\[ H3a: \] There are differences in the mean CCTST composite scores among the five ranges of years of nursing education experience.

\[ H3b: \] There are differences in the mean CCTST analysis scores among the five ranges of years of nursing education experience.

\[ H3c: \] There are differences in the mean CCTST evaluation scores among the five ranges of years of nursing education experience.

\[ H3d: \] There are differences in the mean CCTST inference scores among the five ranges of years of nursing education experience.

Question 4 asked: Is there a relationship between the critical thinking ability of nursing faculty and their level of formal education? Level of formal education was operationalized as the attainment of the highest academic degree: baccalaureate, masters, or doctorate. These degrees can be further refined as either reflecting nursing or non-nursing majors. The conceptual hypothesis of a relationship between critical thinking skills of nursing faculty and their level of education was reflected in the following research hypotheses:

\[ H4a: \] There are differences in the mean CCTST composite scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

\[ H4b: \] There are differences in the mean CCTST analysis scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

\[ H4c: \] There are differences in the mean CCTST evaluation scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

\[ H4d: \] There are differences in the mean CCTST inference scores of nursing faculty with baccalaureate, masters, or doctoral degrees.
Question 5 asked: Is there a relationship between the critical thinking ability of nursing faculty and their preferred methods of instruction? Preferred method of instructing was operationalized according to the level of student interaction in the didactic setting. The categories for didactic instruction are (a) instructor-delivered lecture, (b) instructor-led discussion, (c) structured student learning activities where the instructor designs and guides the activity, or (d) interdependent group learning activities where the instructor serves as facilitator only in the student-guided exploration of a designated topic. The conceptual hypothesis of a relationship between the critical thinking skills of nursing faculty and their preferred teaching methods was reflected in the following research hypotheses:

\[ H_{5a} \]: There are differences in the mean CCTST composite scores of nursing faculty who prefer to use different categories of instructional methodology.

\[ H_{5b} \]: There are differences in the mean CCTST analysis scores of nursing faculty who prefer to use different categories of instructional methodology.

\[ H_{5c} \]: There are differences in the mean CCTST evaluation scores of nursing faculty who prefer to use different categories of instructional methodology.

\[ H_{5d} \]: There are differences in the mean CCTST inference scores of nursing faculty who prefer to use different categories of instructional methodology.

Question 6 asked: Is there a relationship between the critical thinking ability of nursing faculty and their level of formal training in critical thinking? Level of formal training in critical thinking was operationalized according to the mechanisms faculty have utilized to enhance their critical thinking ability and subsequent teaching methods. Mechanisms could range from (a) none, (b) reading critical thinking literature only, (c) attending critical thinking conferences or workshops, or (d) both reading and continuing education. The conceptual hypothesis of a relationship
between the critical thinking skills of nursing faculty and the level of formal training in critical thinking was reflected in the following research hypotheses:

**H6a:** There are differences in the mean CCTST composite scores of nursing faculty who report different levels of critical thinking training.

**H6b:** There are differences in the mean CCTST analysis scores of nursing faculty who report different levels of critical thinking training.

**H6c:** There are differences in the mean CCTST evaluation scores of nursing faculty who report different levels of critical thinking training.

**H6d:** There are differences in the mean CCTST inference scores of nursing faculty who report different levels of critical thinking training.

**Method of Data Analysis**

The following null hypotheses were tested at an alpha level of .05:

**H01a:** There is no difference in the mean CCTST composite score for ADN nursing faculty when compared to the mean CCTST composite score of 15.6 for the sophomore nursing student norm reference group.

**H01b:** There is no difference in the mean CCTST composite score for BSN nursing faculty when compared to the mean CCTST composite score of 16.7 for the senior nursing student norm reference group.

**H01c:** There is no difference in the mean CCTST analysis score for ADN nursing faculty when compared to the mean CCTST analysis score of 4.3 for the sophomore nursing student norm reference group.

**H01d:** There is no difference in the mean CCTST analysis score for BSN nursing faculty when compared to the mean CCTST analysis score of 4.7 for the senior nursing student norm reference group.
There is no difference in the mean CCTST evaluation score for ADN nursing faculty when compared to the mean CCTST evaluation score of 5.7 for the sophomore nursing student norm reference group.

There is no difference in the mean CCTST evaluation score for BSN nursing faculty when compared to the mean CCTST evaluation score of 6.0 for the senior nursing student norm reference group.

There is no difference in the mean CCTST inference score for ADN nursing faculty when compared to the mean CCTST inference score of 5.5 for the sophomore nursing student norm reference group.

There is no difference in the mean CCTST inference score for BSN nursing faculty when compared to the mean CCTST inference score of 6.2 for the senior nursing student norm reference group.

There is no difference between the mean CCTST composite scores of ADN faculty and the mean CCTST composite score of BSN faculty.

There is no difference between the mean CCTST analysis score of ADN faculty and the mean CCTST analysis score of BSN faculty.

There is no difference between the mean CCTST evaluation score of ADN faculty and the mean CCTST evaluation score of BSN faculty.

There is no difference between the mean CCTST inference score of ADN faculty and the mean CCTST inference score of BSN faculty.

There are no differences in the mean CCTST composite scores among the five ranges of years of nursing education experience.

There are no differences in the mean CCTST analysis scores among the five ranges of years of nursing education experience.
Ho3c: There are no differences in the mean CCTST evaluation scores among the five ranges of years of nursing education experience.

Ho3d: There are no differences in the mean CCTST inference scores among the five ranges of years of nursing education experience.

Ho4a: There are no differences in the mean CCTST composite scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

Ho4b: There are no differences in the mean CCTST analysis scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

Ho4c: There are no differences in the mean CCTST evaluation scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

Ho4d: There are no differences in the mean CCTST inference scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

Ho5a: There are no differences in the mean CCTST composite scores of faculty who prefer to use different categories of instructional methodology.

Ho5b: There are no differences in the mean CCTST analysis scores of faculty who prefer to use different categories of instructional methodology.

Ho5c: There are no differences in the mean CCTST evaluation scores of faculty who prefer to use different categories of instructional methodology.

Ho5d: There are no differences in the mean CCTST inference scores of faculty who prefer to use different categories of instructional methodology.

Ho6a: There are no differences in the mean CCTST composite scores of nursing faculty who report different levels of formal critical thinking training.

Ho6b: There are no differences in the mean CCTST analysis scores of nursing faculty who report different levels of formal critical thinking training.
Ho6c: There are no differences in the mean CCTST evaluation scores of nursing faculty who report different levels of formal critical thinking training.

Ho6d: There are no differences in the mean CCTST inference scores of nursing faculty who report different levels of formal critical thinking training.

Upon completion of CCTST scoring, mean scores were determined for each composite and subscore of each instrument for the three groups of nursing faculty. These groups included the mean scores for the total aggregate of nursing faculty (both ADN and BSN), mean scores for ADN faculty only and mean scores for BSN faculty only.

To test the first group of null hypotheses, the faculty mean composite and subscores of the CCTST were compared to the mean composite and subscores of the undergraduate nursing student norms for the CCTST established by the meta-analysis study (N. C. Facione, 1995) through the use of a $t$ test for testing a population value against a constant where the constant comes from a norm population (Ferguson, 1981). This provided a comparison of the faculty mean CCTST scores (population value) to established national reference norms for students (norm population). ADN faculty were compared to the reference norms for sophomore nursing students and BSN faculty were compared to the reference norms for senior nursing students.

To test the second group of null hypotheses, each of the mean CCTST composite and subscores of ADN and BSN faculty were compared through the use of a $t$ test for the difference between two independent means. According to Popham and Sirotnik (1992), the use of this $t$ test is appropriate when comparing the difference between the means of two populations, each with its own mean and variance, on the basis of statistics computed for samples of a certain size randomly drawn from these populations. The populations of ADN and BSN faculty and the
respective means of the CCTST scores reflected the appropriate criteria for this statistical test.

The third group of null hypotheses were tested using the one-way analysis of variance (ANOVA). This group of null hypotheses required the comparison of the mean CCTST scores among the five ranges which represented faculty experience in nursing education. The fourth group of null hypotheses required the comparison of the mean CCTST scores with the five different academic degree categories held by nursing faculty. The fifth group of null hypotheses required the comparison of the mean CCTST scores with the four categories of didactic instruction. The sixth and final group of null hypotheses compared the mean CCTST scores with four levels of formal training in critical thinking.

The one-way analysis of variance (ANOVA) is appropriate when the data are organized in such a fashion as to test for differences in a dependent variable among groups as they relate to a single independent variable (Popham & Sirotnik, 1992). In these cases, each CCTST mean score represented the dependent variable. The independent variables included the years of nursing education experience, and level of formal education, preferred didactic methods and level of formal training in critical thinking. With the variables meeting the required criteria, the one-way ANOVA was determined to be the most appropriate test for data analysis for these hypotheses. Mean differences between individual groups were also explored using a post-hoc comparison. The least significant difference (LSD) range test (SPSS, 1988) was utilized for this purpose.

Having determined the methods for statistical analysis, raw data for each subject were coded and entered into a data set. The data were then analyzed using the Statistical Package for Social Sciences (SPSS) on a mainframe computer.
Summary

This chapter provided an overview of the methodology which was employed to carry out this study in terms of logistics and data analysis. The population and sampling of ADN and BSN faculty in the state of Michigan was described. Instrumentation in the form of the California Critical Thinking Skill Test (CCTST) and a researcher-designed demographic data sheet was explained, as were the data collection procedures. The research questions identified in Chapter I were operationalized, leading to the development of research and null hypotheses. Finally, the data analysis procedures which were utilized were described. The results of the study are discussed in the next chapter.
CHAPTER IV

RESULTS OF THE STUDY

The purpose of this study was to examine the critical thinking skills of undergraduate nursing faculty to determine how these skills compared with the established critical thinking skill norms for undergraduate nursing students and if the critical thinking skills of nursing faculty were related to the type of program they teach in, their years of experience as a nurse educator, their level of formal educational preparation, their preferred methods of instruction and their level of formal training in critical thinking. This chapter will discuss the findings of the study related to each of the six conceptual hypotheses generated.

Description of the Study Sample

The target population for this study was full time nursing faculty who have responsibility for didactic instruction in either an associate degree nursing (ADN) or a bachelor of science in nursing degree (BSN) program in the State of Michigan. A clustered random sampling was conducted of all the ADN and BSN programs in the state, according to geographic region to attain at least one half of the programs in each category. This resulted in a sample of 17 of the 32 ADN programs and 11 of the 16 BSN programs. All of the 28 programs which were solicited for the study did participate, for a 100% response rate at the program level.

A total number of 318 faculty were asked to participate in the study. This included 175 from BSN programs and 143 from ADN programs. The total number of...
faculty who participated in the study was 120 for a 36.5% response rate. The BSN sample was 50 faculty for a 28.6% response rate. The ADN sample was 70 for a 49% response rate. Overall, individual faculty response rates among the programs solicited varied from 7% to 100% of the faculty in each program.

Results

Six conceptual hypotheses with corresponding research and null hypotheses were developed from the research questions presented in Chapter I. An alpha level of .05 was used to test all of the null hypotheses.

The first conceptual hypothesis was stated as: There is a difference between the critical thinking skills of undergraduate nursing faculty and the critical thinking skills of the average undergraduate nursing student.

Critical thinking skills were operationalized as the components of the California Critical Thinking Skills Test (P. A. Facione, 1994), which includes a composite score and subscores in the areas of analysis, evaluation, and inference. The nursing faculty scores were attained from the study sample. The average undergraduate nursing student CCTST scores were derived from the meta-analysis study by N. C. Facione (1995) which included 1,992 nursing students nation-wide. These CCTST scores were reported according to collegiate year: sophomore or senior. The meta-analysis study data provided for a comparison between nursing faculty and the level of student they teach in the ADN and BSN programs respectively. Eight research hypotheses were derived for this first conceptual hypothesis:
H1a: The mean CCTST composite score for ADN nursing faculty is different from the mean CCTST composite score of 15.6 for the sophomore nursing student norm reference group.

H1b: The mean CCTST composite score for BSN nursing faculty is different from the mean CCTST composite score of 16.7 for the senior nursing student norm reference group.

H1c: The mean CCTST analysis score for ADN nursing faculty is different from the mean CCTST analysis score of 4.3 for the sophomore nursing student norm reference group.

H1d: The mean CCTST analysis score for BSN nursing faculty is different from the mean CCTST analysis score of 4.7 for the senior nursing student norm reference group.

H1e: The mean CCTST evaluation score for ADN nursing faculty is different from the mean CCTST evaluation score of 5.7 for the sophomore nursing student norm reference group.

H1f: The mean CCTST evaluation score for BSN nursing faculty is different from the mean CCTST evaluation score of 6.0 for the senior nursing student norm reference group.

H1g: The mean CCTST inference score for ADN nursing faculty is different from the mean CCTST inference score of 5.5 for the sophomore nursing student norm reference group.

H1h: The mean CCTST inference score for BSN nursing faculty is different from the mean CCTST inference score of 6.2 for the senior nursing student norm reference group.

The corresponding eight null hypotheses to be tested were:
Hola: There is no difference in the mean CCTST composite score for ADN nursing faculty when compared to the mean CCTST composite score of 15.6 for the sophomore nursing student norm reference group.

Holb: There is no difference in the mean CCTST composite score for BSN nursing faculty when compared to the mean CCTST composite score of 16.7 for the senior nursing student norm reference group.

Holc: There is no difference in the mean CCTST analysis score for ADN nursing faculty when compared to the mean CCTST analysis score of 4.3 for the sophomore nursing student norm reference group.

Hold: There is no difference in the mean CCTST analysis score for BSN nursing faculty when compared to the mean CCTST analysis score of 4.7 for the senior nursing student norm reference group.

Holb: There is no difference in the mean CCTST evaluation score for ADN nursing faculty when compared to the mean CCTST evaluation score of 5.7 for the sophomore nursing student norm reference group.

Holf: There is no difference in the mean CCTST evaluation score for BSN nursing faculty when compared to the mean CCTST evaluation score of 6.0 for the senior nursing student norm reference group.

Holg: There is no difference in the mean CCTST inference score for ADN nursing faculty when compared to the mean CCTST inference score of 5.5 for the sophomore nursing student norm reference group.

Holf: There is no difference in the mean CCTST inference score for BSN nursing faculty when compared to the mean CCTST inference score of 6.2 for the senior nursing student norm reference group.
These hypotheses were tested by comparing the mean composite and subscores of the CCTST for nursing faculty to the mean CCTST composite and subscores of the undergraduate nursing student norms which were attained from the meta-analysis study by N. C. Facione (1995). A t test for testing a population value against a constant which is derived from a norm population was used to compare the sample nursing faculty means to the national population norm reference nursing student group means. The population norms from the meta-analysis study by N. C. Facione (1995) were reported according to collegiate year: sophomore or senior. The nursing faculty CCTST score means were reported according to the program the faculty represented, either ADN or BSN.

Differences were found between each of the faculty CCTST score means and each of the CCTST score means of nursing student norm reference groups. Table 1 illustrates the differences among the nursing faculty and student nurse groups.

As Table 1 demonstrates, the differences between the faculty and student CCTST mean scores are consistently noted, with the faculty scoring higher than the student reference groups in each case, using the .05 alpha level. Based on these findings, the first eight null hypotheses are rejected, and the research hypotheses are supported, as the mean CCTST composite, analysis, evaluation, and inference scores of nursing faculty are higher than the mean CCTST composite, analysis, evaluation, and inference scores of the nursing student norms.

The second conceptual hypothesis stated: There is a difference between the critical thinking skills of associate degree nursing (ADN) faculty and the critical thinking skills of bachelor of science nursing (BSN) faculty. Four research hypotheses were derived from this conceptual hypothesis:
### Table 1

Comparison of Mean CCTST Scores of Nursing Faculty and Students

<table>
<thead>
<tr>
<th>Nursing Faculty and Nursing Student Norm Groups</th>
<th>n</th>
<th>Standard Deviation</th>
<th>Mean CCTST Score</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADN Faculty</td>
<td>70</td>
<td>3.80</td>
<td>19.9</td>
<td></td>
</tr>
<tr>
<td>Sophomore Student</td>
<td>367</td>
<td>4.10</td>
<td>15.6</td>
<td>.000*</td>
</tr>
<tr>
<td>BSN Faculty</td>
<td>50</td>
<td>4.40</td>
<td>21.4</td>
<td></td>
</tr>
<tr>
<td>Senior Student</td>
<td>682</td>
<td>4.15</td>
<td>16.7</td>
<td></td>
</tr>
<tr>
<td>Analysis Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADN Faculty</td>
<td>70</td>
<td>1.41</td>
<td>4.9</td>
<td>.000*</td>
</tr>
<tr>
<td>Sophomore Student</td>
<td>367</td>
<td>1.50</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td>BSN Faculty</td>
<td>50</td>
<td>1.27</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Senior Student</td>
<td>682</td>
<td>1.50</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>Evaluation Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADN Faculty</td>
<td>70</td>
<td>2.00</td>
<td>8.3</td>
<td>.000*</td>
</tr>
<tr>
<td>Sophomore Student</td>
<td>367</td>
<td>2.30</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td>BSN Faculty</td>
<td>50</td>
<td>2.46</td>
<td>9.2</td>
<td>.000*</td>
</tr>
<tr>
<td>Senior Student</td>
<td>682</td>
<td>2.00</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Inference Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADN Faculty</td>
<td>70</td>
<td>1.64</td>
<td>6.7</td>
<td>.000*</td>
</tr>
<tr>
<td>Sophomore Student</td>
<td>367</td>
<td>1.70</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>BSN Faculty</td>
<td>50</td>
<td>1.89</td>
<td>6.8</td>
<td>.016*</td>
</tr>
<tr>
<td>Senior Student</td>
<td>682</td>
<td>2.00</td>
<td>6.2</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05 alpha level
**H2a:** There is a difference between the mean CCTST composite score of ADN faculty and the mean CCTST composite score of BSN faculty.

**H2b:** There is a difference between the mean CCTST analysis score of ADN faculty and the mean CCTST analysis score of BSN faculty.

**H2c:** There is a difference between the mean CCTST evaluation score of ADN faculty and the mean CCTST evaluation score of BSN faculty.

**H2d:** There is a difference between the mean CCTST inference score of ADN faculty and the mean CCTST inference score of BSN faculty.

The corresponding null hypotheses to be tested were:

**Ho2a:** There is no difference between the mean CCTST composite scores of ADN faculty and the mean CCTST composite scores of BSN faculty.

**Ho2b:** There is no difference between the mean CCTST analysis scores of ADN faculty and the mean CCTST analysis scores of BSN faculty.

**Ho2c:** There is no difference between the mean CCTST evaluation scores of ADN faculty and the mean CCTST evaluation scores of BSN faculty.

**Ho2d:** There is no difference between the mean CCTST inference scores of ADN faculty and the mean CCTST inference scores of BSN faculty.

These hypotheses were tested with a \( t \) test for independent samples to compare the mean scores of the 70 ADN faculty to the mean scores of the 50 BSN faculty. The results are summarized and illustrated in Table 2, which reflects the CCTST composite scores and the CCTST subscores of analysis, evaluation, and inference, respectively, for each faculty group.

As Table 2 demonstrates, differences were found in analysis and evaluation subscores at the .05 alpha level, while differences were not found in the composite score and the inference subscore at the .05 alpha level. Based on these findings, the null
hypotheses which suggested that there are no differences in the mean CCTST composite and inference scores of ADN and BSN faculty are not rejected, and no conclusions can be made regarding differences in the overall critical thinking CCTST score nor the critical thinking skill of inference in regard to ADN and BSN faculty. The two null hypotheses which stated that there are no differences in the mean CCTST analysis and evaluation scores of ADN and BSN faculty are rejected. The findings support the research hypotheses which stated that the mean CCTST analysis and evaluation scores are different for ADN and BSN faculty.

Table 2
Comparison of Mean CCTST Scores of ADN and BSN Faculty

<table>
<thead>
<tr>
<th>Faculty Group for Each CCTST Score</th>
<th>n</th>
<th>Standard Deviation</th>
<th>Mean Score</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSN Nursing Faculty</td>
<td>50</td>
<td>4.40</td>
<td>21.4</td>
<td>.055</td>
</tr>
<tr>
<td>ADN Nursing Faculty</td>
<td>70</td>
<td>3.80</td>
<td>19.9</td>
<td></td>
</tr>
<tr>
<td>Analysis Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSN Nursing Faculty</td>
<td>50</td>
<td>1.22</td>
<td>5.5</td>
<td>.034*</td>
</tr>
<tr>
<td>ADN Nursing Faculty</td>
<td>70</td>
<td>1.41</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>Evaluation Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSN Nursing Faculty</td>
<td>50</td>
<td>2.46</td>
<td>9.2</td>
<td>.048*</td>
</tr>
<tr>
<td>ADN Nursing Faculty</td>
<td>70</td>
<td>2.00</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Inference Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSN Nursing Faculty</td>
<td>50</td>
<td>1.90</td>
<td>6.8</td>
<td>.686</td>
</tr>
<tr>
<td>ADN Nursing Faculty</td>
<td>70</td>
<td>1.64</td>
<td>6.7</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05 alpha level

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The third conceptual hypothesis stated: There is a relationship between the critical thinking skills of nursing faculty and their years of nursing education experience. The number of years of nursing education experience was operationalized as one of five ranges: 1–5 years, 6–10 years, 11–15 years, 16–20 years, and more than 20 years. Four research hypotheses were derived from this conceptual hypothesis:

*H3a:* There are differences in the mean CCTST composite scores among the five ranges of years of nursing education experience.

*H3b:* There are differences in the mean CCTST analysis scores among the five ranges of years of nursing education experience.

*H3c:* There are differences in the mean CCTST evaluation scores among the five ranges of years of nursing education experience.

*H3d:* There are differences in the mean CCTST inference scores among the five ranges of years of nursing education experience.

The four corresponding null hypotheses which were tested stated:

*Ho3a:* There are no differences in the mean CCTST composite scores among the five ranges of years of nursing education experience.

*Ho3b:* There are no differences in the mean CCTST analysis scores among the five ranges of years of nursing education experience.

*Ho3c:* There are no differences in the mean CCTST evaluation scores among the five ranges of years of nursing education experience.

*Ho3d:* There are no differences in the mean CCTST inference scores among the five ranges of years of nursing education experience.

Using the one-way analysis of variance (ANOVA), each of the four mean CCTST scores were compared to the five ranges of nursing education experience. In each case, differences were not found among the means using the 0.05 alpha level. The Cochrane C
test for homogeneity of variance for each CCTST test also exceeds the .05 alpha level.

Table 3 reflects the mean CCTST scores, standard deviation and sample number for each group in regard to years of experience in nursing education.

Table 3

Mean CCTST Scores and Years of Nursing Education
Experience of Nursing Faculty

<table>
<thead>
<tr>
<th>Nursing Ed. Experience Range</th>
<th>CCTST Composite Score</th>
<th>CCTST Analysis Score</th>
<th>CCTST Evaluation Score</th>
<th>CCTST Inference Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$p = .126$</td>
<td>$p = .280$</td>
<td>$p = .140$</td>
<td>$p = .366$</td>
</tr>
<tr>
<td>1–5 Years $(n = 28)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.7</td>
<td>5.0</td>
<td>8.8</td>
<td>6.9</td>
</tr>
<tr>
<td>$SD$</td>
<td>3.5</td>
<td>1.5</td>
<td>1.8</td>
<td>1.7</td>
</tr>
<tr>
<td>6–10 years $(n = 22)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.9</td>
<td>5.1</td>
<td>8.7</td>
<td>7.1</td>
</tr>
<tr>
<td>$SD$</td>
<td>3.9</td>
<td>1.0</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>11–15 years $(n = 22)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>22.2</td>
<td>5.4</td>
<td>9.6</td>
<td>7.0</td>
</tr>
<tr>
<td>$SD$</td>
<td>4.3</td>
<td>1.4</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>16–20 years $(n = 20)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>19.0</td>
<td>4.7</td>
<td>8.1</td>
<td>6.2</td>
</tr>
<tr>
<td>$SD$</td>
<td>4.5</td>
<td>1.3</td>
<td>2.7</td>
<td>1.7</td>
</tr>
<tr>
<td>20+ years $(n = 28)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.0</td>
<td>5.4</td>
<td>8.2</td>
<td>6.5</td>
</tr>
<tr>
<td>$SD$</td>
<td>4.1</td>
<td>1.4</td>
<td>2.0</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Note. ANOVA was used to compare means; $p > .05$; null hypothesis not rejected.

The analysis of these findings indicate that there is no evidence to support the research hypotheses which stated that there are differences in critical thinking skills.
among faculty who report different levels of nursing education experience. The null hypotheses which stated that there are no differences in the mean CCTST composite, analysis and evaluation and inference scores of nursing faculty among the five ranges of nursing education experience are not rejected. No support for the research hypotheses was found. Therefore, no conclusions can be made in regard to the critical thinking skills of analysis, evaluation, and inference and their relationship to nursing education experience.

The fourth conceptual hypothesis stated: There is a relationship between the critical thinking skills of nursing faculty and their level of formal education. Level of formal education was operationalized as the attainment of the highest academic degree: baccalaureate, masters, or doctorate. These degrees were further refined as either reflecting nursing or non-nursing majors. Four research hypotheses were derived from this conceptual hypothesis:

\( H_{4a} \): There are differences in the mean CCTST composite scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

\( H_{4b} \): There are differences in the mean CCTST analysis scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

\( H_{4c} \): There are differences in the mean CCTST evaluation scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

\( H_{4d} \): There are differences in the mean CCTST inference scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

The corresponding null hypotheses to be tested were:

\( H_{04a} \): There are no differences in the mean CCTST composite scores of nursing faculty with baccalaureate, masters, or doctoral degrees.
Ho4b: There are no differences in the mean CCTST analysis scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

Ho4c: There are no differences in the mean CCTST evaluation scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

Ho4d: There are no differences in the mean CCTST inference scores of nursing faculty with baccalaureate, masters, or doctoral degrees.

The frequency counts of each degree level according to the five categories revealed that 14 faculty reported the baccalaureate degree as the highest degree earned, for 11.7% of the total sample. The most common degree among nursing faculty is a masters degree within a nursing major, with 76 faculty in this category for 63.3% of the total sample. A non-nursing masters was reported by 10 faculty for 8.3% of the sample. Doctorally prepared nursing faculty represent 16.7% of the total sample. Of those faculty, 15 faculty reported a non-nursing doctorate, while 5 faculty had a nursing doctorate.

The one-way ANOVA was used to determine if there were differences among the various educational level groups in regard to the CCTST composite and subscores. In each case no differences were found among the means at the 0.05 alpha level. Once again the Cochrane C test for homogeneity of variance demonstrated a probability which exceeded the .05 alpha level.

Based upon the data analysis, the null hypotheses which stated that there would be no differences in mean CCTST composite, analysis, evaluation, and inference scores among faculty with baccalaureate, masters, or doctoral degrees are not rejected. No support was found for the research hypotheses. Consequently, no conclusions can be drawn in regard to a relationship between the critical thinking skills of analysis, evaluation, and inference and the level of formal educational...
preparation of the nursing faculty. Table 4 represents the mean CCTST scores, standard deviations and sample size for each educational level group.

Table 4
Mean CCTST Scores and Educational Level of Nursing Faculty

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>CCTST Composite Score</th>
<th>CCTST Analysis Score</th>
<th>CCTST Evaluation Score</th>
<th>CCTST Inference Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baccalaureate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 14)</td>
<td>Mean</td>
<td>20.6</td>
<td>4.7</td>
<td>8.7</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>2.2</td>
<td>1.4</td>
<td>1.5</td>
</tr>
<tr>
<td>Masters: nursing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 76)</td>
<td>Mean</td>
<td>20.9</td>
<td>5.3</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>4.4</td>
<td>1.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Masters: non-nursing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 10)</td>
<td>Mean</td>
<td>18.3</td>
<td>4.4</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>4.1</td>
<td>1.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Doctorate: nursing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 5)</td>
<td>Mean</td>
<td>23.0</td>
<td>5.2</td>
<td>10.6</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>3.7</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Doctorate: non-nursing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 15)</td>
<td>Mean</td>
<td>19.5</td>
<td>5.2</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>3.8</td>
<td>1.1</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Note. ANOVA was used to compare means; p > .05; null hypothesis not rejected.

The fifth conceptual hypothesis stated: There is a relationship between critical thinking skills of nursing faculty and their preferred methods of instruction. Preferred
The method of instruction was operationalized according to the level of student participation in the didactic setting. The categories for didactic instruction were (a) instructor-delivered lecture, (b) instructor-led discussion, (c) structured student learning activities where the instructor designs and guides the activity, or (d) interdependent group learning activities where the instructor serves as facilitator only in the student-guided exploration of a designated topic. Four research hypotheses were derived from this conceptual hypothesis:

- **H5a:** There are differences in the mean CCTST composite scores of nursing faculty who prefer to use different categories of instructional methodology.

- **H5b:** There are differences in the mean CCTST analysis scores of nursing faculty who prefer to use different categories of instructional methodology.

- **H5c:** There are differences in the mean CCTST evaluation scores of nursing faculty who prefer to use different categories of instructional methodology.

- **H5d:** There are differences in the mean CCTST inference scores of nursing faculty who prefer to use different categories of instructional methodology.

The null hypotheses which were tested were:

- **Ho5a:** There are no differences in the mean CCTST composite scores of faculty who prefer to use different categories of instructional methodology.

- **Ho5b:** There are no differences in the mean CCTST analysis scores of faculty who prefer to use different categories of instructional methodology.

- **Ho5c:** There are no differences in the mean CCTST evaluation scores of faculty who prefer to use different categories of instructional methodology.

- **Ho5d:** There are no differences in the mean CCTST inference scores of faculty who prefer to use different categories of instructional methodology.
The initial frequency distribution of these categories revealed that only six of the faculty, or just 5%, selected the fourth category, interdependent group learning activities as their primary method of instruction. Therefore, this category was deleted and these six responses were added to category number three, structured student learning experiences, which proved to be the most frequently selected category. This category, which reflects the most active student role in the didactic activity of the three remaining was selected by a total of 53 or 44.2% of the faculty sample. The second most popular response was category one, traditional instructor-delivered instruction, where the student has the most passive role in the didactic experience. Thirty-seven or 30.8% of the faculty selected this category. Finally, the second category of instructor-led discussion had the least number of responses. Thirty faculty or 25% of the total sample selected this category.

The one-way ANOVA was used to determine if there were differences among the faculty who preferred one of the three methods of instruction in regard to their CCTST scores. In each case no differences were found among the means using the 0.05 alpha level, and the Cochrane C test for homogeneity of variance yielded values for each CCTST test were also greater than the .05 alpha level.

All four of the null hypotheses which stated that there are no differences in mean CCTST scores in faculty according to their choice of instructional method are not rejected. No support was found for the research hypotheses. Consequently, no conclusions can be made in regard to the relationship of critical thinking skills as measured by the CCTST and the faculty member’s preferred teaching methodology.

Table 5 reflects the mean CCTST scores, standard deviations, and sample size each group of nursing faculty according to their preferred level of instruction.
Table 5
Mean CCTST Scores and Preferred Teaching Methods of Nursing Faculty

<table>
<thead>
<tr>
<th>Teaching Method</th>
<th>CCTST Composite Score</th>
<th>CCTST Analysis Score</th>
<th>CCTST Evaluation Score</th>
<th>CCTST Inference Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>p = .629</td>
<td>p = .323</td>
<td>p = .798</td>
<td>p = .792</td>
</tr>
<tr>
<td>Lecture (n = 37)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>21.1</td>
<td>5.4</td>
<td>8.9</td>
<td>6.8</td>
</tr>
<tr>
<td>SD</td>
<td>4.6</td>
<td>1.3</td>
<td>2.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Discussion (n = 30)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>19.8</td>
<td>4.8</td>
<td>8.5</td>
<td>6.5</td>
</tr>
<tr>
<td>SD</td>
<td>3.9</td>
<td>1.0</td>
<td>2.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Student-Centered (n = 53)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.6</td>
<td>5.2</td>
<td>8.5</td>
<td>6.8</td>
</tr>
<tr>
<td>SD</td>
<td>3.9</td>
<td>1.5</td>
<td>2.1</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Note. ANOVA was used to compare means; p > .05; null hypothesis not rejected.

The sixth conceptual hypothesis stated: There is a relationship between the critical thinking skills of nursing faculty and their level of formal training in critical thinking. Level of formal training in critical thinking was operationalized according to the mechanisms faculty may have utilized to enhance their own understanding of critical thinking and subsequently, their teaching methods. Mechanisms could range from (a) none, (b) reading critical thinking literature only, (c) attending critical thinking conferences or workshops only, or (d) both reading and continuing education. Four research hypotheses were derived from this conceptional hypothesis:
$H6a$: There are differences in the mean CCTST composite scores of nursing faculty who report different levels of critical thinking training.

$H6b$: There are differences in the mean CCTST analysis scores of nursing faculty who report different levels of critical thinking training.

$H6c$: There are differences in the mean CCTST evaluation scores of nursing faculty who report different levels of critical thinking training.

$H6d$: There are differences in the mean CCTST inference scores of nursing faculty who report different levels of critical thinking training.

The corresponding null hypotheses which were tested were:

$Ho6a$: There are no differences in the mean CCTST composite scores of nursing faculty who report different levels of formal critical thinking training.

$Ho6b$: There are no differences in the mean CCTST analysis scores of nursing faculty who report different levels of formal critical thinking training.

$Ho6c$: There are no differences in the mean CCTST evaluation scores of nursing faculty who report different levels of formal critical thinking training.

$Ho6d$: There are no differences in the mean CCTST inference scores of nursing faculty who report different levels of formal critical thinking training.

Of the 120 subjects in the study, only 7 reported that they had no training in critical thinking, either in the form of reading or continuing education. These 7 responses, comprising only 5.8% of the sample, were deleted from the final data analysis and only the three categories which represented some degree of critical thinking training were utilized. The majority of the faculty who participated in the study indicated that they had completed both readings and continuing education in critical thinking. Sixty-one or 50.8% selected this response. Thirty-two faculty reported completing only readings in critical thinking, for 26.7% of the total sample.
and finally, 20 faculty had attended at least one conference on critical thinking for 16.7%.

The one-way ANOVA was used once again to determine if there were differences in CCTST scores among faculty who had selected one of the three options of critical thinking training. In each case, no differences were found among the means using the 0.05 alpha level. The Cochrane C test for homogeneity of variance also reveals probabilities which exceed the .05 alpha level for each CCTST test. Table 6 reflects the mean CCTST scores of nursing faculty according to their level involvement in professional development in critical thinking.

Table 6
Mean CCTST Scores and Levels of Critical Thinking Training of Nursing Faculty

<table>
<thead>
<tr>
<th>Level of Training in Critical Thinking</th>
<th>CCTST Composite Score</th>
<th>CCTST Analysis Score</th>
<th>CCTST Evaluation Score</th>
<th>CCTST Inference Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readings Only (n = 32)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>19.5</td>
<td>5.0</td>
<td>8.1</td>
<td>6.4</td>
</tr>
<tr>
<td>SD</td>
<td>5.0</td>
<td>4.2</td>
<td>2.7</td>
<td>1.9</td>
</tr>
<tr>
<td>Workshops Only (n = 20)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.2</td>
<td>4.2</td>
<td>8.4</td>
<td>6.6</td>
</tr>
<tr>
<td>SD</td>
<td>3.8</td>
<td>1.1</td>
<td>2.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Readings &amp; Workshops (n = 61)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>21.2</td>
<td>5.1</td>
<td>9.0</td>
<td>7.0</td>
</tr>
<tr>
<td>SD</td>
<td>3.8</td>
<td>1.4</td>
<td>2.0</td>
<td>1.7</td>
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</table>

Note. ANOVA was used to compare means; p > .05; null hypothesis not rejected.
In view of the data analysis, all four of the null hypotheses which stated that there are no differences in mean CCTST scores among faculty who select different instructional methods are not rejected. No support was found for the four research hypotheses. Therefore, no conclusions can be made in regard to a relationship between critical thinking ability and teaching methods utilized by nursing faculty.

Summary

This chapter has provided an overview of the results of the data analysis which was conducted to determine if any relationships existed between the dependent variable of critical thinking skills of undergraduate nursing faculty as measured by the CCTST and a variety of independent variables. The CCTST scores were compared to national norms for student nurses as well as the type of program the faculty teach in, their years of experience in nursing education, their level of formal educational preparation, their preferred methods of instruction and their level of formal training in critical thinking.

Twenty-eight null hypotheses were tested. Based upon the data analysis, 10 null hypotheses which were derived from the first two conceptual hypotheses are rejected and the corresponding research hypotheses are supported. The first conceptual hypothesis stated that there is a difference between the critical thinking skills of undergraduate nursing faculty and the critical thinking skills of the average undergraduate nursing student. The findings of the study revealed that the nursing faculty demonstrated higher mean CCTST scores in all areas when compared to mean CCTST scores for corresponding norm referenced nursing student groups. Thus, all eight of the null hypotheses related to this conceptual hypothesis were rejected and the research hypotheses were supported.
In regard to the second conceptual hypothesis which stated that there is a difference between the critical thinking skills of ADN faculty and the critical thinking skills of BSN faculty, the study revealed a relationship between the type of program nursing faculty teach in and the CCTST subscores of analysis and evaluation. BSN faculty demonstrated higher mean scores in the areas of analysis and evaluation than their ADN colleagues. Thus, the two null hypotheses which stated that there is no difference between the mean CCTST subscores of analysis and evaluation were rejected and the research hypotheses were supported. There was no evidence of a relationship, however, between the mean CCTST composite score and the mean inference subscore and the type of program the faculty teaches in; thus, no conclusions can be made in regard to these two research hypotheses.

Finally, the remaining four conceptual hypotheses which stated that there is a relationship between the mean CCTST scores and the variables of nursing education experience, educational level, preferred teaching method, and level of critical thinking training were not supported by the findings of the study. The 16 null hypotheses that correspond to these conceptual hypotheses are not rejected. No conclusions can be made in regard to possible relationships between critical thinking skill level as measured by the CCTST and the variables of years of experience in nursing education, level of education, preferred teaching method, and level of critical thinking training. These findings of the study are discussed in the next and final chapter.
CHAPTER V

DISCUSSION OF THE STUDY

The purpose of this study was to examine the critical thinking skills of undergraduate nursing faculty to determine how these skills compared to the established critical thinking skill norms for undergraduate nursing students and if the critical thinking skills of nursing faculty were related to the type of program they teach in, their years of experience as a nurse educator, their level of formal educational preparation, their preferred methods of instruction, and their level of formal training in critical thinking.

This chapter will present a discussion of the findings of the study.

Significant Findings of the Study

The California Critical Thinking Skills Test (CCTST) (P. A. Facione, 1994) was used to measure the critical thinking skills of the 120 undergraduate nursing faculty participating in the study. The CCTST composite scores as well as the analysis, evaluation and inference subscores were compared to national norms for student nurses (N. C. Facione, 1995). The results of the study demonstrated that nursing faculty scored consistently higher than nursing students in all areas. In addition, when associate degree nursing (ADN) faculty scores were compared to bachelor of science degree nursing (BSN) faculty scores, BSN faculty demonstrated higher critical thinking skills than ADN faculty in the cognitive subskills of analysis and evaluation.
Based upon the remaining findings of the study, no conclusions can be drawn in regard to a relationship between critical thinking skills as measured by the CCTST and the variables of years of experience in nursing education, educational level, preferred teaching method or level of formal training in critical thinking among the faculty who participated in the study.

Relationship of the Study to Previous Critical Thinking Research

This study of the critical thinking attributes of undergraduate nursing faculty provides a perspective which has not been previously explored in the general higher education literature. The only related study from the higher education arena is the recently published study by Paul et al. (1997) which explored perceptions and practices of teachers and higher education faculty related to critical thinking in the California educational system. The faculty aspect of the critical thinking construct has been explored in the nursing education literature, but not extensively, with only five studies cited prior to this one.

In regard to the question of whether nursing faculty would demonstrate higher critical thinking skill levels than the average undergraduate nursing student, the study reflected the fact that nursing faculty did demonstrate critical thinking skills which were superior to those of their nursing student counterparts. Although it might be assumed that nursing faculty would demonstrate superior critical thinking skills when compared to their students, the studies by M. Jones (1992) and Saarman et al. (1992) did not support this premise. M. Jones found that baccalaureate (BSN) nursing faculty did not outperform their students on the Cornell Critical Thinking Test (CCTT). Likewise Saarman et al. found that nursing faculty did not score significantly higher than sophomore nursing students. Saarman et al. used both the
CCTT and the WGCTA as critical thinking measurement instruments. This study presents a different perspective when comparing the critical thinking skills of nursing faculty and students, as the faculty did demonstrate higher critical thinking skills. In addition, this study utilized a different measurement instrument, the CCTST. This is noteworthy because the CCTST is based on the APA Delphi conceptualization of critical thinking, whereas the CCTT and the WGCTA are not.

The findings of this study support the studies of Hartley (1992) and Hartley and Aukamp (1994) who found nursing faculty to demonstrate higher critical thinking skills than baccalaureate nursing students. However, these studies also used the Watson Glaser Critical Thinking Appraisal (WGCTA) as the critical thinking measurement instrument, not the CCTST. The only study which is closely aligned with this study was conducted by Lacey (1996), where the CCTST was used to measure the critical thinking skills of ADN students, BSN students, and nursing faculty. Lacey found that although there were no differences between ADN and BSN students, faculty did score higher than either student group on the CCTST. This study lends support to these findings.

Although the nursing education literature is laden with studies which have compared the critical thinking skills of students at different levels, such as ADN versus BSN, the comparison of ADN and BSN faculty in regard to critical thinking skills has not been explored in the nursing education literature which is available to date. The National League for Nursing (NLN) has identified specific, but different criteria related to critical thinking for both programs (NLN, 1990, 1991). This would imply that the critical thinking skills required for each level of practice may be different from the discipline perspective. Whether or not this is related to the necessary critical thinking skill level of the respective faculty remains to be explored.
Most of the nursing education research, which spans from 1979 to the present has focused on the construct of critical thinking within the context of baccalaureate nursing education (Bauwens & Gerhard, 1987; Berger, 1984; Brigham, 1989; Kokinda, 1989; Miller, 1987, 1992; Patterson, 1994; Saucier, 1995; Sullivan, 1987). Only recently, has research also focused on the associate degree nursing student as a separate entity (Toth, 1997). The many studies which have compared BSN and ADN students have rendered mixed results, with some studies demonstrating that the BSN student has higher critical thinking skill level than that of the ADN student (Bingaman, 1993; Brooks & Shepherd, 1992; del Bueno, 1990; Itano, 1989; Kokinda, 1989; Lynch, 1988; Murphy, 1990; Pardue, 1987; Pepa et al., 1997). These studies are almost equivalent to those which failed to support the premise that BSN students would outperform their ADN counterparts in regard to critical thinking skills (Bower, 1995; Brigham, 1989; Dungan, 1985; Gross et al., 1987; J. T. Jones, 1984; Notarianni, 1991; Poole, 1989; Saint Clair, 1994).

This study suggests that in the cognitive domains of analysis and evaluation, BSN faculty are more skilled than ADN faculty. Although this conclusion is not supported specifically by other research, the general consensus from the nursing research literature that the baccalaureate nursing education experience results in higher critical thinking skill development than that of the associate degree nursing education experience is congruent with the findings of the study. If critical thinking is a greater focus at the BSN level than that of the ADN, it could be expected that BSN faculty may demonstrate a greater sense of accountability to critical thinking as a professional skill than does the ADN faculty member, whose focus is primarily on the development of technical nursing skills. This notion is supported by Marshall (1995) who found that associate degree nursing faculty viewed critical thinking more
simplistically than did baccalaureate nursing faculty. In the same vein, C. J. Green (1995) found that BSN faculty used more critical thinking methods in the didactic setting than did ADN faculty. The findings of this study are consistent with these related studies.

The findings of this study did not demonstrate a relationship between critical thinking skills and the number of years of experience the faculty member had in nursing education. Nor was a relationship between critical thinking skill and educational preparation of the nursing faculty member demonstrated. Neither of these variables have previously been addressed in the research literature as they are related to actual critical thinking skill level of nursing faculty. However, the findings of the present study are congruent with those of Doas (1997) who examined these same two variables, experience and educational degrees in generic and RN to BSN students for their relationship to CCTST scores. Her findings with students paralleled the findings of this study with faculty. Gordon's (1997) study found that the way nursing faculty conceptualized critical thinking as a construct was related to the number of years of teaching experience and level of educational preparation. However, Gordon's study also found that regardless of these relationships, faculty lacked clarity regarding the fullest expression of the mechanisms and operations of critical thinking processes and applications. This finding was substantiated by other studies among nurse educators (P. C. Baker, 1992; Christie, 1992; C. J. Green, 1995; Jones & Brown, 1991; Koch-Parrish, 1992; Marshall, 1995; Ruest, 1993) as well as by Paul et al. (1997) with higher education faculty in general. This study provides further validation of this lack of clarity in terms of what critical thinking is and how it is to be operationalized within the context of nursing education and practice. If faculty are not clear about what critical thinking is, it can be inferred that they have
not consciously cultivated this skill, in spite of their professional growth and development in the form of professional experience and formal educational endeavors.

The findings of this study did not demonstrate a relationship between critical thinking skill level of nursing faculty and their preferred method of didactic instruction. The relationship between these variables had not been explored prior to this study. The majority of the participants in the study did select the teaching method which reflected the most active student involvement in the didactic process. This apparent endorsement of active student participation in didactic methods by faculty is consistent with the conclusions of studies which reflect faculty agreement that passive learning is ineffective in teaching critical thinking (Harrington, 1992; McCaffrey, 1993; Sander, 1992; Tate, 1996; Toth, 1997). However, Paul et al. (1997) noted in their recent faculty study that “though the overwhelming majority (89%) claimed critical thinking to be a primary objective of their instruction, only a small minority (19%) gave a clear explanation of what critical thinking is. Furthermore, according to their answers, only 9% of the respondents were clearly teaching for critical thinking on a typical day in class” (p. 18). The implications of this study in regard to the findings of Paul et al. suggest that although nursing faculty may be utilizing more interactive techniques in the classroom setting, there is no current evidence to demonstrate that the techniques are chosen because of faculty members’ skill level in critical thinking.

Finally, the findings of this study did not demonstrate a relationship between critical thinking skills of nursing faculty and their level of formal training in critical thinking. Only one previous study (Koch-Parrish, 1992) addressed the issue of professional development for the purpose of improving individual faculty skills in
critical thinking. Unlike the Koch-Parrish study which noted that most of the faculty surveyed reported little or no training in critical thinking, this study indicated that the majority of the faculty who participated reported that they had completed both readings in critical thinking and attended one or more workshops in critical thinking. However, there was no evidence to suggest that this professional development in critical thinking impacted upon their critical thinking ability. These findings are again supported by the Doas (1997) study which found that neither generic nor RN to BSN students in a baccalaureate program demonstrated higher critical thinking skills as measured by the CCTST in relation to having taken previous critical thinking courses. The implications of both these studies suggest that perhaps isolated experiences in critical thinking training may not have the effect of improving actual critical thinking ability as measured by the CCTST.

Implications of the Study for Current Critical Thinking Theory

Prior to this study, the majority of research in the discipline of nursing education has focused on concept definition, construct development and the attempt to operationalize critical thinking within the education and nursing practice domains. Gordon (1997) noted that although nursing faculty contend that they conceptualize critical thinking in the same way that critical thinking experts from other disciplines do, it is evident from her study that nurse educators’ view of critical thinking is not congruent with that of critical thinking experts. In addition, the perceptions of faculty regarding critical thinking are not consistent within the discipline (Gordon, 1997; Koch-Parrish, 1992; Marshall, 1995).

The conceptual framework for this study was based upon the consensus definition of critical thinking which was developed by the American Philosophical
Association (APA) Delphi report (P. A. Facione, 1991). This definition has provided an excellent framework for further study in the realm of critical thinking, allowing for more probing research which can move beyond construct development to examine the assessment and interventions related to critical thinking from a common critical thinking conceptualization.

Prior to this study, the nursing education community had utilized other critical thinking frameworks which have resulted in very inconclusive results regarding the measurement of critical thinking in nurses and nursing students. These frameworks primarily utilized the critical thinking models proposed by the Watson Glaser Critical Thinking Appraisal (WGCTA) (Watson & Glaser, 1980) or the Cornell Critical Thinking Test (Ennis, 1985). Both of these instruments are based on slightly different critical thinking models which are not consistent with the critical thinking construct as defined by the APA Delphi consensus definition (Rane-Szostak & Robertson, 1996). The use of the California Critical Thinking Skills Test (CCTST) in this study has the potential to elevate the critical thinking research and theory development to a new level as it is the first and only critical thinking instrument to derive its construct validity from the APA consensus definition of critical thinking (P. A. Facione, 1994).

The nursing education community was fairly unfamiliar with the CCTST prior to this study, as only one other study (Lacey, 1996) had tested faculty critical thinking skills using the CCTST with results which were congruent with the findings of this study. This lack of familiarity with the CCTST provided a unique opportunity to examine faculty critical thinking skills with minimal preconceived knowledge about the instrument.

The most noteworthy findings of the study, which demonstrate that nursing faculty participating in the study scored higher than the nursing student norm
reference groups lend credibility to the CCTST as a viable instrument to measure the critical thinking attributes that are consistent with those desired in nurses. If nursing educators are assumed to be superior critical thinkers by virtue of their nursing practice experiential base, then nursing students could be inferred to be less skilled in their critical thinking ability. The results of the study bear this out in regard to the performance of faculty on the CCTST.

The current status of the conceptualization of critical thinking in nursing education reflects a fragmented approach, with individual programs defining critical thinking from a variety of perspectives (NLN, 1991). This lack of congruence has resulted in an ineffective attempt to assess critical thinking from a common perspective and consequently to identify effective interventions to promote critical thinking in students. If the discipline of nursing were able to embrace a common critical thinking definition and model, such as the one proposed by the APA Delphi report, the progression toward critical thinking theory development would be greatly facilitated. The critical thinking framework proposed by Dexter et al. (1997) uses the APA Delphi conceptualization of critical thinking for the purpose of assessment and curriculum alignment of critical thinking theory for all levels of nursing student. This study, conducted with the CCTST, offers additional support for the adoption of the APA Delphi consensus definition of critical thinking for generic applications by the nursing education community.

Examination of Findings That Failed to Support the Hypotheses

This study demonstrated that nursing faculty had critical thinking skills which were consistently higher than those of undergraduate nursing students and that BSN faculty had higher critical thinking skill in the areas of analysis and evaluation than did
their ADN colleagues. However, there were several other variables studied for which a relationship to the critical thinking skills of nursing faculty as measured by the CCTST was not demonstrated.

The number of years of experience in nursing education was the first variable for which no relationship to critical thinking skill as measured by the CCTST was demonstrated in the study. There are two potential underlying assumptions related to this variable of experience in nursing education. Perhaps the most obvious assumption would be that nursing education and clinical experience would contribute to cognitive growth as a function of normal professional socialization and role development. If this were true, the more senior nursing faculty would have the highest critical thinking scores. However, it could also be noted that the active promotion of critical thinking as a measurable cognitive skill is a fairly contemporary notion in the higher education arena, spanning less than two decades. From this point of view, it could be conversely assumed that the nursing faculty who are less seasoned, yet more recent products of a more progressive nursing educational system may actually have an advantage in the area of cognitive development. This could be attributed to the perceptions articulated by Burnard (1988) and Alexander (1993) which indicate that nursing has historically been conceptualized as a vocational training process as opposed to the professional educational experience for which contemporary nurse educators strive. If both of these points of view are equally plausible, the findings of this study suggest that years of experience may not have the same impact on all nurse educators and perhaps other variables such as individual dispositions, willingness to change or to take risks, opportunities for mentoring, professional support and development may be more influential in the acquisition of critical thinking ability than simply the passage of time.
The second variable which was not demonstrated in the study to be related to critical thinking is educational level attained by nursing faculty. The assumption underlying this component of the study was that the educational process or experience would have a positive effect on the acquisition of critical thinking skill level in nursing faculty, with each higher degree reflecting higher critical thinking skill level. A closer examination of the distribution of educational degrees reported by faculty may be helpful in explaining the results of the study. As expected, there were very few faculty who reported a baccalaureate degree as the highest degree held. This is explained by the fact that faculty are required by the Michigan State Board of Nursing to hold a minimum of a masters degree to deliver didactic content in either an ADN or BSN program. These faculty could be assumed to be completing their masters degree, and as expected they were all noted to be at the ADN program level. The masters degree in nursing was the most common degree in both the BSN and ADN programs, and only BSN faculty reported doctoral degrees. With regard to this distribution pattern and the fact that BSN faculty outscored ADN faculty on two of the four CCTST scores, it would be assumed that faculty with the highest degree level, doctorate, would outperform their colleagues with masters and baccalaureate degrees on at least some of the CCTST components. However, the findings of the study did not support this assumption.

These findings may be explained by the small numbers in some of the categories. For instance, with the exception of the masters in nursing, the other four categories each had fewer than 20, with the doctorate in nursing having only 5. These small sample numbers may have been inadequate to demonstrate a difference of any significance in regard to this question. The sample was, therefore, fairly homogeneous, with most nursing faculty at both ADN and BSN levels holding a
masters degree within a nursing major. This absence of diversity among faculty in regard to educational degrees attained may explain the statistical outcomes of the study in regard to this variable as it is related to critical thinking skill.

The last two variables examined in the study in relation to critical thinking skill were preferred teaching method and level of training in critical thinking. In regard to both of these variables, the findings of the study did not demonstrate a relationship to critical thinking skills as measured by the CCTST. The underlying assumption which is foundational to the selection of these two variables for the study is that faculty who are motivated to teach critical thinking will seek out professional development activities in critical thinking and will also utilize teaching methods which are intended to enhance critical thinking in students. It would further be assumed that these same faculty who make these conscious behavioral choices would demonstrate higher critical thinking skill levels than their colleagues who do not engage in such activities.

As noted previously, the majority of nursing faculty who participated in the study selected the responses in both these categories which would indicate that they strongly endorsed critical thinking philosophically, yet their CCTST scores did not reflect that these choices or behaviors had any relationship to their own levels of critical thinking skill. These findings may be in part attributed to the confusion which has been noted to exist among nursing faculty in regard to what really constitutes critical thinking and which teaching methods actually serve to enhance critical thinking ability among nursing students (Gordon, 1997; Paul et al., 1997). Faculty who selected the more student-centered methods of instruction, may actually be engaging in what Paul (1995) cites as “tactical” teaching strategies which do not necessarily enhance critical thinking ability, but instead simply make the classroom
more “active” and interesting. Therefore, they may not be actively working to heighten critical thinking skill in students and may not be modeling critical thinking behaviors themselves. By the same token, it cannot be assumed that participation in a critical thinking workshop will result in transforming the faculty member’s attitude and consequently his or her behaviors in regard to teaching and modeling critical thinking. On a more positive note, however, the faculty responses to the questions related to these variables are encouraging and may reflect that faculty are becoming more conscious of the implications of their own behaviors in regard to the acquisition of critical thinking skills in nursing students.

Recommendations for Further Research

In view of the minimal attention critical thinking attributes of nursing faculty have received as a research focus, further replication of this study is recommended, with a more concentrated focus on the variables which were not found to be related to critical thinking: educational level, years of nursing education experience, teaching methods, and critical thinking training. Efforts to attain a larger sample might possibly yield larger group numbers in regard to the independent variables of level of education, preferred teaching strategies and participation in formal critical thinking training. This would provide a more heterogeneous sample within which to examine these variables. The small sample size of the study was found to reflect minimal diversity among some of the categories for each variable. Larger sample size and consequently greater diversity may increase the potential to demonstrate relationships between the variables and critical thinking skill level of nursing faculty.

The demonstration of differences between nursing faculty CCTST scores and those of nursing student norm reference groups supports further use of the CCTST
to measure critical thinking skills of nursing students. This study has provided support for the CCTST and its potential usefulness as a measurement instrument for nursing program success in regard to the critical thinking skill acquisition of nursing students. The vast number of nursing student research studies which have used other measurement instruments could easily be replicated using the CCTST.

One of the most intriguing findings of the study was the differences noted between BSN and ADN faculty in regard to analysis and evaluation CCTST subscores. This finding raises the question regarding how any individual acquires critical thinking skills which are superior to those of other individuals. Are there perhaps intervening variables which have served to enhance the critical thinking skills of BSN faculty so that they are superior to those of ADN faculty? It seems evident that both the nursing education and clinical practice experiences must be further examined to determine if individual differences in nursing faculty, students, and clinical practitioners arise from either experience or perhaps from a combination of both. More research which examines the nursing education curricula in regard to a specific critical thinking focus whether in the form of a critical thinking course or deliberate integration of critical thinking experiences holds a great deal of potential. In addition, further studies which compare faculty, students, and practitioners would begin to probe the question regarding the individual differences which are apparent, yet elude explanation. In summary, the question of how critical thinking skill is acquired remains the underlying issue and provides fertile ground for continued research in the higher education arena.

Recommendations for other related research are also noted in regard to the measurement of critical thinking dispositions for both students and faculty. The California Critical Thinking Dispositions Inventory (CCTDI) (Facione, Facione, &
Sanchez, 1994) is a companion instrument to the CCTST which examines the basic underlying beliefs and attitudes which are held in relation to critical thinking. This instrument can be used with the CCTST to provide a more comprehensive profile of critical thinking attributes. The meta-analysis study by N. C. Facione (1995) included data from nursing students as measured by this instrument, so that comparison is available for further faculty research.

Implications of the Study for Nursing Education

Critical thinking as a phenomenon has amassed considerable attention in both the nursing education and general education arenas. Specifically, within nursing education, the focus of the National League for Nursing (NLN) accreditation process on critical thinking as a required outcome of nursing programs has resulted in a concerted effort on the part of nurse educators to define, operationalize and measure critical thinking in their students. The use of the CCTST in this study has demonstrated compelling implications for nursing education in the collective effort to accomplish these tasks. The CCTST has been demonstrated to be the best of the current instruments available to measure critical thinking skills which are most congruent with those desired in nurses. Nurse educators now have a more viable option available in the CCTST to use for the purpose of program evaluation as well as individual student assessment.

The minimal research to date on the critical thinking attributes of nursing faculty is also an area to be reflected upon by the nursing education community. The vital link between the nurse educator and the nursing student cannot be ignored as it relates to the acquisition of professional skills which are desired in graduate nurses. The faculty member serves as a professional role model throughout the nursing
education experience. If critical thinking skills are truly desired in nursing students, it is assumed that the best way to cultivate them is for nursing faculty to model them in both the didactic and clinical practice arenas. This study has demonstrated that nursing faculty have critical thinking ability which exceeds that of their students, thus lending encouragement to the modeling of these skills. The increased use of interactive teaching methodologies among nursing faculty was an encouraging finding of this study because the indication is that faculty are beginning to recognize that traditional didactic methods are not effective in instilling critical thinking skills in students. Similarly the active participation of nursing faculty in critical thinking training is viewed as a positive movement among faculty. Continued participation in such activities needs to be encouraged and supported by the nursing education community as faculty strive for excellence in critical thinking. Another implication here is that the more novice nursing educators could benefit from collegial interactions with their peers who are more experienced in critical thinking and teaching methods which may serve to enhance such skills in students. Such mentoring has the potential to elevate the didactic practice of nursing faculty during their early developmental years.

Summary

The findings of this study have served to reinforce the importance of the nursing faculty role in the cognitive growth of nursing students. The use of the CCTST to measure the critical thinking skills of nursing faculty has resulted in the support for this instrument as a valid measurement mechanism for the critical thinking skills desired in nurses. Faculty were found to be more skillful critical thinkers than nursing students. In addition, BSN faculty were found to outperform their ADN
faculty peers in the CCTST subskills of analysis and evaluation. Although specific relationships were not demonstrated between the critical thinking skills of nursing faculty and the independent variables of years of experience, educational level, preferred teaching method and level of critical thinking training, some inferences were noted which may provide some useful insights for the nursing education community. Perhaps the most important implication of this study is that nursing faculty must continue to strive for excellence in critical thinking. This focus must be not only directed toward faculty accountability for student critical thinking performance, but also toward individual faculty responsibility to cultivate his or her own critical thinking ability, for it has been noted that “he or she who dares to teach must never cease to learn” (Anonymous).
DEMOGRAPHIC DATA SHEET

PLEASE COMPLETE THE FOLLOWING INFORMATION:

1. Please identify the type of program you teach in.
   A. Baccalaureate Degree Nursing Program
   B. Associate Degree Nursing Program

2. Please indicate the total length of time you have been involved in didactic nursing education at the university or college level.
   A. 1–5 years
   B. 6–10 years
   C. 11–15 years
   D. 16–20 years
   E. More than 20 years

3. Please indicate your educational level in terms of the highest degree earned:
   A. Bachelors
   B. Masters—in nursing
   C. Masters—not in nursing
   D. Doctorate—in nursing
   E. Doctorate—not in nursing

4. Please indicate the level of formal training you have engaged in related to critical thinking and its application in the educational setting:
   A. None
   B. I have read some of the critical thinking literature.
   C. I have attended at least one or more critical thinking conference or workshop.
   D. I have completed both readings and continuing education in the area of critical thinking.

See the back of this page for the last question.
5. Please identify which one of the following categories of teaching methods best describes your practice in the didactic setting most of the time.

MARK ONLY ONE

A. Instructor Delivered Lecture

B. Instructor-Led Discussion

C. Structured student learning activities where instructor designs and guides the activity (such as Problem-Based Learning Groups, student led discussions, Role-plays, student presentations, use of case studies, etc.).

D. Interdependent Group or Individual Learning activities where the instructor serves as facilitator only in the student-guided exploration of a designated topic or concept (such as Cooperative or Collaborative Learning Groups, Reflective exercises, etc.).

If you have other comments in regard to this study or in regard to the topic of critical thinking in general, please feel free to share them in the space below:

Thank you for your participation in the study.
Appendix B

Approval Letter From the Human Subjects
Institutional Review Board
To: Dr. Uldis Smidchens
Julie Coon

From: Richard A. Wright, Chair
Human Subjects Institutional Review Board

Subject: HSIRB Project # 96-08-03

Date: August 30, 1996

This is to inform you that your project entitled "A Study of the Critical Thinking Attributes of Undergraduate Nursing Faculty." has been approved under the exempt category of research. This approval is based upon your proposal as presented to the HSIRB, and you may utilize human subjects only in accord with this approved proposal.

Your project is approved for a period of one year from the above date. If you should revise any procedures relative to human subjects or materials, you must resubmit those changes for review in order to retain approval. Should any untoward incidents or unanticipated adverse reactions occur with the subjects in the process of this study, you must suspend the study and notify me immediately. The HSIRB will then determine whether or not the study may continue.

Please be reminded that all research involving human subjects must be accomplished in full accord with the policies and procedures of Western Michigan University, as well as all applicable local, state, and federal laws and regulations. Any deviation from those policies, procedures, laws or regulations may cause immediate termination of approval for this project.

Thank you for your cooperation. If you have any questions, please do not hesitate to contact me.

Project Expiration Date: August 30, 1997
Appendix C

Letter to Faculty Liaison Person
With Overview of Study
Dear Faculty member:

I would like to thank you once again for your willingness to assist me with the data collection for my study within your institution. Your participation has enabled me to include a more substantial number of nursing programs in the study than would be possible if I had to travel to every site personally. I am hopeful that this approach will result in a larger number of subjects for the study overall.

I am enclosing the materials you will need for your faculty who agree to participate in the study. There are enough copies of both the California Critical Thinking Skills Test (CCTST) and the demographic data sheet for each faculty member. In addition, there is a letter to faculty which explains the purpose of the study and provides directions for completing the instruments. Each set of instruments is enclosed in a separate envelope for each faculty member so that they can seal the instruments inside before they return them to you when completed.

I would like to request that you facilitate this process in the following manner:

1. Receive the instruments from me in the mail.
2. Explain the nature of the study to your faculty colleagues in an effort to engage their interest in participating in the study. (This may be done collectively at a faculty meeting or on an individual basis. An informational sheet is provided in this packet to assist you in this process).
3. Distribute the instruments to those faculty who indicate an interest and/or a willingness to participate.
4. Follow up with faculty after a designated time period if they have not yet completed the instrument.
5. Collect the instruments and return them to me in the enclosed, self-addressed and postage paid envelope by November 20, 1996.

If you should need to contact me at any time during the study, I am available at the following numbers: 616-839-4838 (home), 616-592-2289 (office) or by E-mail: Jcoon@Music.ferris.edu. When the results are available, I will be sharing them with each program which participated in the study. I am hoping to deliver my oral defense in December 1997, so results will be available within the next academic year. Please refer to the next page for specific information to share with faculty. I have provided a detailed study overview for you because I realize that some faculty may quickly dismiss the study without adequate information to make an informed choice. This same information is included in an abbreviated form in a letter to the faculty in each packet. I hope it will be helpful to convince as many faculty as possible to participate in the study. Once again, I want to thank you for your role as facilitator of this study. Please do not hesitate to let me know if I can ever reciprocate in the future.

Sincerely,

Julie A. Coon, RN, MSN
Doctoral Candidate
OVERVIEW OF THE STUDY

NAME OF THE STUDY: A Study of the Critical Thinking Attributes of Undergraduate Nursing Faculty

NAME OF RESEARCHER: Julie A. Coon, RN, MSN, Professor of Nursing at Ferris State University; Doctoral Candidate at Western Michigan University, Dept. of Educational Leadership

PURPOSE OF THE STUDY:
The purpose of the study is to examine the critical thinking skills of undergraduate nursing faculty to determine how these skills are related to variables such as the type of program they teach in, their level of educational preparation, their experience as a nurse educator, their methods of instruction and their level of formal training in critical thinking. The study is intended to examine critical thinking within the context of how the role of the instructor may serve as an intervening variable in the development of critical thinking in students.

DESCRIPTION OF THE STUDY:
Participation in the study is voluntary. If faculty elect to participate, they will be asked to complete the California Critical Thinking Skills Test and a very brief demographic data sheet. This should take approximately 45-50 minutes. The instruments will be distributed by a faculty member from the program. Faculty will be given approximately two weeks to complete the instruments and will then return them to the faculty member who is coordinating the data collection on site. All data will be reported in the aggregate form. Individual scores will not be reported, as data will be collected in an anonymous manner. One half of the ADN and BSN programs in the State of Michigan were randomly selected for participation in the study. All nursing programs which participate in the study will be provided with the results upon completion of the study.

BENEFIT OF THE STUDY TO NURSING FACULTY:
As a nursing faculty myself, I am very cognizant of the fact that nursing faculty are busy people, with many demands imposed upon their time and energy. I am hopeful, however, that faculty will share my belief that the study has great potential value for the nursing education community in regard to the ongoing dialogue about critical thinking. I think we would all agree that the nursing faculty member would seem to be the most integral variable to impact upon the student nurse’s educational experience, as the nurse educator has contact with nursing students in both the classroom and clinical setting. This person is perhaps the most influential component of the nursing education experience, yet, according to my review of the literature, the least studied in terms of critical thinking skills.
In addition, I hope that faculty will be interested to have the opportunity to examine the California Critical Thinking Skills Test, as it is a new and exciting instrument for the assessment of critical thinking skills. The use of the CCTST has been minimal to date. This instrument shows great potential, especially in the critical thinking research in nursing education. This study provides an excellent opportunity to determine if perhaps the CCTST will be more useful than previously favored instruments (such as the Watson Glaser Critical Thinking Appraisal) in measuring critical thinking skills that are more congruent with those required by the discipline of nursing. The results with a large sample of nursing faculty will perhaps validate this instrument further.

I would also reinforce that there should be no perceived threat to the participant as their scores will not be reported individually. However, if they do participate, their program will be provided with the study results. I believe that the potential insights to be gained are very exciting, and hope for all of these reasons, nursing faculty will be motivated to find the time to participate in the study.
Appendix D

Letter to Participants
Julie A. Coon, RN, MSN  
P.O. Box 91  
Lake City, MI 49651

Dear Nursing Faculty Member:

My name is Julie Coon and I am a nursing educator at Ferris State University. I am in the dissertation phase of my doctoral studies in Educational Leadership at Western Michigan University and am requesting your participation in my research study. The purpose of the study is to examine the critical thinking attributes of undergraduate nursing faculty in the state of Michigan. The study is intended to examine critical thinking within the context of how the role of the instructor may serve as an intervening variable in the development of critical thinking in students. When reviewing the literature on critical thinking in nursing education, I found that the nurse educator has been largely ignored in terms of how the critical thinking attributes of nursing faculty might be related to the critical thinking outcomes of nursing students.

If you agree to participate in the study, I would ask that you complete the California Critical Thinking Skills Test (CCTST) and a brief demographic data sheet. Both instruments will take approximately 45–50 minutes to complete. Your participation is entirely voluntary, and all data collected will be anonymous. Results will be reported in various aggregated forms to reflect a profile of ADN and BSN educators in the State of Michigan. Each program from which faculty participate in the study will be provided with a report of the research findings.

The use of the CCTST has been minimal to date. This instrument shows great potential, especially in the critical thinking research in nursing education. This study provides an excellent opportunity to determine if perhaps the CCTST will be more useful than previously favored instruments (such as the Watson Glaser Critical Thinking Appraisal) in measuring critical thinking skills that are more congruent with those required by the discipline of nursing. The results with a large sample of nursing faculty will perhaps help validate this instrument.

As a nursing faculty myself, I am very cognizant of the fact that nursing faculty are busy people, with many demands imposed upon their time and energy. I am hopeful, however, that you will share my belief that the study has great potential value for the nursing education community in regard to the ongoing dialogue about critical thinking.

Thank you for considering this request.

Sincerely,

Julie A. Coon, RN, MSN  
Doctoral Candidate
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