The Influence of Expert Status and Learning Style Preference on Critical Thinking Abilities of Professional Nurses.

Cynthia Ann ofstad Prestholdt

Follow this and additional works at: https://digitalcommons.lsu.edu/gradschool_disstheses

Recommended Citation
https://digitalcommons.lsu.edu/gradschool_disstheses/6128
INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.
THE INFLUENCE OF EXPERT STATUS AND LEARNING STYLE PREFERENCE ON CRITICAL THINKING ABILITIES OF PROFESSIONAL NURSES

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy

in

The School of Vocational Education

by

Cynthia Ann Ofstad Prestholdt
B.S.N., University of Minnesota, 1963
M.S., University of Minnesota, 1967
December 1995
ACKNOWLEDGEMENTS

Embarking on a significant educational endeavor at mid-life leaves one humbly indebted to many who substantially contributed towards the realization of that goal. I am especially grateful to my major professor, Dr. Michael Burnett, for his constant optimism, patience, support, and expertise during all phases of this study. His unique ability to convey his undivided attention and to effectively guide the novice researcher deserves special commendation.

Sincere appreciation is also expressed to the other members of my committee, Dr. Betty Harrison for her contributions engendering personal and professional growth, Dr. Nathan Gottfried, Dr. Dirk Steiner, and Dr. Satish Verma for their constructive criticism, time, and support. Dr. James Trott also deserves recognition for his earlier mentorship and for continued encouragement.

I am also very grateful to numerous supportive faculty colleagues at Southeastern Louisiana University School of Nursing. I especially wish to thank Drs. S. Kay Thornhill, Peggy Harris, Catherine Holland, and Ellienne Tate for their ongoing encouragement and confidence. I also appreciated the small grant provided by Southeastern Louisiana University to partially defray research expenses.

Important among those deserving recognition are my family, especially my beloved parents, Lillian and Olaf Ofstad, and step-mother, Lynda Ofstad. I am indebted to my mother who, throughout her lifetime, provided consistent encouragement, love, and great confidence in the ability of her children and grandchildren to succeed. I am grateful to my father for a half century of believing that his daughter could achieve whatever educational goal she pursued, and for providing an energetic role model of learning that continues productively well into his eighth decade of life. Special thanks go to my children, Jennifer and Jeremy, for their encouragement and unwavering confidence that their mother would complete this goal.

ii

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
I am profoundly grateful to my husband, Perry H. Prestholdt, for sharing, without complaint, the daily sacrifices inherent during a spouse's graduate study. He unselfishly provided the knowledge and understanding, computer skills, loving patience, and consistent support so indispensable to my completing this endeavor.

Finally, grateful appreciation is directed to the many professional nurses, especially in memory of Evelyn Davis, who contributed their time as participants in this study. Their cooperation was essential to the successful completion this project.
# TABLE OF CONTENTS

ACKNOWLEDGMENTS ................................................................. ii
LIST OF TABLES .................................................................................. vii
ABSTRACT .............................................................................................. x

## CHAPTER

1 INTRODUCTION ........................................................................... 1
   Contextual Influences on Contemporary Nursing Practice ........ 1
   Statement of the Problem .......................................................... 8
   Purpose and Objectives of the Study ........................................ 9
   Significance of the Study .......................................................... 13
   Definition of Terms ................................................................... 15

2 REVIEW OF RELATED LITERATURE ......................................... 17
   Preview ..................................................................................... 17
   Historical Perspective of Critical Thinking ............................. 18
   Current Definitions of Critical Thinking ................................. 20
   Adult Cognitive Development and Critical Thinking ............. 27
   Critical Thinking Assessment Instruments ........................... 31
   Research on Critical Thinking ............................................... 37
   Novice to Expert Conceptualizations .................................... 55
   Learning Style .......................................................................... 60
   Recapitulation .......................................................................... 67

3 METHODOLOGY ......................................................................... 69
   Research Design ....................................................................... 69
   Population and Sample ........................................................... 69
   Instrumentation ........................................................................ 73
   Data Collection Procedure ..................................................... 83
   Data Analysis .......................................................................... 89

4 FINDINGS .................................................................................. 96
   Demographic Characteristics ............................................... 96
   Determination of Critical Thinking Ability ............................. 135
   Determination of Learning Style ............................................. 150
   Exploratory Model Explaining Critical Thinking in Nurses .... 154

5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .......... 159
   Summary ................................................................................. 159
   Conclusions, Implications and Recommendations ................ 173

REFERENCES ................................................................................. 182
<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPENDIX A</td>
<td>194</td>
</tr>
<tr>
<td>Letter of Approval From Dean</td>
<td>195</td>
</tr>
<tr>
<td>APPENDIX B</td>
<td>196</td>
</tr>
<tr>
<td>Letter of Approval From University Human Research Committee</td>
<td>197</td>
</tr>
<tr>
<td>APPENDIX C</td>
<td>198</td>
</tr>
<tr>
<td>Publisher's Letter Regarding CCTST</td>
<td>199</td>
</tr>
<tr>
<td>APPENDIX D</td>
<td>200</td>
</tr>
<tr>
<td>Publisher's Letter Regarding LSI</td>
<td>201</td>
</tr>
<tr>
<td>APPENDIX E</td>
<td>202</td>
</tr>
<tr>
<td>Kolb LSI Instrument (1985)</td>
<td>203</td>
</tr>
<tr>
<td>APPENDIX F</td>
<td>204</td>
</tr>
<tr>
<td>Participant Profile Form For Experienced and Expert Nurses</td>
<td>205</td>
</tr>
<tr>
<td>APPENDIX G</td>
<td>207</td>
</tr>
<tr>
<td>Kolb Cycle of Learning (1985)</td>
<td>208</td>
</tr>
<tr>
<td>APPENDIX H</td>
<td>209</td>
</tr>
<tr>
<td>Kolb Learning-Style Type Grid</td>
<td>210</td>
</tr>
<tr>
<td>APPENDIX I</td>
<td>211</td>
</tr>
<tr>
<td>Participant Profile Form For Novice Nurses</td>
<td>212</td>
</tr>
<tr>
<td>APPENDIX J</td>
<td>214</td>
</tr>
<tr>
<td>First Cover Letter to Novice Nurses</td>
<td>215</td>
</tr>
<tr>
<td>APPENDIX K</td>
<td>216</td>
</tr>
<tr>
<td>Consent to Participate in a Research Study</td>
<td>217</td>
</tr>
<tr>
<td>APPENDIX L</td>
<td>218</td>
</tr>
<tr>
<td>Participant Directions for Novice Nurses</td>
<td>219</td>
</tr>
<tr>
<td>APPENDIX M</td>
<td>220</td>
</tr>
<tr>
<td>Second Cover Letter to Novice Nurses</td>
<td>221</td>
</tr>
<tr>
<td>APPENDIX N</td>
<td>222</td>
</tr>
<tr>
<td>Follow-up Post Card to Students</td>
<td>223</td>
</tr>
<tr>
<td>APPENDIX O</td>
<td>224</td>
</tr>
<tr>
<td>Follow-up Letter to Novice Nurses</td>
<td>225</td>
</tr>
<tr>
<td>APPENDIX P</td>
<td>226</td>
</tr>
<tr>
<td>Cover Letter to Experienced Nurses</td>
<td>227</td>
</tr>
</tbody>
</table>
LIST OF TABLES

1. Response Rates Among Participating Professional Nurse Participants ............. 89
2. Age of Novice Professional Nurse Participants .................................................... 98
3. Levels of Education Completed by Responding Novice Professional Nurses 99
4. Professional Credentials Reported by Novice Professional Nurses ............... 100
5. Current Employment Status Reported for Novice Professional Nurses . . . 101
6. Years of Clinical Nursing Experience Reported by Novice Professional Nurses 102
7. Institutional Settings of Work Experience Reported by Novice Professional Nurses 103
8. Years of Clinical Institutional Work Experience Reported by Novice Professional Nurses 104
9. Predominant Clinical Specialty Areas Reported by Novice Professional Nurses 105
10. Years of Clinical Experience in Predominant Clinical Specialty Areas Reported by Novice Professional Nurses 106
11. Current Clinical Specialty Area Reported by Novice Professional Nurses 107
12. Age of Experienced Professional Nurse Participants ......................................... 109
13. Levels of Education Completed by Experienced Professional Nurses . . . 110
14. Number of Years Since Completion of Reported Levels of Education for Experienced Professional Nurses 111
15. Professional Credentials Reported by Experienced Professional Nurses . . . 112
16. Current Employment Status Reported by Experienced Professional Nurses 113
17. Years of Clinical Nursing Experience Reported by Experienced Professional Nurses 114
18. Institutional Settings of Work Experience Reported by Experienced Professional Nurses 115

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.</td>
<td>Years of Clinical Institutional Work Experience Reported by Experienced Professional Nurses</td>
<td>116</td>
</tr>
<tr>
<td>20.</td>
<td>Predominant Clinical Specialty Area Reported by Experienced Professional Nurses</td>
<td>117</td>
</tr>
<tr>
<td>21.</td>
<td>Current Clinical Specialty Area Reported by Experienced Professional Nurses</td>
<td>119</td>
</tr>
<tr>
<td>22.</td>
<td>Current Position Titles of Responding Experienced Nurses</td>
<td>120</td>
</tr>
<tr>
<td>23.</td>
<td>Age of Expert Professional Nurse Participants</td>
<td>122</td>
</tr>
<tr>
<td>24.</td>
<td>Levels of Education Completed by Expert Professional Nurses</td>
<td>123</td>
</tr>
<tr>
<td>25.</td>
<td>Number of Years Since Completion of Reported Levels of Education for Expert Professional Nurses</td>
<td>124</td>
</tr>
<tr>
<td>26.</td>
<td>Professional Credentials Reported by Expert Professional Nurses</td>
<td>125</td>
</tr>
<tr>
<td>27.</td>
<td>Current Employment Status Reported for Expert Professional Nurses</td>
<td>126</td>
</tr>
<tr>
<td>28.</td>
<td>Years of Clinical Nursing Experience Reported by Expert Professional Nurses</td>
<td>127</td>
</tr>
<tr>
<td>29.</td>
<td>Institutional Settings of Work Experience Reported by Expert Professional Nurses</td>
<td>128</td>
</tr>
<tr>
<td>30.</td>
<td>Years of Clinical Institutional Work Experience Reported by Expert Professional Nurses</td>
<td>129</td>
</tr>
<tr>
<td>31.</td>
<td>Predominant Clinical Specialty Area of Expert Professional Nurses</td>
<td>131</td>
</tr>
<tr>
<td>32.</td>
<td>Current Clinical Specialty Area of Expert Professional Nurses</td>
<td>132</td>
</tr>
<tr>
<td>33.</td>
<td>Current Position Titles of Responding Expert Nurses</td>
<td>134</td>
</tr>
<tr>
<td>34.</td>
<td>CCTST Raw Score Results for Novice Professional Nurses</td>
<td>136</td>
</tr>
<tr>
<td>35.</td>
<td>CCTST Percentile Rank Scores for Novice Professional Nurses</td>
<td>137</td>
</tr>
<tr>
<td>36.</td>
<td>CCTST Raw Score Results for Experienced Professional Nurses</td>
<td>139</td>
</tr>
<tr>
<td>37.</td>
<td>CCTST Percentile Rank Scores for Experienced Professional Nurses</td>
<td>140</td>
</tr>
<tr>
<td>38.</td>
<td>CCTST Mean Raw Scores for Expert Professional Nurses</td>
<td>141</td>
</tr>
<tr>
<td>39.</td>
<td>CCTST Percentile Rank Scores for Expert Professional Nurses</td>
<td>142</td>
</tr>
</tbody>
</table>
40. Levels of Education Completed by Experienced and Expert Professional Nurses .......................................................... 143
41. Analysis of Variance for Respondents' Age by Sample Nurse Group .......................................................... 144
42. Mean Age in Years for Novice, Experienced and Expert Professional Nurse Study Participants .......................................................... 144
43. Gender of Novice, Experienced and Expert Professional Nurse Participants .......................................................... 145
44. Ethnicity Reported by Participating Professional Nurses ..................................................................................... 146
45. Analysis of Variance for CCTST Inductive Reasoning Scores Among Novice, Experienced, and Expert Professional Nurses .......................................................... 148
46. Mean Percentile Critical Thinking Scores for Novice, Experienced, and Expert Nurses .......................................................... 149
47. Learning Styles of Novice Professional Nurses ..................................................................................... 151
48. Learning Styles of Experienced Professional Nurses ..................................................................................... 152
49. Learning Styles of Expert Professional Nurses ..................................................................................... 153
50. Predominant Learning Style of Professional Nurses Studied ..................................................................................... 154
51. Multiple Regression Analysis of Critical Thinking for Study Population of Professional Nurses .......................................................... 157
ABSTRACT

The primary purpose of this study was to compare novice, experienced, and expert professional nurses in terms of their critical thinking ability. The study also sought to identify the influence of selected individual characteristics on the critical thinking ability of professional nurses.

Three samples of professional nurses, representing three levels of experience and skill, were selected for use in this study. Subjects included a convenience sample of 38 novice nurses (graduating seniors in a generic baccalaureate nursing program), 42 randomly selected experienced nurses, and a purposive sample of 48 expert nurses recognized as exemplary by their peers.

A three-part instrument was used for data collection. The instrument included the California Critical Thinking Skills Test, 1990 (CCTST), the Kolb Learning Style Inventory 1985 (LSI), and a researcher developed Participant Profile Form.

Data were collected on-site and by mailed questionnaire for the novice sample, and by mailed questionnaire for the experienced and expert samples. After three mailings and a telephone contact, the useable response rates of those agreeing to participate in each group were: 84% for the novice group, and 96% each from the experienced and expert groups.

Results of the study included: a) a significant positive relationship for novice nurses in overall critical thinking ability (CCTST Overall Cognitive Skills) and cumulative academic grade point average ($r = .37, p \text{ one-tail} = .01$); b) significant differences between expert and novice nurses on the critical thinking subscale measure for Inductive Reasoning, $F (2, 125) = 4.22, p = .02$; c) no significant differences between the expert and experienced nurses on any critical thinking measure. d) No model was found explaining a significant portion of the variance in critical thinking ability when experience/skill level, learning style, and selected
demographic factors were entered as independent variables into a multiple regression analysis.

Regarding predominant learning styles, the novice and experienced nurses had a higher representation of the Assimilator style, and the experts had slightly more Accommodators than Assimilators. Chi-square analysis revealed no significant association between the variable of learning style and experience/skill level of the nurses.

Recommendations included a longitudinal follow-up study, possibly incorporating qualitative measures, to elucidate the construct of critical thinking in expert performance.
CHAPTER 1
INTRODUCTION

Nursing is an evolving profession encompassing the greatest number of health care workers in America today (U.S. Department of Health and Human Services, 1990). The environment of health care delivery -- the arena in which this large cadre of nurses practice -- is undergoing significant change, thereby presenting challenges to the profession and to those who educate its future practitioners. Such challenges are leading to curricula reform with promotion of critical thinking in preparation for competent practice. Indeed, "The critical thinking nurse who is an expert practitioner of nursing is essential for client survival and advancement of the profession as a whole" (Heaslip, 1994, p. 32).

Contextual Influences on Contemporary Nursing Practice

Rapid clinical, diagnostic, and therapeutic advances and expensive medical technology are significant forces impacting the American health care system today. Additional impacting forces on health care include an aging population, high incidence of many avoidable conditions and chronic diseases, diverse populations with less access to preventive health care, and major proposals for restructuring the health care system through financial reform. These forces have influenced the delivery of health care and have thereby affected medical and nursing practice.

The Pew Health Professions Commission Report (O'Neil, 1993), forecasts a restructured health care system more oriented toward prevention, health, and individual responsibility for health-related behaviors. The system will be information driven, focused on consumers, emphasizing coordinated care and more balanced technology, and with increased accountability to consumers and society for the outcomes of treatment. More nurses will be needed to provide both preventive and primary care in a variety of nonacute settings, as well as highly technical acute care in hospital settings.
Concomitant with these expanding opportunities for professional nurses are current insufficient numbers, with projections for increased shortages in the supply of available nurses (U.S. Department of Health and Human Services, 1990).

What are the implications of these changes for the practicing professional nurse? Nurses are expected to function in dynamic hospital environments with acutely ill patients, with rapidly expanding information systems, using complex technology, and always cognizant of cost-containment. They are expected to perform more independently as primary care-givers in a variety of ambulatory and non-acute care settings. Clinical practice now demands quality reasoning, individualized solutions to unpredictable client circumstances that cannot be taught by rote (Miller & Malcolm, 1990).

Critical Thinking in Education

The issue of critical thinking in education has gained much popularity in recent years - becoming a "buzz word". This is evidenced by a plethora of articles in the popular and professional literature, by the availability of numerous seminars and workshops, by the establishment of academic centers devoted to critical thinking, and by its inclusion as a demonstrable outcome required for accreditation. Ennis (1985) refers to critical thinking as "reflective and reasonable thinking that is focused on deciding what to believe or do" (p. 45).

Concern regarding the poor quality of reasoning that students exhibit in problem solving or in thinking about issues is reflected in writings such as Adler's The Paideia Proposal: An Educational Manifesto (1982), in "Why Johnny Can't Think" (Lichtenstein, 1987), and in Bloom's The Closing of the American Mind (1987). The need for higher order thinking skills is also evident in other, non-nursing literature about training programs for a changing work force. Carnevale, Gainer, and Meltzer (1990) identified "employability skills", seven essential skill groups employers want. One of these skill groups was adaptability: creative
thinking and problem solving -early identification and resolution of problems (p. 29). The Commission on the Skills of the American Workforce (1990) also identified a need for strong general education, problem solving, critical thinking, communication and interpersonal relationship skills in response to changing technology and growing employee autonomy.

Finally, in 1990, the President of the United States and state governors announced six national educational goals to be achieved by the year 2000. Goal Five includes a specific recommendation that "the proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially" (National Center for Educational Statistics, 1995, p. 1).

**Nursing Responses to Contextual Changes**

The nursing profession has responded to these formidable challenges through publication of several relevant documents: the American Nurses' Association's (ANA) *Nursing's Agenda for Health Care Reform* (American Nurses' Association, 1991), the National League for Nursing's (NLN) *Vision for Nursing Education* (National League for Nursing, 1993), and the American Association of Colleges of Nursing's (AACN) *Position Statement: Nursing Education's Agenda for the 21st Century* (American Association of Colleges of Nursing, 1993). The latter two documents argue the necessity for major curricula reform in nursing education, emphasizing process rather than content, fostering the development of essential cognitive and interpersonal abilities in the practice of nursing. Critical thinking is listed first among the attributes identified as being of paramount importance to nursing in both the AACN (1993) and NLN (1993) documents.

**Critical Thinking and Nursing Education**

The development of cognitive skills has long been an important facet of educational preparation in nursing and continues to be so today. In establishing the
first professional nursing school in London in 1860, a visionary, Florence Nightingale, advocated an educational process whereby nurses carefully observed their patients so they could make intelligent decisions regarding their care. She wrote, "No training is of any use unless one can learn to . . . think things out for oneself" and "To nurse is a field of which one may safely say: there is no end in what we may be learning every day" (Nightingale, 1992, p. 11).

What, then, is critical thinking, particularly in the context of nursing? According to Jones and Brown (1991), it is an "orientation to cognition predicated on reflective thought and a tolerance for ambiguity, . . . a multidimensional cognitive process demanding skillful application of knowledge and experience in making discriminating judgements and evaluations" (p. 530). It is process oriented and requires possession of specific skills and abilities. Although it does not provide uniformly correct answers or actions, it can provide a schema of good options for individual choice.

The National League for Nursing accreditation criteria (1991) for schools of nursing now require that graduates of baccalaureate programs demonstrate critical thinking skills in reasoning, analysis, research or decision-making relevant to the discipline of nursing. Indeed, both academic and clinical nurse educators seek to foster sound clinical decision-making, critical thinking, and life-long learning abilities among their students.

Questions have been raised about the effectiveness of traditional educational programs in developing the critical thinking skills of nursing students. In a Virginia survey of new RN competencies (Eubanks, 1992), hospital nursing executives reported that "hospitals increasingly expect RNs to think critically, work in an interdisciplinary team, resolve conflicts, and communicate" (p. 49). The difference between new RNs' abilities and employer role expectations may contribute to job stress, thereby jeopardizing retention of new nurses. Faulty thinking can lead to
compromised patient care, resulting in unnecessary complications, extended hospitalization, prolonged rehabilitation and home care, increased financial burden, litigation, and sometimes, mortality. Strong cognitive abilities are, therefore, inherently crucial to the safe, effective practice of professional nursing care.

**Reasoning of Novices and Experts**

Evidence revealing differences in reasoning abilities between novices and experts has been reported as follows. Kurfiss (1988) indicated that novices and experts differ in their use of "declarative, procedural, and metacognitive knowledge" and this lends understanding to students' difficulties in the early stages of learning a discipline (p. 30). Indeed, novices tend to categorize problems on the basis of superficial features, fail to include all elements of a problem, use trial and error in lieu of analysis, and often just quit. Conversely, experts work at the level of principles and plans, use heuristics, and aggressively seek connections between their knowledge and the present problem. According to Dewey (1933), experts regard a solution plan as a hypothesis and self-monitor their progress.

The research in cognitive development of Perry (1970) in males and Belenky, Clinchy, Goldberger, and Tarule (1986) among females produced models of intellectual development reflecting movement of young adults through four primary positions. Students moved from the limited position of Dualism/Received Knowledge, to Multiplicity/Subjective Knowledge, to Relativism/Procedural Knowledge (for a small minority/less than half of college seniors), and finally to Commitment in Relativism/Constructed Knowledge. Students progress at varying speeds during this process, and all may not achieve the highest level described.

Patricia Benner's seminal work, *From Novice to Expert* (1984), explored the development of five levels of competency in clinical nursing practice. These levels were based on the Dreyfus model (1980) of skill acquisition including novice, advanced beginner, competent, proficient, and expert. Although this work did not
explore critical thinking per se, it did explain how clinical knowledge is embedded in expert practice.

Benner described each proficiency level within the context of nursing, using exemplars from actual nursing practice. There were significant, recognizable performance differences in moving from the novice level to the expert level. Inexperienced novices exhibited limited, inflexible, rule-governed behavior. Expert practitioners, with five or more years of experience, had an intuitive grasp of situations and problem solutions, no longer relying on rules and maxims. Highly skilled analytic ability remained necessary for situations in which nurses lacked prior experience, when events and behaviors were not as expected, or when alternative perspectives were not available (Benner, 1984, p. 34). One might also speculate on the observed progression in the development of critical thinking ability as a new nurse moves through the stages of novice to expert.

Nursing Research Involving Critical Thinking

Research assessing critical thinking outcomes of various nursing education programs has been relatively scant, with overall ambiguous results. Some studies have found significant gains in critical thinking skills in comparing pretest and posttest performance among students (Richards, 1977; Frederickson, 1979; Berger, 1984). Fleeger (1987) found no support that baccalaureate education improved students' critical thinking ability. Sullivan (1987) found no significant differences between entry and exit scores in a full cohort of registered nurse (RN) baccalaureate students. Miller (1992), however, did find a significant difference between pretest and posttest scores in a similar cohort of RN students. Three studies found different levels of critical thinking ability among different types of nursing education programs (Kintgen-Andrews, 1988, 1991; Brooks & Shepherd, 1990; Pardue, 1987).
The relevant literature provided no apparent studies of comparisons of critical thinking ability in novice and designated experts from the general nursing population. Additionally, this researcher found no studies comparing these populations in terms of critical thinking ability and considering the influence of learning styles.

**Learning Styles and Critical Thinking**

Considerable research has been conducted over several decades to learn more about the complex process of human learning. Natural perceptions and conceptual processes have a significant impact on the ways people think (Guild and Garger, 1985). There has been extensive documentation that each person has his/her individual preferred ways to learn - to perceive and process information (Gregorc, 1985, 1982; Kolb, 1985, 1984, 1976; Dunn & Dunn, 1987; Canfield, 1980).

College student populations today exhibit characteristics very different from their counterparts of 25 years ago. Contemporary students are more diverse by age, race, socioeconomic class, gender, culture, academic ability, family stability and support, employment, sexual orientation, physical/mental health, enrollment status, and so forth (M. Lee Upcraft in Weimer and Menges, in press). In view of such diversity, it should be remembered that all students have potential, "We need only to reach them where they are and take them to where they dream of going" to develop this rich resource of "human capital" (Harrison, 1992, p. 29). One way of reaching diverse student populations is through applying understandings of learning style.

Kolb (1976, 1985) wrote of a cyclic process of learning involving four components: observation, reflection, abstract conceptualization, and active experimentation leading to further observations. Persons may have idiosyncratic preferences of one component over another reflecting their own learning style. It may be that not all students are equally proficient in each phase of the process, however skill can be developed in other phases.
Learning style may be germane to the development of critical thinking in several ways. Two important aspects of critical thinking include being open to multiple viewpoints and the ability to critique one's own thinking. Students may be assisted in developing self-awareness of their own dominant learning style, monitoring their learning process, and thereby better adapting to a variety of faculty teaching styles. Nurse educators with knowledge of factors affecting student learning can then better align educational experiences in critical thinking to maximize opportunities for individual learning success.

Students can be provided an educational environment which engenders these abilities thereby enabling continued learning independent of formal educational institutions. Students transitioning from novices and beyond are thereby empowered and gain potential as change agents in improving their professional performance, and possibly those with whom they work and associate.

Statement of the Problem

Professional nurses are a significant component of the American health care delivery system. The changing landscape of this healthcare delivery system mandates that professional nurses function optimally and more independently in a complex, dynamic milieu. In order to effectively provide nursing care, nurses need to access and process much information, make important clinical judgments, solve complex problems, and rapidly make decisions. It thus becomes imperative that nurses employ critical thinking skills in their daily professional practice.

This study sought to describe the nature of critical thinking abilities manifest in study populations of novice, experienced and expert professional nurses respectively. More specifically, are there differences, and to what extent, between the three groups of novice, experienced and expert nurses regarding overall cognitive skills, inductive and deductive reasoning skills, analysis, inference and evaluation abilities?
Demographic factors included in this study were: the potential influence of learning style mediating critical thinking ability, level of educational preparation, professional credentials, aspects of clinical experience, age, ethnic origin, gender, and for novices, their overall cumulative grade point average.

Purpose and Objectives of the Study

The purpose of this study was to compare novice, experienced, and expert professional nurses in terms of their critical thinking ability. The study additionally sought to identify the influence of learning styles and other selected individual demographic characteristics, on the critical thinking ability of professional nurses.

Specific research objectives designed to address the purpose of this study were to:

1. Describe a novice professional nurse sample on selected demographic variables. Selected characteristics for description included:
   a.) Level of educational preparation
   b.) Years of clinical nursing experience
   c.) Predominant specialty area of clinical nursing practice (area in which they had worked the greatest number of years).
   d.) Setting of present clinical nursing position
   e.) Years in present clinical nursing position
   f.) Specialty area of present clinical nursing position
   g.) Title of present nursing position
   h.) Professional credentials other than Registered Nurse licensure
   i.) Age
   j.) Gender
   k.) Ethnic Origin
   l.) Cumulative College Grade Point Average
2. Describe an experienced professional nurse sample on selected demographic variables. Selected characteristics for description included:
   a.) Level of educational preparation
   b.) Years of clinical nursing experience
   c.) Predominant specialty area of clinical nursing practice (area in which subject has worked the greatest number of years).
   d.) Institutional setting of present clinical nursing position
   e.) Years in present clinical nursing position
   f.) Specialty area of present clinical nursing position
   g.) Title of present nursing position
   h.) Professional credentials other than Registered Nurse licensure
   i.) Age
   j.) Gender
   k.) Ethnic Origin

3. Describe an expert professional nurse sample on selected demographic variables. Selected characteristics for description included:
   a.) Level of educational preparation
   b.) Years of clinical nursing experience
   c.) Predominant specialty area of clinical nursing practice (area in which subject has worked the greatest number of years).
   d.) Institutional setting of present clinical nursing position
   e.) Years in present clinical nursing position
   f.) Specialty area of present clinical nursing position
   g.) Title of present nursing position
   h.) Professional credentials other than Registered Nurse licensure
   i.) Age
j.) Gender
k.) Ethnic Origin

4. Determine the critical thinking ability of a novice professional nurse sample as measured by the California Critical Thinking Skills Test: College Level, 1990 (CCTST) in the following areas:
   a.) Overall Cognitive Skills
   b.) Analysis
   c.) Inference
   d.) Evaluation
   e.) Inductive Reasoning
   f.) Deductive Reasoning

5. Hypothesis: There is a positive relationship between critical thinking ability as reflected in Overall Cognitive Skills, as measured by the California Critical Thinking Skills Test, College Level 1990, (CCTST), and cumulative grade point average in the study sample of novice nurses.

6. Determine the critical thinking ability of an experienced professional nurse sample as measured by the California Critical Thinking Skills Test: College Level, 1990 (CCTST) in the following areas:
   a.) Overall Cognitive Skills
   b.) Analysis
   c.) Interpretation
   d.) Evaluation
   e.) Inductive Reasoning
   f.) Deductive Reasoning

7. Determine the critical thinking ability of an expert professional nurse sample as determined by the California Critical Thinking Skills Test: College Level, 1990 (CCTST) in the following areas:
a.) Overall Cognitive Skills
b.) Analysis
c.) Interpretation
d.) Evaluation
e.) Inductive Reasoning
f.) Deductive Reasoning

8. Compare novice, experienced and expert professional nurse samples on the following demographic characteristics:
   a.) Level of Educational preparation
   b.) Age
c.) Gender
d.) Ethnic Origin

9: **Hypothesis:** Expert professional nurses in the sample will exhibit higher levels of critical thinking abilities, as measured by the California Critical Thinking Skills Test: College Level, 1990, than do novice and experienced professional nurse samples in each of the following areas:
   a.) Overall Cognitive Skills
   b.) Analysis
c.) Inference
d.) Evaluation
e.) Inductive Reasoning
f.) Deductive Reasoning

10. Determine the predominant learning style of a sample of novice professional nurses as measured by the Kolb Learning Style Inventory, 1985.

11. Determine the predominant learning style of a sample of experienced professional nurses as measured by the Kolb Learning Style Inventory, 1985.
12. Determine the predominant learning style of a sample of expert professional nurses as measured by the Kolb Learning Style Inventory, 1985.

13. Compare novice, experienced, and expert professional nurse samples on predominant learning style as measured by the Kolb Learning Style Inventory, 1985.

14. Hypothesis: A model exists which explains a significant portion of the variance in overall critical thinking abilities of professional nurses in the study sample, and the variables of expert status and learning style preference are significant contributors to that model. Additionally, the following variables will be entered into the model on an exploratory basis: educational preparation at masters degree level, number of years of clinical nursing experience, professional certification, ethnic origin, and age.

Significance of the Study

An important rationale for conducting this study is the current absence of published research comparisons between novice professional and acknowledged nursing practice experts regarding level of critical thinking ability in professional nurses. At a time when the major professional nursing accrediting body, the National League for Nursing, mandates critical thinking ability as an educational outcome, it becomes imperative that the concept of critical thinking be more clearly explicated in terms of the discipline.

Determining the level of critical thinking of novices, in contrast to such ability in experienced nurses and recognized expert nurses, could provide a basis for ascertaining potential realistic gains in educational settings. Understanding differing levels and characteristics of critical thinking as a developmental process may well lead to the establishment of standards for critical thinking skills levels (Facione, 1986).
Development of critical thinking skills likely requires educational involvement beyond the basic level of preparation. Outcomes of this study thus could also be of use to those providing continuing education in nursing, "the perfect milieu for the enhancement and continuous development of critical thinking skills." (Schank, 1991, p. 86.)

Conversely, failing to establish significant differences between novice, experienced, and expert nurses regarding critical thinking ability would raise questions about the adequacy of the CCTST instrument currently used to measure the construct in nursing per se. Failure to establish significant differences between the three groups could also raise questions about the validity of the construct as a necessary component of expert knowledge, or the validity of the assumption that critical thinking is related to performance. Thus the test may, or may not, be a valid measurement of the construct within the discipline of nursing. Results could also indicate that differences are evident only in specific subskills, which could be specifically targeted for educational emphasis.

In terms of learning styles, Kurfiss (1988) lends support for such a study in stating that "Individual differences in approaches to critical thinking merit exploration, particularly those related to gender, ethnicity, and learning style " (pp. 103 - 104). Among a nurse researcher's recommendations for further study, Sander (1992) included variables such as learning style, especially regarding teaching strategies for promoting critical thinking ability. Study results could demonstrate relationships between specific learning preferences and critical thinking ability overall, or in relation to sub-skill(s). Conversely, learning style preference may not be a significant factor in relation to critical thinking ability. It is possible that other demographic variables examined may contribute more to explaining critical thinking ability in the study populations.
In summary, a study comparing critical thinking ability in novice and expert nurses, with consideration of selected demographic variables, including learning style as a mediating variable, held both practical and theoretical utility for contributing to an understanding of critical thinking as process and construct within the discipline of nursing.

Definition of Terms

For the purpose of this study, the following terms were operationally defined:

Professional Nurse - An individual who is currently licensed by a state board of nursing to practice as a Registered Nurse (RN), or upon imminent graduation from a current educational program, will become eligible to sit for the national licensing examination required for state board licensure as an RN.

Novice Nurse - An individual who is completing the final semester of baccalaureate education as initial preparation for professional nursing practice.

Experienced Nurse - An individual who has practiced as a professional RN for at least five years.

Expert Nurse - An individual who has practiced as a professional RN for at least five years, and has received formal recognition from professional colleagues for exemplary performance in the practice of professional nursing.

Critical Thinking - Although many definitions of this entity have been proposed, the one adopted for use in this study was the one developed by the multi-disciplinary national Delphi panel:

We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. CT is essential as a tool of inquiry." (in Facione, 1991, p. 2.)
**Generic Program** - Refers to nursing programs in which an upper division baccalaureate nursing major is built upon a base of liberal arts and sciences.

**Learning Style** - is defined as an individual's characteristic means of perceiving and processing information (Kolb, 1976). The four styles of learning based on Kolb's theory of experiential learning are: Accommodators, Assimilators, Divergers, and Convergers.

**Specialty Area of Clinical Nursing Practice** - Refers to a nurse's primary practice specialty, i.e. Medicine, Surgery, Obstetrics, Pediatrics, Gerontology, Emergency Care Orthopedics, Cardiology, Mental Health, Oncology, Community Health, School Health, Occupational Health, Staff Development/Inservice Education, and other specialties identified by study participants.

**Institutional Setting of Clinical Nursing Practice** - Refers to type of employing agency, i.e. acute care hospital, home health agency, day surgery center, public health department, nursing home, hospice, university health service, physician's office, and other agencies identified by study participants.
CHAPTER 2
REVIEW OF RELATED LITERATURE

Preview

Embarking on an exploration of the literature pertaining to critical thinking becomes a formidable task by virtue of burgeoning interest in the topic predominantly during the past ten years, from many sectors and from varied perspectives. Cassel and Congleton (1993) cite 930 references in their survey of critical thinking literature from the 1960s to the present. Although the concept is not new, there has been an effort in this century to integrate critical thinking into education by scholars from philosophy, education (especially philosophy of education), psychology, and from within specific disciplines, notably higher education. Supplementary to critical thinking, other theoretical constructs to be addressed relative to this study include adult cognitive development, novice to expert professional development, and learning styles.

This section will present a review of relevant literature beginning with a historical perspective of critical thinking, followed by definitions of the entity, and then by describing attributes of critical thinkers. A brief discussion of adult cognitive development will precede a descriptive overview and evaluation of critical thinking assessment instruments. Research on critical thinking will be summarized, with greater emphasis placed on the outcomes of nursing research. Novice to expert conceptualizations of professional development will follow. This section will end with a discussion of research on learning styles, again with special reference to nursing applications. A final recapitulation of this section will serve as a basis for the next chapter on study methodology.

others for further conceptual understanding of critical thinking. Methodologies and issues pertaining to teaching critical thinking, and rhetoric about philosophical controversies within the critical thinking movement, will not be addressed in this review.

Historical Perspective of Critical Thinking

One of the earliest recorded proponents of critical thinking was the ancient Greek philosopher Socrates (469-399 B.C.), who questioned the citizenry of Athens about their "unexamined" way of life, prodding people into thinking (Ozmon & Craver, 1990). His ideas were orally transmitted through a dialectic question and answer approach recorded by Plato (427-347 BC). Plato eventually opened an Academy in which students and faculty used a dialectic approach to regard both sides of an issue in solving problems, known as Socratic discussion/questioning. In this view of education, there is provision of information and assistance in helping students to question, examine, and reflect on ideas and values (Beck, Bennett, McLeod, & Molyneaux 1992). Socratic questioning became an important teaching methodology in many sectors of higher education for centuries.

Higher education in Western civilization during the 17th and 18th centuries provided classical education in seminaries, primarily for the upper class. Education during this period included Latin and Greek language instruction, with memorization and repetition emphasized as common methodologies for learning. Critical thinking skills were not emphasized in education during this period.

In America, higher education became more generally available to the populace through the development of early religious schools, through normal schools in the early 1800s, and through Land Grant Colleges beginning in the 1860s. The latter prepared graduates for "agriculture and the mechanic arts": farming, business, the professions, and the clergy. Students were taught the three Rs, some religion, and patriotic history; they were not necessarily expected to think analytically or
critically about affairs of the day. During the 19th century, educators such as Horace Mann and John Stuart Mill wrote critically about educational outcomes, and urged cultivation of intellect. Mann (cited in Paul, 1990) stated that, "more than 11/12ths of all the children in the reading classes do not understand the meanings of the words they read" (p. 9).

John Dewey, writing in How We Think (1933), fostered renewed interest in critical thinking by distinguishing between thinking as process and product. He espoused "reflective thinking," which he defined as:

Active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends ... it includes a conscious and voluntary effort to establish belief upon a firm basis of evidence and rationality. (p. 9)

Dewey believed that learning does not always result in good judgment and that education can enhance or detract from problem solving and judgment. His ideas stimulated the "progressive education" movement, which largely impacted elementary education, rather than post-secondary levels of education in the area of thinking.

Additional attention to critical thinking can be attributed to Edward Glaser's An Experiment in The Development of Critical Thinking (1941). This book summarized an American perspective on critical thinking, provided rationale for critical thinking as an educational objective, reviewed related research, and presented findings of an experimental study designed to improve critical thinking abilities of high school students. He defined critical thinking as involving three things: "(1) an attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences, (2) knowledge of the methods of logical inquiry and reasoning, and (3) some skill in applying those methods." (Glaser, pp. 5-6)
Glaser collaborated with Goodwin Watson in developing the *Watson-Glaser Tests of Critical Thinking* (1941) through extensive revision of Watson's 1925 tests of fair-mindedness. Glaser reported an average gain on a battery of critical thinking tests given in four high school experimental classes after ten weeks that was significantly greater than the average gain of four control classes on the same tests (p. 175). He also found general improvement in ability to think critically in the experimental groups, measured independently of subject knowledge.

Robert Ennis was an important contributor to current interest in critical thinking through publication of "A Concept of Critical Thinking" in 1962. He initially defined critical thinking as "the correct assessing of statements" and identified twelve aspects and three dimensions of the concept, thereby providing a useful list of proficiencies (p. 83). The concept of critical thinking thus appears to have a variety of meanings, reflecting its scope, goals, process, methodology, and critical attributes (Beck et al. 1992, p. 5).

**Current Definitions of Critical Thinking**

In order to develop a conceptual understanding of critical thinking for the purposes of this study, several recent definitions are examined. Critical thinking may be perceived as a subject or as a dynamic process. It is generally regarded as purposeful, with qualities observable through the thinker's behavior. There is disagreement regarding critical thinking as a genetically inherited versus a completely learned ability. There is also controversy about critical thinking as a domain specific entity versus a broadly transferable entity. In that discussions of the phenomenon arise from diverse disciplines with varying philosophical perspectives, descriptions of skills tend to be discipline-specific. The inclusion of inductive and deductive reasoning behaviors, however, does tend to be included in most discussions regarding critical thinking skills.
**Broad Definitions**

Watson and Glaser (1980) continued to view critical thinking as a composite of attitudes, knowledge, and skills, but added refinements to their earlier definition as follows:

(1) attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true;

(2) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and

(3) skills in employing and applying the above attitudes and knowledge (p. 1).

Others contributing to a conceptual understanding of critical thinking include John McPeck (1990), credited with raising the central issue of availability of "general" as opposed to "domain specific" critical thinking skills. He argued that the only proper way to understand critical thinking is to teach it within the context of a given discipline, rather than through a discipline-neutral approach.

Richard Paul, one of the foremost proponents of the critical thinking movement in education, disagreed with McPeck's views, believing that critical thinking applies across disciplines and domains. He defined critical thinking as "Thinking that takes charge of itself and maintains, through a self-monitoring, self-assessing process, a minimal level of 'quality'." (personal communication, June 3, 1994). This metacognitive aspect of Paul's conception of critical thinking is quite evident in his 1993 book, where he described critical thinking as a unique kind of purposeful thinking in which the thinker systematically and habitually imposes criteria and intellectual standards upon the thinking (p. 21). Paul further expanded the concept of critical thinking (1990) by adding his perceptions regarding its two
forms: "strong sense" (fairminded) which is disciplined to encompass the interests of diverse persons or groups; and "weak sense" (sophistic) which is disciplined to serve the interests of a particular individual or group, to the exclusion of others (p. 33).

Stephen Brookfield (1985) extended critical thinking to a conceptualization within adult education, fostering a spirit of critical reflection. Indeed, he regards a central task of adult education to be that of prompting adults to consider alternative ways of thinking (p. 48).

Halpern (1984) regarded critical thinking as purposeful and goal directed, occurring in problem-solving and decision-making. This is in contrast with non-directed thinking which is routine and habitual.

In the view of Kurfiss (1988), critical thinking "is defined as an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information that can therefore be convincingly justified (p. 2). She noted that a conclusion and supporting justification are the two outcomes of critical inquiry.

In "Testing College-Level Critical Thinking," Peter Facione (1986) defined critical thinking as "the ability to properly construct and evaluate arguments" (p. 222). He hypothesized that critical thinking tests might eventually be used to differentiate critical-thinking skills and subskills. He maintained that diagnostic testing requires discrimination among sets of skills, thereby detecting a student's strengths and weaknesses. He identified three sets of skills as: (a) those associated with constructing arguments; (b) those associated with evaluating arguments; and (c) those preliminary skills associated with properly identifying arguments, distinguishing them from other closely related things done in or through the use of language (p. 228).

One of the simplest, more frequently cited definitions used in education is provided by Norris and Ennis: "Critical thinking is reasonable and reflective
thinking that is focused upon deciding what to believe or do." (1989, p. 1). This
definition emphasizes the process of teaching students how to think, rather than what
to think. This process entails reliance on good reasons for reaching conclusions, for
consciously examining the reasonableness of one's own or others' thought, and for
focused, purposeful thinking with an action outcome.

**Specific Definitions**

According to Facione (1990), the 1980s brought growing accord within
education that the processes of inquiry, learning, and thinking should take
precedence over the accumulation of skills and increasingly outdated information.
There was, however, no consensus regarding the skills and abilities characterizing
critical thinking, and effective ways of teaching and assessing it. In 1987, the
American Philosophical Association, through its Committee on Pre-College
Philosophy, charged Facione with the task of making a systematic inquiry into the
current state of critical thinking and its assessment. From 1988 through 1989, a
Delphi panel of 46 members, men and women from around America, participated in
six rounds of questions, working toward consensus from blind review of participant
quotations and synthesized responses. The Delphi Method is a qualitative research
methodology requiring formation of an interactive panel of experts. The panelists
represented the disciplines of Philosophy (52%), Education (22%), the Social
Sciences (20%), and the Physical Sciences (6%) (Facione, 1990b, p. 3). This 1990
consensus articulated an ideal, serving to guide critical thinking assessment and
curriculum development at all educational levels.

**The Delphi Consensus**

Findings reflecting the attributes of good critical thinkers included both skill
and dispositional dimensions. The Delphi Consensus Statement (Facione, 1990b)
defined critical thinking as follows:
We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based (p. 2).

The expert panel also regarded critical thinking as an essential tool of inquiry, "as a liberating force in education and a powerful resource in one's personal and civic life" (Facione, 1990, p. 2). The researcher adopted the Delphi Consensus definition as the operational definition of critical thinking for the study herein.

**Skills and abilities.** The Delphi Panel regarded critical thinking as but one among several related forms of higher-order thinking (mental abilities), such as problem-solving, decision-making and creative thinking. Core cognitive skills included by these experts were:

1. Interpretation, Sub-skills: Categorization, decoding significance, and clarifying meaning.
2. Analysis, Sub-skills: Examining ideas, identifying arguments, analyzing arguments.
4. Inference, Sub-skills: Querying evidence, conjecturing alternatives, drawing conclusions.
5. Explanation, Sub-skills: Stating results, justifying procedures, presenting arguments.

The Delphi experts characterized these cognitive skills as pervasive and purposeful. They additionally did not regard critical thinking as a singular school subject, rather, it could be presented in discipline-specific content or in programs relying on everyday events (Facione, 1990, p. 5). Experts emphasized the value of a solid liberal education as a foundation for development of such skills and abilities.
Dispositions and attitudes. This dimension of critical thinking relates to "affective dispositions," the habitual attitudes or approaches exhibited by "good" critical thinkers. The phrase "critical spirit" was used in referring to "a probing inquisitiveness, a keenness of mind, a zealous dedication to reason, and a hunger or eagerness for reliable information." (Facione, 1992, p. 8). Each appropriately exercised cognitive skill was thought to be correlated with a cognitive disposition - being disposed towards, having an aptitude to complete that skill.

The Delphi experts reached consensus (83%) about the affective dispositions characterizing good thinkers (p. 15). There were differences of opinion, however, regarding the inclusion of certain affective dispositions in the concept of critical thinking (p. 15). A 61% majority held that affective dispositions were part of the meaning of critical thinking (p. 13). Approximately one-third held that critical thinking only refers to cognitive skills and dispositions, arguing that adeptness at critical thinking skills but not habitually using them thereby disqualifies one from being termed a critical thinker. This minority group used critical thinking in the strict procedural sense, sharply distinguishing "between what is true of critical thinking from what is true of good critical thinkers (p. 14).

The dispositions of the good, or paradigm, critical thinker described by the Delphi Panel were:

The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit. (p. 2).
Nursing Definitions

In terms of the discipline of nursing, an initial text on critical thinking in nursing was written by Bandman and Bandman (1988, revised in 1995). These authors defined critical thinking "as the rational examination of ideas, inferences, assumptions, principles, arguments, conclusions, issues, statements, beliefs, and actions." (1995, p. 5). Such an examination included the nursing process, decision making, and reasoning on controversial issues. Four types of reasoning comprising critical thinking were identified, namely deductive, inductive, informal or everyday, and practical reasoning. The Bandmans (1995) additionally provided a 14 item checklist to further particularize this definition (pp. 7-8).

Alfaro-LeFevre (1995) summarized critical thinking in nursing, stating it:

- Entails purposeful, goal-directed thinking
- Aims to make judgments based on evidence (fact) rather than conjecture (guesswork)
- Is based on principles of science and scientific method
- Requires strategies that maximize human potential and compensate for problems caused by human nature (p. 9)

Although the National League for Nursing Criteria and Guidelines for the Evaluation of Baccalaureate Nursing Programs (1991) mandates demonstration of critical thinking ability as an educational outcome for baccalaureate nursing graduates, this body did not prescribe a definition for all schools. Instead, it requires that each program establish its own definition of critical thinking and measure achievement of such accordingly. As evidenced by the literature, printed conference topics, and continuing education offerings, nurse educators appear to have developed considerable interest in studying critical thinking. Nurse researchers generally appear to adopt a definition compatible with the instrument used to measure critical thinking in their research project.
Summary

Although critical thinking is an old concept, it has garnered much new attention during the past decade, both as a desirable educational process and outcome, as well as a researchable entity. The Delphi Consensus in 1990 sought to provide significant across-discipline agreement regarding critical thinking abilities, and to a lesser degree, some agreement regarding dispositions. However, as Manuto (1993) concluded, critical thinking is a function of intellectual performance but there remains no theoretical consensus about what critical thinking is. He asserted that critical thinking research is yet in its infancy and a more effective interdisciplinary approach is needed.

The literature does not reflect consensus within the discipline of nursing per se regarding critical thinking abilities, although demonstration of such in baccalaureate nursing graduates is required (NLN, 1991). Individual collegiate nursing programs have been given the autonomy to define and measure critical thinking as they deem appropriate. A review of the literature led the researcher to conclude that nursing research needs to be done to further clarify the concept of critical thinking within the discipline of nursing.

Adult Cognitive Development and Critical Thinking

The discourse on critical thinking in the literature pertaining to higher education frequently refers to research on adult cognitive development, notably that of Perry (1970) and Belenky, Clinchy, Goldberger, and Tarule (1986). William Perry's seminal work with Harvard (and some Radcliffe) undergraduate students began with interviews in 1958 and continued into the 1960s, covering students' four years of college experience. He described students' cognitive growth in three major stages of thinking, and a progression of thought patterns through nine consecutive positions. The primary stages of thinking were Dualism, Multiplism, and Relativism. In Dualism (Positions 1 and 2), students view the world in polar terms
with an external locus of control (teacher an authority); all events are seen as good or bad, right or wrong. Students next move to Multiplism (Positions 3 and 4) in which there is beginning acceptance of diversity. They finally move to Relativism (Positions 5 through 9) with an understanding that all knowledge is contextual. According to Perry, the locus of control becomes internal, the individual makes initial commitment and later affirms identity (Perry, 1970; Frisch, 1987). An individual is able to make a commitment to a profession, a life-style or responsibility only at position seven or above.

A 1981 study of baccalaureate nursing students by Collins found these students functioning at positions two (dualism) and three (multiplism), and that professional commitment could not be expected until after graduation (cited in Frisch, 1987, p. 26). Valiga (1983) also studied cognitive development across all four levels of 123 baccalaureate nursing students during an academic year using two alternate forms of the KneWi projective essay technique. Pretest and posttest essays were scored by outside trained raters, blind to the study's purpose and the students' status levels. Overall findings were that students minimally increased in cognitive development from year to year, but generally were still in Perry's category of Dualism upon graduation. According to Valiga, outcomes implied that most graduates function dependently, are conformists, and cannot responsibly make decisions in complex/ambiguous/ uncertain situations (p. 119). Given the study results, the author raised serious questions regarding nursing student recruitment, educational environments, and nurse educators' role in fostering cognitive development.

In another early study, Brabek (1983) compared critical thinking ability with scores on a reflective judgment instrument. She studied four educational levels of students from high school to masters' program, matching pairs on educational level but differing in critical thinking ability. Results indicated that the two measures
were moderately correlated \( r = .40 \), with low-scoring critical thinkers scoring no higher than stage 4 on the reflective judgment interview (Perry's late Multiplicity). The high-scoring groups' maximum was stage 5 (Perry's early contextual Relativism), with 30% scoring above stage 4. Findings were regarded as supporting the hypothesis that students who have not acquired basic critical thinking skills subscribe to epistemological views no higher than multiplicity.

Frisch (1987) evaluated cognitive development of two groups of junior baccalaureate nursing students \( (N = 42) \) and found the majority of students operating at Perry's position three, some at position one, and only one at position four (p. 27). These findings also supported Collins' conclusion that professional commitment cannot be expected until after graduation. Frisch suggests an explanation for new graduate "reality shock" in that professional nursing requires considering events from multiple viewpoints, and new graduates operating at dualistic or multiplistic cognitive levels may have adjustment difficulties. "A period of socialization into the professional role and a chance to grow in reasoning ability are essential for the new graduate" (p. 27).

Belenky et al. (1986) further expanded understanding of epistemological development in this area through research pertaining to Women's Ways of Knowing. One of the major criticisms of Perry's (1970) research was that his study sample was predominantly male. Belenky and associates began a project in the late 1970s by interviewing 135 women from nine different academic institutions and "invisible colleges" - human service agencies supporting women in parenting their children. Some 90 women subjects were enrolled in one of six academic institutions, whereas 45 women were from three different family agencies. Sections of the completed interviews were separated out and were independently scored by coders "blind" to demographic and other factors pertaining to study subjects.
Expanding on Perry's scheme, the women's perspectives on knowing and viewing the world were grouped into five epistemological categories as follows (Belenky et al., 1986, p. 15):

Silence - a position in which women perceive themselves as mindless and voiceless and subject to the whims of external authority.

Received Knowledge (comparable to Dualism) - women conceive of themselves as capable of receiving, even reproducing, knowledge from the all-knowing external authorities but not capable of creating knowledge of their own.

Subjective Knowledge (comparable to Multiplism, almost half the women in the study) - a perspective from which truth and knowledge are conceived of as personal, private, and subjectively known or intuited.

Procedural knowledge (comparable to Relativism) - a position in which women are invested in learning and applying objective procedures for obtaining and communicating knowledge.

Constructed Knowledge (comparable to Commitment in Relativism) - a position in which women view all knowledge as contextual, experience themselves as creators of knowledge, and value both subjective and objective strategies for knowing.

Belenky and associates (1986) identified five major differences in outcomes between women in their sample and the subjects in Perry's study. Perry's Harvard males tended to identify with male authority figures in Level 1, whereas the women tended not to identify with authorities. Secondly, a responsibility to help others was noted as a central theme for the women, an issue not identified in Perry's subjects. A third difference was that listening/gaining a voice was a dominant metaphor for women, whereas the implied metaphor of seeing was attributed to Perry's interviewees (Kurfiss, 1988, p. 57). A fourth difference was the perspective of
"silence" in Belenky's women, preceding dualism/received knowledge, although silence was not found among the college student sample. A final difference was the discovery of "connected knowledge" among women, used in attempts to understand unfamiliar ideas, the reasons for another's way of thinking.

In "The development of thoughtfulness in college women," Clinchy (1989) examined ways of knowing and style of discussion used by college women. She distinguished between "separate" knowing, involving activities of critical thinking and textual analysis, and "connected" knowing, based on the premise that understanding another's viewpoint requires adoption of that person's own terms. Using interviews, she found that male college students were more comfortable with separate knowing and women with connected knowing. Studies on knowledge development in women may be particularly germane to nursing in that it remains a predominantly female profession.

McMillan (1987) reviewed 27 studies of the effects of instructional variables on the critical thinking of students. Although critical thinking improves while students attend college, it is not clear what factors influence this change. He concluded that research to date fails to provide much foundation for improving instructional programs. It was hoped that the inclusion of learning styles as a possible mediator of critical thinking in the study herein would provide some useful information for improving instructional programs.

Critical Thinking Assessment Instruments

Evaluating Critical Thinking Instruments

A number of commercially available tests have been designed to assess comprehensive critical thinking ability. One must, therefore, determine the suitability of a given test for the intended purpose.

Norris and Ennis (1989) provided a useful list of seven guidelines for examining critical thinking tests. These guidelines included examining the
directions, items, scoring guide, and taking the test oneself. One should also compare one's answers with the guide, deciding if the scoring guide is reasonable. Ask oneself, "Does this really test for some aspect of critical thinking?" (p. 56). If the test is purportedly comprehensive, note if there is coverage of critical thinking in a balanced manner. If purportedly aspect-specific, does it cover enough of the aspect? Finally, read the test manual, note statistical information, remembering that test publishers have a conflict of interest regarding information included or excluded. Information about reliability is especially important.

The Delphi Consensus Panel (Facione, 1990) did include a recommendation regarding evaluating the acceptability of a critical thinking assessment strategy or instrument. The recommended areas for consideration included content and construct validity, reliability and fairness. In terms of content validity, the experts recommended that an instrument be founded both on an appropriate conceptualization of critical thinking, as well as clearly explicating the target aspects of critical thinking under assessment. Assessment strategies for targeting the dispositional and the cognitive skills dimensions should be undertaken. In terms of construct validity, the Delphi Panel experts urged that each question be evaluated to insure that a correct response is based on good critical thinking processes.

In terms of reliability, each item should be evaluated to insure that good critical thinkers perform better on the item than do weak critical thinkers, and that evaluations by different judges are generally consistent with one another. Caution was recommended in interpreting technical measures of test-form reliability on written instruments, as empirical research is yet needed on sub-skill intercorrelations and with dispositions.

In terms of fairness, assessments should be carefully examined to prevent the unfair influence of various factors such as gender, age or related life experience, ethnicity or socioeconomic status, differences in social norms or cultural
assumptions, reading ability, or in terms of domain-specific knowledge (Facione, 1990, p. 20). The Delphi Panel experts encouraged discipline-specific critical thinking assessment, although the fairness criterion should be applied to both discipline-neutral and discipline-specific assessments.

The Delphi Panel experts also recommended that assessment of critical thinking be done frequently and explicitly, and that it be used both diagnostically and summatively. A variety of different instruments should be employed, appropriate to the targeted aspect of critical thinking and to the level of student learning.

**Cornell Critical Thinking Tests (CCTT)**

The multiple-choice Cornell Critical Thinking Tests, developed by Ennis and Millman (1985) consist of two forms. Level X is a 71 item test, primarily intended for junior and senior high school students and for those in their freshman year of college. Level Z is a 52 item test designed for undergraduates, graduate students, and for adults. This discussion will only include Level Z, as it pertains to adults.

Seven sections are included in this instrument: Deduction, Meaning, Credibility, Inductive Inference (direction of support, if any), Inductive Inference (prediction and hypothesis testing), Definition and Unstated Reasons, and Assumption Identification (Norris & Ennis, 1989, p. 65). Content validity is related to Ennis' conception of critical thinking. The CCTT manual provides a variety of norms that can assist in comparing critical thinking performance across different groups and over time. Reliability estimates reportedly range from .50 to .77 (Norris & Ennis, p. 68). This instrument has been reported very little among nursing populations.

**Watson-Glaser Critical Thinking Appraisal (WGCTA)**

The Watson-Glaser Test was initially developed in the late 1930s and is thus the oldest and most extensively used critical thinking test. There are two parallel
forms of this 80 item multiple-choice test, Forms A and B, each form designed to test the same aspects of critical thinking. It was primarily designed for testing high school and college level students, although it can be used for junior high level students also. In terms of reading difficulty, it was designed for those with an equivalent of a ninth-grade education. This test is intended for use as a power test, rather than a speed test, and can usually be completed in 40 minutes.

The authors of the Watson-Glaser Test viewed critical thinking as a composite of attitudes, knowledge, and skills. A series of exercises on the test include problems, statements, arguments, and interpretations of data purportedly similar to those encountered on an everyday basis at work, school, and in print materials (Watson & Glaser, 1980, p. 2). Test-takers respond to two different kinds of item content: items with "neutral" or "controversial" content. The rationale for this is that strong attitudes, biases and opinions can affect ability to think critically. Five subtests are included in the WGCTA, namely: Inference, Recognition of Assumptions, Deduction, Interpretation, and Evaluation of Arguments. The test can be scored by hand or by machine.

Reliability estimates for the WGCTA range from .70 to .82, consistent with the range for other multiple-choice critical thinking tests (Norris & Ennis, 1989, p. 61). The authors contend that test validity is a joint characteristic of the test and the purpose for which the test is to be used (Watson & Glaser, 1980). The test has been normed on a number of populations, such as: students in different regions, at different levels and in different types of colleges, preservice teachers, nursing students in different regional baccalaureate programs, MBA and medical students in regional universities, police officers, high school students. According to Watson and Glaser (1980), the WGCTA can be used to measure gains in critical thinking following various instructional programs, predict success in occupations or programs when critical thinking is considered to be important, and in researching the
relationship between critical thinking abilities and other traits or abilities. Some empirical evidence of WGCTA test validity is provided in the Critical Thinking Appraisal Manual (Watson & Glaser, 1980, pp. 10-11).

California Critical Thinking Instruments

This series of recently developed instruments were designed by Drs. Noreen (RN) and Peter Facione (1992, 1993) to measure the constructs for critical thinking abilities and dispositions elucidated by the Delphi Consensus Panel. They are linguistically contemporary in contrast to some of the older tests.

California Critical Thinking Skills Test (CCTST)

The CCTST measures critical thinking skills in relation to short problem statements and scenarios. It was developed to measure Overall Cognitive Skills, Inductive and Deductive Reasoning and the Delphi Panel categories of Analysis, Inference, and Evaluation. It consists of a 34 item, multiple choice test with discipline-neutral content that can be either hand or computer scored (P. A. Facione & N. C. Facione, 1993). It has two statistically equivalent forms, A and B. It can be given to an adult population in a 45 to 60 minute time period. Further information on this test, including the 1994 Mental Measurements Yearbook evaluation, is included in the methodology chapter of this manuscript.

California Critical Thinking Disposition Inventory (CCTDI)

This newest instrument was specifically designed by the Faciones (1992) to measure the critical thinking dispositions identified by the Delphi Consensus Panel:

- **Truthseeking:** A courageous desire for the best knowledge, even if such knowledge fails to support or undermine one's preconceptions, beliefs or self interests.

- **Open-Mindedness:** Tolerance to divergent views, self-monitoring for possible bias.
• **Analyticity**: Demanding the application of reason and evidence, alert to problematic situations, inclined to anticipate consequences.

• **Systematicity**: Valuing organization, focus and diligence to approach problems of all levels of complexity.

• **Self-Confidence**: Trusting of one's own reasoning skills and seeing oneself as a good thinker.

• **Inquisitiveness**: Curious and eager to acquire knowledge and learn explanations even when the applications of the knowledge are not immediately apparent.

• **Maturity**: Prudence in making, suspending, or revising judgment. An awareness that multiple solutions can be acceptable. An appreciation of the need to reach closure even in the absence of complete knowledge.


According to the test authors, critical thinking dispositions are measured in relation to Likert-style attitudinal prompts. There are 75 items with a six point Agree-Disagree response option. The Dispositions Test was not considered for use by this investigator in the current study because an a priori decision had been made to include only variables associated with critical thinking **cognitive** abilities.

### Miscellaneous Critical Thinking Tests

**The Ennis-Weir Critical Thinking Essay Test**

This instrument is the singular commercially available, comprehensive critical thinking test in essay format. It is directed at high school and college students, and uniquely tests for some critical thinking dispositions. The test entails presentation of a fictitious letter, containing eight numbered paragraphs, to a newspaper editor. Students are asked to write a response evaluating the thinking reflected in each of the eight paragraphs and in the letter as a whole. The test manual provides information on scoring student responses in under ten minutes.
Reliability estimates are based on interrater comparisons and estimates given are relatively high for essay tests: .86 and .82 (Norris & Ennis, 1989, p. 83).

A potential problem in using this test is that different graders may rank subject responses in the same order, but still have very different average scores. The test's validity is primarily based on presentation of typical daily situations in which the subjects are asked to reason soundly about a range of actions people exhibit when trying to persuade one another. If these situations are not relevant to the test audience, the test may have less validity when applied to that audience. An additional problem is the increased time necessary to review each completed essay test when compared to scoring a multiple-choice test.

The Torrance Test of Creative Thinking (TTCT) and the KneWi Essay Test are additional instruments less frequently used in assessment of thinking abilities. The Torrance Test has verbal forms A and B for determining scores of creative thinking ability in the areas of verbal fluency, flexibility, and originality. Subjects are asked to think about possibilities regarding a variety of activities in completing a set of seven written, timed exercises. The tests are hand scored by the publisher through content analysis of the subjects' responses. Torrance (1974) reports construct validity with coefficients of correlations of .49 to .51, and test-retest designs with reliability coefficients from .60 to .93.

The KneWi is a projective test whereby Widdick redefined K nefelkamp's cognitive development instrument in which two essay questions are scored by trained raters. Students are then placed on the Perry scale in terms of their measure of dualism, relativism, and commitment.

Research on Critical Thinking

In his "Synthesis of Research on Critical Thinking", completed before the Delphi Consensus, Norris (1985) broadly interpreted empirical, philosophical and policy research on the subject. He concluded that critical thinking is a complex of
many considerations. One must be productive in terms of conceiving of alternate
courses of action or belief, produce reliable observations, make sound inferences,
offer reasonable hypotheses, and have the disposition to think critically about issues
(p. 40). He also found critical thinking to be an educational ideal, that evidence
from high school and college students does not reflect high level performance in this
area, and this may also be true of adults. Further, Norris found that critical thinking
is extremely sensitive to context and that assessments of critical thinking should seek
explicit indications of people's reasons for conclusions (p. 42). He reported that
readily identifiable errors in thinking may indicate deeper level thinking errors,
notably poor metacognitive or executive skills. He noted that a "critical spirit" is as
important as skill in critical thinking, that such skills are no substitute for
experience, common sense, and sound knowledge of subject matter. Finally, Norris
reported little detailed knowledge about the effectiveness of teaching critical
thinking, although research typically concludes that instruction is effective (p. 44).

Norris later (1988) identified two issues needed in research on the concept,
namely the generalizability of critical thinking and the evaluation of critical thinking
ability. He also argued that the combined expertise of philosophers, psychologists,
and subject matter specialists is needed.

General Higher Education Research in Critical Thinking

A review of over 100 research articles pertaining to critical thinking revealed
several studies involving higher education. Much of the research on critical thinking
at the collegiate level has been designed to study changes in critical thinking,
examine a variety of variables affecting student learning, and incorporate some
measure of critical thinking as part of the study design.

Pascarella (1989) conducted a longitudinal study of changes in critical
thinking in college and non-college students by matching subsamples of both groups
on ethnicity, Watson-Glaser Critical Thinking Appraisal scores, American College
Testing Program (ACT) composite scores, and family socioeconomic studies. After one year, the two groups repeated the WGCTA and completed a questionnaire regarding specific experiences and activities occurring during that year.

Findings from the Pascarella study were that the single year of college resulted in a 17% improvement in critical thinking over no college attendance. No specific experience was found to influence this development of critical thinking. A composite measure of college activities, however, did correlate positively with the development of critical thinking.

In an investigation of the relationship between reflective judgment and skills constituting standardized critical thinking tests, Mines, King, Hood, and Wood (1990) studied a broad range of 100 students: 20 freshmen, 40 seniors, and 40 graduate students. The students took both the WGCTA and the CCTT instruments as a group, and the Reflective Judgment Interview individually. Measures of academic aptitude were each student's scores on the ACT, SAT, or GRE.

Study results indicated that overall scores for each measure increased with educational level, and that academic ability failed to account for educational level difference. A major finding was that students who used assumptions of higher stages of reflective judgment to reason, demonstrated better critical thinking skills compared to those using assumptions of the lower stages. The specific critical thinking skills distinguishing reflective judgment stages included: "(1) interpretation, weighing evidence, and identifying generalizations; (2) detecting fallaciously ambiguous arguments; (3) deduction; and (4) inference." (in Cassel & Congleton, 1993, p. 65). The authors concluded this may indicate that such skills must be mastered for ongoing intellectual development through the stages of reflective judgment.

from five major areas of study: business, health science, liberal arts, math/physical science, and social science. They found that advanced students scored higher than beginning students, and that students with higher grade point averages (GPAs) had better critical thinking skills, irrespective of advanced study discipline.

More specific information was provided when Miller, Sadler, and Mohl (1993) examined the relationship between preclinical medical school course evaluations and critical thinking skills of 196 University of Texas medical students by correlating exam results with the Watson Glaser Critical Thinking Appraisal. The subjects' undergraduate and medical school GPAs, and Medical College Admission Test (MCAT) scores were additionally included in the analysis. The course exams were 25 tests given during the first 2 years of medical school. Findings were that 16 of these exams had significant positive correlations with the WGCTA, as did MCAT scores and first year GPAs. Interestingly, a review of WGCTA subscale scores reflected correlations more robust for interpretation (18 exams), evaluation of arguments (15 exams), and less robust for inference (7 exams) and recognition of assumptions (3 exams). The authors concluded that such results suggest that objective multiple-choice exams can at least partially reflect critical thinking skills.

In terms of "Critical Skill Clusters for Vocational Education," Custer and Claiborne (1992) contend that the workplace of the future will be very different from that of today, and that vocational education must be prepared to respond. The accelerating pace of technological change increases as information technologies are infused into the workplace. An expanded range of abilities requires problem solving, critical thinking, communication, and interpersonal relationship skills (p. 15).

Although not a study of critical thinking per se, Custer and Claiborne (1992) conducted research to explore the perceptions of vocational educators about the types
of skills needed for participation in the emerging work force. This was operationalized by examining the effect of selected demographic and educational factors on the three skill clusters of employability, basic and technical skills. A combination of qualitative and quantitative approaches was used in data collection, including a Critical Skills Inventory (CSI) to gather quantitative data from a stratified and purposive sample of 273 Missouri Trade and Technical and Health Occupations teachers. Qualitative information was obtained through a series of structured interviews with a purposive sampling of five vocational administrators and six groups of teachers. The Critical Skills Inventory was comprised of 75 forced-choice skill pairings to assess employable skills. A key question was "Which of the following skills will be the most important to students when they finish school and enter the work force?" (p. 21). An overall response rate of 85.3% was obtained regarding the Inventory.

Custer and Claiborne (1992) reported their most striking finding to be that employability skills were consistently perceived to be the most important skill cluster of students entering the work force. Also, basic skills (including ability to problem solve and gather/analyze information) were ranked ahead of technical skills, although the difference was not statistically significant. These vocational educators, therefore, may not perceive the seriousness of need for solid basic skills, despite the emphasis on "applied academics," Tech Prep and government reports. Among the authors' recommendations was that vocational administrators should provide more preservice and in-service information regarding employability and basic skills for both beginning and experienced vocational teachers. They asserted that the future workplace will "need workers capable of solving problems, thinking critically and creatively, and extending their knowledge to new situations and applications."

(Custer & Claiborne, p. 38.)
In reviewing critical thinking research in higher education, the literature is surprisingly sparse in terms of understanding critical thinking as a construct aside from philosophical issues and educational methods. McDonald (1993), for instance, described a critical thinking model with self-direction and dialogic elements -- emphasizing collaborative interaction between teacher and learner. She used critical thinking and self-directed learning as the theoretical base for her model. She selected educational principles from recognized theorists, including learning styles, information-processing, and andragogic and behaviorist theory. The three primary components of the model included teacher (critical agent), learner (self-directed), and teaching-learning environment (dialogic). She asserted that an environment with five characteristics of each component present and functioning would provide a climate providing for critical thinking/learning enhancement in adult learners. Empirical data to support such learning outcomes was not discussed.

Chaffee (1992) argued in support of promoting critical thinking especially for developmental students. She described the Critical Thinking Program at LaGuardia Community College where over 85% of the entering students tested need remediation in basic language and math abilities, as well as knowledge about the world (p. 2). The Program began in 1979, supported by two National Endowment for the Humanities (NEH) grants, with a keystone course entitled "Critical Thinking Skills." It has since become an interdisciplinary program for over 800 entering students annually.

The LaGuardia model assumes that language and thought are related, dynamically and interactively. The goal of infusing critical thinking across the curriculum is operationalized through teaching "pairs". A section of critical thinking is paired with another academic course (i.e. math, science, English, and so on) and students are required to take both courses concurrently. The three aims of the Critical Thinking Skills course are to: (a) enhance and accelerate the
development of students' reading, writing, and speaking skills; (b) develop and refine students higher order thinking, reasoning and problem-solving abilities; and (c) encourage students to explore basic attitudes towards their lives and larger social concerns, fostering qualities like mature judgment and social responsibility (p. 3).

The LaGuardia Critical Thinking Program has received ongoing evaluation by the NEH and appears to have succeeded in meeting the objectives of literacy, reasoning and problem-solving, and critical attitudes. During a nine year period, 85% of the students in the Writing/Critical Thinking pairs have passed the English Exit Exam, compared to 52% of students college wide (Chaffee, p. 6). In addition, 68% of students in the Reading/Critical Thinking pairs passed the CUNY Reading Skills Assessment Test, compared to 35% of students college wide (p. 6). A variety of evaluation strategies (not cited) were used to assess reasoning and problem solving. It was concluded that the program does foster development of general and specific levels of students' thinking abilities. Additionally, students recognized both development and transfer of thinking skills to other content courses. Faculty also noted that participating students displayed such qualities as self-awareness, initiative and maturity. These students tended to be more attentive, less likely to be absent from class, more serious about coursework, better at verbalizing and asking questions, and demonstrated increased self-confidence (p. 6). The author did not present objective data to substantiate these results.

Nursing Research on Critical Thinking

The Cumulative Index of Nursing and Allied Health Literature (CINAHL) database began listing critical thinking in 1989. Since then, approximately 50 articles on the subject have appeared in the nursing literature. Attesting to current heightened interest in critical thinking, the entire November 1993 issue of the Journal of Nursing Education focused on the topic.
Studies on nursing education critical thinking research began in the late 1970s and have most frequently used the Watson-Glaser definition and WGCTA test in studies of critical thinking. No research studies were found as yet in nursing using either of the new California Critical Thinking Tests. Hickman (1993) and Beck et al. (1992) both provide excellent reviews and varying perspectives regarding critical thinking research in nursing.

In a review of six studies presenting longitudinal data using the WGCTA, there were four studies in which no significant gains were found over time (Berger, 1984; Bauwens & Gerhard, 1987; Kintgen-Andrews, 1988, 1991; and Sullivan, 1987). The two longitudinal studies that showed gains in WGCTA (Gross et al. 1987; Poole, 1989), included BSN and associate degree (ADN) students in their study populations.

Nine studies presented cross-sectional data, with five of them (Brooks & Shepherd, 1990; Lynch, 1988; Pardue, 1987; and Scoloveno, 1981) reporting significantly higher critical thinking scores in comparing BSN and RN-BSN students with other groups. Three studies reported no significant differences between groups (Brigham, 1989; Dungan, 1986; and Matthews & Gaul, 1979). Kokinda (1989), however, reported a significant difference in WGCTA subtest performance of inference, deduction, and evaluation of arguments among four levels of BSN students in a stratified random sample of each class.

Mixed results were found in ten studies of critical thinking and clinical judgment reported from 1977 to 1990. These studies used varying subject numbers and populations (ADN, BSN, RN-BSN and graduate students), and a wide variety of measures of clinical judgment.

Two recent studies looked at critical thinking in terms of nursing faculty perceptions (Sander, 1992) and nurse educator ability (Hartley & Aukamp, 1994). Most nursing studies used the WGCTA as the instrument for measuring critical
thinking, primarily reporting overall scores. Very few studies used the Cornell, KneWi, SAT or other testing measures of critical thinking. Study designs have usually been correlational, comparative, and/or pretest/posttest designs with no control group. Generalizations from these studies should be made with caution because subject samples have predominantly been convenience, intact, or purposive samples. Random selection (Valiga, 1983) and stratified random sampling (Pardue, 1987) have been rarely used in studies of critical thinking in nursing.

Sample size in nursing studies has also been quite variable, from comparative groups numbering in the 20s to approximately 160 total subjects. Critical thinking research in nursing education may thus be regarded as embryonic, but with increased attention during the last decade. Information regarding specific studies follows.

Critical Thinking as a Correlate of Success in Nursing

The first three studies to be described were longitudinal designs and used the WGCTA as the measure of critical thinking. All three correlated critical thinking with selected predictor variables, not as manipulated variables.

Bauwens and Gerhard (1987) used a descriptive correlational design to identify predictor variables for success in a baccalaureate program of nursing, with the goal of developing a multivariate theoretical model for the prediction of this success. The study sought early indicators potentially useful for admission decisions or advisement during the first nursing term.

A volunteer convenience sample of 159 consenting students completed the WGCTA and one other survey during the first and last terms of the nursing program. The two predictor variables were University pre-nursing cumulative GPA and entry WGCTA. The four outcome variables were near graduation WGCTA, graduation GPA and Nursing Cumulative Average, and National Counsel Licensing Examination (NCLEX-RN) scores. Graduation GPA was dropped from the analysis due to high correlations with the pre-nursing GPA and the Nursing Cumulative

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Average. Reported data analysis included descriptive statistics of sample characteristics. Findings on each variable were summarized by central tendency and dispersion measures, with comparisons to available national norms. A matrix of Pearson correlation coefficients was reviewed for significance, multicollinearity, and substantive meaning. Stepwise multiple regression was used to test theoretical relationships.

Results indicated that pre-nursing GPA was strongly correlated with Nursing Cumulative Average ($r = .62$ with $p < .005$), and entry WGCTA score significantly accounted for 28% of the variance in critical thinking scores at graduation (Bauwens & Gerhard, 1987, p. 281). Both critical thinking and academic achievement contributed significantly to prediction of NCLEX scores. Additionally, 22% of the variance in NCLEX scores was explained by academic achievement measures and WGCTA scores at program entry, significant at the $p < .01$ level (p. 281). Findings suggested that pre-existing critical thinking ability is a good predictor of success in nursing, and the WGCTA is a useful pre-admission screening instrument.

Interestingly, there was no significant difference by $t$-test between entry and exit ($N = 53$ subjects) WGCTA scores, suggesting that specific educational experiences in nursing did not produce gains in critical thinking ability. The authors suggested this finding may be related to WGCTA emphasis on logical thinking rather than problem-solving process as used in nursing. They urged study replication in other nursing programs.

Gross, Takazawa, and Rose (1987) examined the usefulness of critical thinking and NLN pre-admission exam scores as admission selection criteria. They also studied the effect of nursing education on critical thinking ability as reflected in WGCTA scores. A correlational, pretest/posttest study design without control group was used. An accessible sample of 108 AS and BS students were tested at entry and exit of their respective nursing programs using the WGCTA. Independent
variables identified were age, years of school after high school, ethnicity, entry NLN, entry and exit WGCTA, and enrollment in AS or BS program. Dependent variables, as indicators of academic success, were program completion, GPA, and NCLEX scores. The authors acknowledged considerable attrition in sample size from entrance to exit, and due to those failing to take the exit WGCTA, hence results should be regarded with caution.

In summarizing results from their study, Gross et al. (1987) reported that AS and BS students showed comparable significant improvement in critical thinking ability from entry to graduation as measured by WGCTA mean scores. For the BS group only, critical thinking was a predictor of NCLEX performance ($r = .24, p < .05$) (p. 321). Following multiple regression analysis, cumulative GPA was found to be the only significant predictor of performance on NCLEX ($r = .67, p < .000$), accounting for 38.3% of the variance (p. 321).

Tiessen (1987) conducted a study to learn which of eight predictor variables contributed most strongly to baccalaureate nursing students' ability to think critically, as measured by the WGCTA. A convenience sample of 150 volunteer generic students (one quarter of the enrolled students), representing all four academic levels, were included in the study population. Multiple regression analysis was used to examine intercorrelations between the WGCTA total score (criterion variable) and the predictor variables of SAT verbal score, SAT quantitative score, GPA, age, and total number of credit hours in all required courses. Results revealed that 24% of the variance ($r = .49$) in critical thinking could be attributed to SAT quantitative (math) score, total number credit hours in arts and humanities, and GPA (p. 120). Students' math ability was reported to correlate most strongly with critical thinking, was a good predictor of success, and was considered a valid criterion for admission. The correlation between critical thinking and credit hours in arts and humanities may reflect a general college, rather than program, effect.
In summary, the foregoing studies revealed critical thinking to be a good predictor of success in nursing programs studied. In the two studies examining changes in critical thinking from entry to exit, one study found highly significant changes (Gross et al.), whereas Bauwens and Gerhard did not find significant changes.

Effects of Nursing Education on Critical Thinking Ability

Addressing the 1914 convention of the Society of Superintendents, nurse Lillian Clayton stated, "Nurses have too long been required to work without knowing the reasons for what they did.... They must be taught to think as well as use their hands." (in Hanson, 1989, p. 88). Nurse educators today continue to seek evidence that education enhances critical thinking ability.

In an early study, Valiga (1983) used a comparative, pretest/posttest with no control group design to study the differences in cognitive development (not critical thinking per se) among all four levels of baccalaureate nursing students. Changes in cognitive development in baccalaureate students over an academic year were studied using the KneWi test (Perry Scheme). Subjects were a random selection of BSN students, then 123 volunteers from the initial group; approximately equal numbers from among each of the four levels. Students completed a KneWi cognitive development essay during the first month of the fall semester and completed an alternate form late in the spring semester of the same academic year.

Valiga (1983) reported that most of the scores, and all of the means, reflected Perry's Dualism category. On posttest scores, the only significant pairwise comparison (p = .01) was between freshman and senior students, with senior scores higher, reflecting a more advanced stage of cognitive development (p. 118). There were no significant mean differences found regarding cognitive development at the end of the academic year. The author provided suggestions to foster and reward cognitive development beyond Dualism.
Berger (1984) conducted a longitudinal study of 137 baccalaureate nursing students from one school of nursing, administering the WGCTA to students at both the sophomore and senior levels. An obvious shortcoming was that information on subject selection was not provided.

Berger found a statistically significant increase in mean WGCTA scores when the group was tested in their senior year. Pearson's correlation coefficients were computed to ascertain any relationship between WGCTA and GPAs in nursing and science courses - none were found. A significant positive relationship between science and nursing GPA was found. A relationship between gender and critical thinking ability was not found. Primary study findings were that nursing students had higher critical thinking abilities than liberal arts students, and that critical thinking scores increased significantly during the nursing program (p. 307).

Sullivan (1987) studied 46 registered nurse baccalaureate (RN/BSN) students as an intact purposive sample from entry to exit of upper division programs. Approximately two-thirds of the subjects were diploma graduates, and one-third were associate degree graduates. Three instruments were administered: WGCTA, Torrance Test of Creative Thinking (TTCT, verbal forms A and B), and the Stewart Evaluation of Nursing Scale (for evaluating clinical nursing competence). All instruments were administered during the first four weeks of the first semester and in the last four weeks of the final semester. A specially trained clinical specialist rated the nursing performance of each subject at entry and exit from the program. Grade point averages (GPA) at entry and exit were also obtained for each student.

Findings reported by Sullivan (1987) reflected significantly higher clinical performance scores and mean GPA at graduation, lower creativity scores at graduation, and no difference between entry and exit critical thinking scores. There were significant positive correlations (p < .05) found between scores on entry and exit critical thinking, entry and exit GPA, and among creativity measures - and a
significant negative correlation between year of initial nursing graduation and entry WGCTA score (p. 14). Sullivan recommended further research among RN/BSN students to consider personal and professional variables possibly associated with the three variables included in this study.

A very early study was conducted by Richards in 1977 (cited in Miller and Malcolm, 1990). She compared generic baccalaureate students' performance on the WGCTA upon entry and exit from two different curricula in the same school: a new content-integrated one and an older block curriculum. Richards found a significantly lower mean critical thinking score among students graduating from the new content integrated curriculum. She believed this was attributable to the one-way problem solving taught in the integrated curriculum, thereby limiting acquisition of a multidimensional perspective on conceptualizing problems. Several of the following writers have suggested strategies to foster critical thinking in students.

Bowers and McCarthy (1993) suggested using writing-to-learn (WTL) strategies to restructure a required prenursing health issues course, thereby increasing student opportunities to develop analytic skills. Their course was redesigned to incorporate WTL strategies based on Perry's model of position of adult cognitive development. Writing assignments were constructed to "nudge" students from Dualism to Multiplism and beyond. Formal course evaluations by students have consistently reflected a positive response, although research per se was not reported. The use of writing across the curriculum as a process for developing critical thinking was also described by Lashley and Wittstadt (1993). Heliker (1994) also described strategies for problem-based learning in nursing that create a climate facilitating active learning, enhancing development of higher levels of cognitive thinking.
Effect of Different Types of Nursing Programs on Critical Thinking

Several studies have been done using different approaches to investigate effects of nursing education on students' critical thinking abilities. An early study by Frederickson and Mayer (1977) administered a general critical thinking test to 27 AD nursing seniors and 28 BSN seniors and found the BSN students scored higher than their AD counterparts.

Lynch (1988) examined the relationship between nursing education level and critical thinking abilities (WGCTA scores) through comparisons of graduating AD and generic BSN students. Subjects comprising the convenience sample studied were from four AD programs and from three BSN programs. The possible covariance of SAT scores and students' ages was also explored.

Results of data analysis in the Lynch study revealed that the mean WGCTA score for the BSN students was significantly higher than the mean for the AD students. Although there was no significant correlation between the WGCTA scores and students' ages, there was a significant correlation between SAT scores and WGCTA score.

Kintgen-Andrews (1988) made comparisons of critical thinking abilities by administering the WGCTA to 55 practical nursing students, 38 university prehealth science freshmen, 55 two-year AD nursing students, and 29 university generic nursing program sophomores (Kintgen-Andrews, 1991, p. 153). The groups were drawn from schools associated with a career ladder consortium with opportunities for program articulation. For instance, the PN/AD track was parallel to the first two years of the generic BSN track. A pretest/posttest design was used in studying the effect of one year of academic study on the critical thinking abilities of all four groups, measured at the beginning and end of the academic year.

Overall findings by Kintgen-Andrews (1988) revealed no significant gains in any group over the one academic year. The sophomore BSN students, however, did
have significantly higher WGCTA scores than the AD students at both testing times. Upon further analysis, the differences between the groups was believed to have resulted from selection, rather than from different types of programs.

A more recent study by Miller (1992) was designed to assess critical thinking skills (WGCTA outcomes) as one component of baccalaureate program effectiveness. The study design was an ex post facto, one-group pretest-posttest design. The student's post-test performance was the dependent variable, whereas the college curriculum (all courses taken) was the independent variable. The WGCTA was administered as a pretest during the first course in the nursing major, and as a posttest during the last course in the nursing major.

Data analysis regarding pretest-posttest differences in overall WGCTA scores were found to be significant at the 0.05 level. This study also uniquely presented outcomes regarding differences in pretest and posttest scores on each of the five subtests of the WGCTA. In all cases, the means of posttest scores were higher than the pretest scores. Recognition of Assumptions and Deduction produced mean differences beyond the 0.05 significance level (p. 1404). The ordering of subtest scores from highest to lowest remained the same at both testings: Interpretation, Recognition of Assumptions, Deduction, Evaluation of Arguments, and Inferences. In addition, correlating the nursing GPA with the WGCTA total score was significant, although correlation with the GPA in all other courses was not significant. Finally, graduates from diploma nursing schools made significantly greater gain in overall critical thinking skills than did graduates from AD nursing programs (significant at the 0.01 level, p. 1405). This study, unlike most of the others, does attempt to provide needed information regarding subtest scores.

**Relationship of Critical Thinking to Clinical Practice**

A number of studies have undertaken investigation of critical thinking among different types of nursing programs as well as other activities related to clinical
nursing practice. Brooks and Shepherd (1990) conducted a descriptive study to investigate the relationship between clinical decision-making skills in nursing and critical thinking abilities of senior nursing students in four types of nursing programs. The nursing programs were: generic BS, AD, diploma, and an upper division RN completion program. Fifty senior students were conveniently selected from each type of program (N = 200 subjects). The Nursing Performance Simulation Instrument was used to measure clinical decision-making, and the WGCTA was used to determine general critical thinking abilities.

Statistical analysis indicated that the mean WGCTA scores for students in the upper division and generic programs were significantly different from the AD and diploma mean scores (p = 0.05, p. 395). There was no statistical difference between the upper division and the generic scores or between the diploma and associate scores. The clinical decision-making scores in nursing skills were virtually identical for the three basic programs; however, it was significantly higher for the upper division seniors as compared to the other groups. A weak but significant positive correlation (r = 0.249) was found between clinical decision-making and critical thinking across all four types of programs (Brooks and Shepherd, p. 391).

A study by Pardue (1987) involved decision-making skills and critical thinking ability among 121 associate degree, diploma, generic baccalaureate, and master's-prepared nurses. Sites for data collection included two large hospitals - all four types of nurses were from one hospital, and all masters nurses were from the second facility. Stratified random sampling was used for sample selection at the first hospital, followed by random selection of 100 nurses from the AD, diploma, and BS categories; the remaining nurses were masters' prepared. The WGCTA was again used to measure critical thinking ability and was self-administered.

A second research instrument (questionnaire) was developed by Pardue to measure three dimensions of nurses' decision-making skills. Part A provided data
on self-reported frequency of making decisions and perceived difficulty with making decisions (based on domains and competencies of nursing practice identified by Benner, 1984). Part B of the instrument provided data on "factors which influence decision making," and Part C was a demographic data sheet (p. 357). Nurses who met the study criteria were mailed the two research instruments with instructions for completion and return in a stamped, self-addressed envelope.

Results of analysis revealed significant differences (p = .001) in critical thinking abilities among the four groups of nurses. The BS and MS prepared nurses had significantly higher critical thinking scores than the AD or diploma nurses. Baccalaureate education improved critical thinking more than diploma or AD education. There was no significant difference in overall "self-reported frequency of making decisions" among the four groups, nor were there significant differences in perceived difficulty with making decisions among the four groups (p. 358).

Matthews and Gaul (1979) compared BSN senior students with graduate students in terms of critical thinking ability and the ability to derive nursing diagnoses. Again, WGCTA was used to measure critical thinking. Evaluation of a researcher-developed case study measured ability to identify nursing diagnoses. Findings revealed no significant differences between the two nursing groups in terms of WGCTA scores, implying that graduate education had no significant effect on critical thinking abilities above the BSN level. The ability to derive nursing diagnoses was not found to be related to critical thinking, as measured by the WGCTA.

The focus of a descriptive study by Ketefian (1981) was the relationship between critical thinking, educational preparation, and level of moral judgment in 79 practicing nurses. Again, WGCTA was used to measure critical thinking, a personal information sheet provided educational information, and moral judgment was measured by Rest's Defining Issues Test. Critical thinking was found to be
positively related to moral judgment ($r = .53, p < .001$), and critical thinking and educational level accounted for 32.9% of the variance in moral judgment (p. 98).

In summary, nursing educational research in the area of critical thinking is of recent origin. Longitudinal and cross-sectional studies have been done, although most studies have been cross-sectional designs. Studies have varied in subject populations, size, sampling, and in measures of critical thinking, although Watson Glaser testing has predominated. Overall results of studies of critical thinking in nursing education are mixed - some studies reflect student gains over the course of an educational experience, others do not. Very little information has been gained regarding the type of critical thinking subskills most evident in nursing populations. The present study is specifically designed to gather information regarding critical thinking subskills evident in both experienced and novice professional nurses.

Novice to Expert Conceptualizations

This investigator directly explored local concern regarding the need for critical thinking in nursing during Spring, 1994. Individuals representing three levels of health care in three different acute care institutions were individually queried, including a human resources assistant director, a nursing education coordinator, and a first-line supervisor on a medical unit. All were asked to comment regarding issues, concerns, and challenges encountered by new nurse graduates in the workplace - problems they experienced regarding these new nurses.

All interviewees spontaneously identified concerns about problem-solving, decision-making, and critical thinking. They reported that new graduates have problems making clear decisions quickly, in articulating problems, in prioritizing, and in discriminating essential from non-essential concerns. Obviously, there are differences in the expectations and performance of new graduates regarding thinking abilities. Characteristics of novice and expert nurses will be presented next.
Theoretical Framework

A novice is usually regarded as a person "new to a situation or position; beginner" (Steinmetz, 1993, p. 452). An expert can be simply defined as "one who demonstrates expertise.... The essence of expertise is an ability, the ability to accurately perform the required mental or physical activity rapidly and with the fewest number of cues." (Thompson, Ryan, & Kitzman, 1990, p. 3).

The topic of expert performance has gained increased research interest from many fields, especially during the last decade. Dreyfus and Dreyfus (1980) presented their model for the development of expertise, initially based on a study of airline pilots, which posits that a student passes through five levels of proficiency in the acquisition and development of a skill: novice, advanced beginner, competent, proficient, and expert. They further asserted that there are three general aspects of skilled performance in which change occurs: (1) movement from reliance on abstract principles to the use of past concrete experience as paradigms; (2) change in the learner's perception of the demand situation, seen more and more as a complete whole in which only certain parts are relevant; (3) passage from a detached observer to involved performer - engaged in the situation (cited in Benner, 1984, p. 13).

Ericsson and Charness (1994) recently provided a comprehensive review of the structure and acquisition of expert performance, maintaining that it is predominantly mediated by acquired skills and physiological adaptations. Their research perspective is that of focusing on reproducible, empirical phenomena of superior performance in the daily life of exceptional performers. They have endeavored to capture this performance under laboratory conditions.

One of the findings of such research is that more experienced subjects proceed by forward reasoning; that is, they tend to form an immediate representation of a problem that systematically serves to cue their knowledge. Novices, however, have not developed processes for orderly and efficient access to their knowledge.
According to Ericsson and Charness, the internal representation of relevant information about situations is imperative to an expert's ability to reason, plan and evaluate outcomes of possible actions. Additionally, extended practice can improve memory skills enabling persons to store information in their Long Term Memory, circumventing the limited capacity of Short Term Memory. This acquired memory skill may only relate to encoding and accessibility in a specific domain, and the skill may not transfer to another domain. In daily life, expert performance is ongoing and dynamic. Experts must analyze each situation, recognize if and when an action is required, and anticipate future events. Ericsson and Charness assert that the central mechanisms mediating the superior performance of experts are acquired and that most domains of expertise today have a fairly lengthy history of continued development -- deliberate practice for initially acquiring expert performance.

Nursing research appears to support such assertions.

Summary of Nursing Research Applications

Benner (1984) is generally recognized as the foremost nurse researcher in the study of progression toward expert nursing practice. Her research applied, and extended, the Dreyfus model of skill acquisition to clinical nursing practice. Benner's seminal research involved 21 pairs of nurses, preceptors and new graduates, selected from three hospitals for interviews regarding critical incidents commonly shared. Critical incidents were situation-based descriptions of episodes in patient care. Additional interview and/or participant observations were done with 51 additional experienced nurse clinicians, 11 new graduates, and 5 senior nursing students -- all from six hospitals. Audio taped interviews were conducted by a team of four persons, verbatim transcripts were made, and textual analysis was completed using the constant comparative method. Findings revealed significant and recognizable performance differences in progression from novice to expert level.
Novices had no experience in the situations in which they were expected to perform, and exhibited limited, inflexible, rule-governed behavior. Nursing students, and nurses entering new clinical settings without prior experience, may be limited to novice level performance.

Advanced beginners, such as new graduates, demonstrated marginally acceptable performance, but were rule-bound and required preceptor support. Competent practitioners were typified by the nurse employed in the same/similar situation for two or three years. They began to see actions in terms of long range plans, had more perspective and could prioritize.

The proficient performer, with three to five years of experience, could perceive situations as wholes, "a web of perspectives," with performance guided by maxims and keen perception (Benner, 1984, p. 28). The expert practitioner, with five or more years of experience, no longer relied on rules and maxims. Experience had led to an intuitive grasp of situations and problem solutions. Highly skilled analytic ability remained necessary in situations in which nurses did not have prior experience, when events and behaviors were unexpected, or when alternative perspectives were not available.

In an extension of this work on understanding novice to expert development of clinical proficiency, Benner and Tanner (1987) explored intuitive judgment as a facet of nursing expertise. They interviewed and observed twenty-one nurses with at least five years experience in the same clinical area, nurses who were identified by their peers as experts. The interviews were found to include examples of Dreyfus's (1985) six key areas of intuitive judgment: pattern recognition, similarity recognition, common-sense understanding, skilled know-how, sense of salience, and deliberative rationality. They concluded that both intuitive knowledge and analytic reasoning can, and often do, work together as nurses with expertise approach patient care problems in actual situations. Hampton (1994) likewise discussed expertise and
intuition in two case studies of the author's recent experience. She concluded that intuition and expertise are closely related, and there is a wealth of untapped knowledge in clinicians expressing the art of nursing through expert practice.

The Dreyfus model applied to nurses was further extended when Benner, Tanner, and Chesla (1992) conducted research with 105 nurses in critical care nursing at eight hospitals in three metropolitan areas. Novices were not included in this study. General findings were that experts perceived their clinical world as vastly different from that of advanced beginners and from nurses at other levels. Experts had advanced pattern recognition, learned qualitative distinctions in practice, and were able to "read" situations based on changing relevance.

An application of Benner's research to nursing education was described by Carlson, Crawford, and Contrades (1989). A senior Professional Nursing Practice clinical course for students in an associate to baccalaureate degree program productively used students' critical incident experiences to help them note and evaluate their own developmental process in moving from novice to advancing levels of practice.

Itano (1989) compared the clinical judgment process in 13 experienced registered nurses and 13 senior baccalaureate student nurses. Nurse-patient assessment interviews were audio-taped and observed by a data collector, and three experienced nursing faculty rated the clinical judgment process of the subjects using a researcher-developed rating scale. Findings suggested that experienced nurses collected more cues than did the students, thus novices collect fewer cues from which to make clinical judgments.

Two additional recent studies looked at expert practice, one in terms of career progression in selected clinical nurse specialists (McGregor, 1991), and the other (Goodnough-Hanneman, 1990) in terms of relationships and patterns between expert and nonexpert critical care nursing practice and patient outcomes. Neither of
the foregoing studies included the analysis of novice performance in professional nursing.

No studies were found exploring critical thinking ability in terms of professional development from novice to expert nurse perspectives. As cited, there were significant differences found in the clinical performance of nurses, depending on level of experience. One might also expect to find differences in critical thinking abilities manifest in novice nurses compared with expert nurses. This researcher adopted Benner's criteria by including novices as beginners in nursing (students), experienced nurses with at least five years of clinical experience, and expert nurses with at least five years of clinical experience - plus designation as experts by peers.

Learning Style

The construct of learning styles as potential mediators affecting critical thinking ability was also considered in the study herein. According to both Karrer (1988) and Keefe (1987), elements of learning style approaches appeared in the research literature in 1892, over a century ago. The German psychologist, Carl Jung, wrote about "psychological types" as early as 1921. During a period of increased interest in individual differences, Gordon Allport (1937) coined the term "cognitive style" in 1937 and defined it as "distinctive ways of living in the world" (Allport, 1961, p. 271). Research on cognitive styles greatly expanded in America after 1945 by Asch and Witkin (field dependent/independent concepts) at Brooklyn College, by Holzman and Gardner at the Menninger Foundation, and Kagan and colleagues at the Fels Institute. Carl Jung (1971), also explored how individuals perceive and process information. He found they reach decisions through different methods: some use an analytical, logical, rational/thinking process; while others focus on a subjective, perceptive, emotional/feeling process.

Partridge (1983) wrote of a "baffling" array of research and rhetoric under the rubric of "learning styles," including cognitive style, student response style, and
integrated models of learning style. Indeed, the terms learning style and cognitive style have often been used interchangeably in the literature emerging since the 1970s.

**Overview of Conceptualizations of Learning Style**

Learning style is a hypothetical construct intended to help explain the process of learning, and generally refers to an individual's unique way of interacting with the environment (Sewell, 1986). Several authors refer to Keefe's 1979 contention that "learning styles are characteristic cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment." (in Keefe, 1987, p. 10). According to Semple (1982), researchers in the area of learning styles are generally interested in practical educational applications.

Curry (1983, 1990) reported reviewing 21 models of learning style for their psychometric acceptability, and proposed a conceptual framework for organizing these models into mutually exclusive strata as follows: (Curry cited in Merritt, 1989, p. 3).

1. **instructional preference** models deal with directly assessing the ways people prefer to learn, (i.e. Canfield Model, 1980).
2. **information processing** models deal with the intellectual approach people take to assimilate information, (i.e. Kolb LSI, 1976 & 1985, Models).
3. **cognitive personality** style models deal with the underlying and relatively stable dimensions of an individual's personality that do not interact directly with the environment and have wide applicability to predict behavior, (i.e. Myers-Briggs Type Indicator).

A significant quantity of literature may be found dealing with learning style preferences of all age groups and at various educational levels. Most of these studies, according to Merritt, are descriptive, ex post facto in nature, use
convenience sampling, illustrate a variety of factors, and use a self-report format and a variety of learning style models. For the purposes of this study, the remainder of this review will focus on Nursing learning style research, specifically that using the Kolb Learning Style Inventory (LSI). It should be noted that this model is germane to a study of critical thinking in that it deals with information processing -- approaches taken to assimilate information.

**Kolb's Model of Experiential Learning Theory**

One of the most frequently cited learning style theories in nursing research literature was that of Kolb (1976). Kolb's model characterizes a four-stage learning cycle requiring the abilities of: concrete experiencing (CE) of a learning situation, reflective observation (RO) of relevant phenomena in the experience, abstract conceptualization (AC) about the meaning of phenomena experienced, and active experimentation (AE) regarding what has been experienced, observed, and conceived (1976). Measurement of learning style exemplified by this model can be achieved through use of Kolb's Learning Style Inventory. The first edition was available in 1976, followed by an improved, revised edition in 1985.

The LSI 1985 is a 12-item questionnaire designed to measure relative emphasis in the four learning modes described by ranking a series of four words that describe these different abilities. The instrument is designed for self-administration and can be completed in about 10 minutes. Scoring the test involves summing the 12 numbers entered in each of four columns, resulting in raw score ranges from 12 to 48 (Kolb, 1985b, p. 4). A subject with a high score on CE, represents an empathetic person with a receptive, experienced-based approach to learning, relying heavily on feeling-based judgments. A high score on AC reflects an individual with an analytical, conceptual approach to learning, relying heavily on logical thinking and rational evaluation. A person scoring high on AE reflects an active doer who relies heavily on experimentation - usually an extrovert. The
subject scoring high on RO would reflect a tentative, impartial, and reflective approach to learning - more introverted.

The model reflects cardinal dimensions viewed as polar opposites. Thus concrete experience is opposite of abstract conceptualization, and reflective observation is the opposite of active experimentation. Two combination scores are obtained by subtracting: Abstract Conceptualization minus Concrete Experience (AC - CE), and Active Experimentation minus Reflective Observation (AE - RO). These scores reportedly range from +36 to -36 (Kolb, 1985b, p. 4). Four major learning style types are derived by combining scores, thereby describing an individual as a Diverger, Accommodator, Assimilator, or a Converger (McBer & Company, 1985, p. 7).

**Divergers** combine concrete experience with reflective observation, prefer observation to action, are imaginative, understand people, and may seek art, entertainment, or service careers (McBer & Company, 1985).

**Convergers** have strength in abstract conceptualization and active experimentation, are practical problem-solvers and decision-makers, and are often found in specialist and technology careers (McBer & Company, 1985).

**Assimilators** combine abstract conceptualization and reflective observation thereby understanding a wide range of information, and possessing ability to place it in concise, logical form. Such persons are often effective in information and science careers (McBer & Company, 1985).

Finally, **Accommodators** combine concrete experience with active experimentation and enjoy "hands-on" experience, act on their "gut" feelings rather than on logical analysis. They are people-oriented, enjoy challenges, and are frequently found in careers involving sales, marketing, and business (McBer & Company, 1985).
According to the LSI 1985 Technical Specifications Manual, the four basic scales and two combination scores all show "very good" internal reliability as measured by Cronbach's alpha (N = 268), ranging from .73 (RO) to .88 (AC-CE) (Kolb, 1985b, p. 4). In The Mental Measurements Yearbook (Conoley & Kramer, 1989), Gregg concurs with these statements regarding the LSI 1985. Validity research regarding the LSI 1985 was not cited in the Technical Specifications Manual, although demographic analysis of the normative sample and validity relationship between learning style and career field of study were depicted.

Kolb's theory and the LSI 1976 and 1985 have both been widely used in educational research, have received both applause and criticism, and "seem to have undergone the closest scrutiny to date. " (Merritt, 1989, p. 13). Hunsaker (1980) questioned the construction, reliability, and validity of the LSI 1976 edition, since revised. Much of the criticism has resulted from the ipsative nature, and the construct validity (Fox 1984) of the instrument. In a review of LSI applications in nursing research, DeCoux (1990) found that nursing students were scattered among the four learning style categories, although convergers among nursing students were rare. She also reported that it was not always clear which LSI edition had been used in testing, only subscale scores and not final learning styles were reported, and concluded that the LSI does not display adequate validity and reliability (DeCoux, 1990, p. 206). Some researchers call for refinement of learning style instruments and acknowledge that the relationship between preferences and other personal characteristics is in an early stage of development (Merritt, 1989). The LSI instrument does, however, continue to have widespread use as reflected in the following studies.

Learning Style Research in Nursing

One of the most interesting general findings of learning style research among many types of health care disciplines is that students appear to prefer teacher-
structured, concrete learning environments. Although a goal might be that of preparing self-directed, lifelong learners, many of the student populations studied appear to prefer student-dependent, concrete learning situations, especially among undergraduate students. This preference would seem to run counter to some of the goals expressed regarding the development of critical thinking abilities in students, but may verify some of Perry's (1970) findings regarding young adult cognitive development.

Using a sample of 466 basic and RN students enrolled in required upper-division nursing courses in six NLN accredited baccalaureate programs, Merritt (1983) administered both Canfield's LSI and Kolb's LSI instruments. Results indicated that both groups of adult learners preferred structured environments with requirements clearly defined and content presented in an organized, logical manner. Findings did not support the propositions that length of career employment or age account for differences in the learning styles measured. An implication was that faculty need to consider developing different learning environments for the two different learner groups.

In a study using a learning strategies preference questionnaire administered to beginning and graduating groups of basic baccalaureate nursing students, Ostmoe, Van Hoozer, Scheffel, and Crowell (1984) found the students preferred strategies that are traditional, teacher-directed, and highly organized. The graduating students, however, preferred clinical practicum experience.

Lassan (1984) surveyed a population of RN and basic collegiate nursing students using Kolb's LSI. She found the two groups became more similar in learning style as they progressed, and that all seemed to accept greater diversity of educational methods as they reached senior level. It should be noted that males and associate degree graduates were excluded from this study.
Kolb's LSI was used by Wilkerson (1986) to assess learning preferences in a group of 133 basic nursing students. A significant finding was that these students scored lower, overall, on the Reflective Observation subscale. This indicates less preference for discrimination learning. As nurses are expected to discriminate normal from abnormal conditions, this finding suggests the students need assistance in learning to discriminate.

The issue of need for whole-brain education in nursing was raised by Holbert and Thomas (1988). They were concerned that traditional educational programs present an imbalanced emphasis on left-brain modalities (verbal, rational, analytic thought) while neglecting right-brain modalities such as nonverbal, visual-spatial skills, and intuitive, holistic thought. They presented an account of an introductory gerontological nursing educational unit based on Kolb's model and McCarthy's (1990) approach to designing whole-brain learning experiences. Holbert and Thomas (1988) included the specific teaching methods used in presenting a successful educational unit; research results were not included.

In a study of 93 nursing students, Hodges (1988) administered both the LSI and the Myers-Briggs Type Indicator (MBTI), Lowenfeld's Test of Subjective Impressions and Visual-Haptic Word Association Test, the Bem Sex-role Inventory, and an investigator-designed demographic questionnaire. Results indicated that the highest percentage of students were divergers and accommodators, that is concrete learners and active experimenters. The MBTI reflected high percentages of students in the sensing, feeling, judging categories. They were feminine by sex-role, and preferred the haptic (kinesthetic or tactile imagery) perceptual mode.

Highfield (1988) found the predominant learning style of a primarily minority group of 65 volunteer basic nursing students to be Assimilation in response to the Kolb LSI. Learning style was not affected by progress in nursing education, and neither age nor previous nursing education affected learning style. Additionally,
about half of the senior assimilators scored highest at both ends of the abstract-concrete continuum, signaling strong integration of opposing ways of learning.

Laschinger and Boss (1989) found a greater proportion (63%) of nearly 200 RN and upper level basic nursing students with concrete learning styles rather than abstract styles using Kolb's LSI (p. 219).

In a survey of 98 students from three groups of basic baccalaureate nursing students, Prestholdt (1990) found the graduating seniors and Sophomore students, but not the pre-nursing group of students, to be predominantly Concrete Sequential when using the Gregorc Style Delineator. A significant relationship between student dominant learning style preference and successful progression in the nursing program was not found.

In a study by Haislett, Hughes, Atkinson, and Williams (1993), student learning styles were assessed using Kolb's LSI-1985. Analysis indicated that the sample of 100 baccalaureate students were mainly assimilators and divergers, they earned a significantly higher GPR, and did better on a number of other measures studied. Accommodators were found to be the most at-risk learning style group, and specific assistive interventions were suggested.

As indicated at the outset of this review of learning styles, nursing students reflect a variety of styles, although there appears to be a greater number of studies reflecting preference for more concrete, teacher-led educational environments. Studies of learning style preference among general (non-student) populations of professional nurses were not found.

Recapitulation

The plethora of literature discussing aspects of critical thinking is most evident in terms of philosophy, definitions, and teaching applications across disciplines and regarding varied age groups. There is a growing body of research regarding critical thinking as a construct and regarding educational outcomes when
attempts have been made to enhance students' critical thinking skills. Such "good" thinking usually includes ability to analyze, synthesize, use and evaluate situations and learning experiences. Natural perceptions and conceptual processes significantly affect the way people think. As Guild and Garger (1985) point out, different aspects of thinking are easy or difficult depending on an individual's mind processes, and "This is a challenging area that remains to be explored in more depth." (p. 86).

Most studies have looked at critical thinking as a broad construct, although some are beginning to elucidate subskill categories.

Much has been written about the importance of critical thinking and its development in higher education and in nursing within a dynamic, information-oriented society. There has been no available research demonstrating a relationship between critical thinking and learning styles, nor within the domain of nursing. Although researchers have explored the development of novice to expert professional ability, no studies of critical thinking per se among novice, experienced and expert nurses were found, nor were studies found with consideration of learning styles as a mediating influence. It thus appears that a study of critical thinking in professional nurses, with consideration of expert status and learning styles, would be a fruitful area for research.
CHAPTER 3

METHODOLOGY

The primary purpose of this study was to compare novice, experienced and expert professional nurses in terms of their critical thinking ability. The study also sought to identify the influence of selected individual demographic characteristics, including learning style, on the critical thinking ability of professional nurses.

This chapter presents information regarding the procedures used in conducting the study. The methodology of the study is organized in the following sections: (1) research design, (2) population and sample, (3) instrumentation, (4) data collection procedures, and (5) data analysis.

Research Design

This exploratory study included an ex post facto research design using a descriptive survey technique. The investigator studied the nurse subjects after their critical thinking ability had been influenced by their learning styles and personal characteristics.

Population and Sample

The target population for this study was defined as professional nurses. Three samples of professional nurses were selected for use in this study, representing three levels of experience/skill: novice, experienced and expert. The accessible population of novice nurses was defined as generic senior nursing students who were completing the final semester of baccalaureate education in a selected National League for Nursing (NLN) accredited program in Louisiana, and who agreed to participate. These students were completing their initial preparation for professional nursing during Fall, 1994. The term, "generic," refers to programs in which an upper division baccalaureate nursing major is built upon a base of liberal arts and sciences.
The school of nursing, from which the novice subjects were drawn, is within a public-supported comprehensive, regional state university located in the southeastern area of Louisiana. During the spring of 1994, it was designated as the fastest growing university among all four-year universities in the United States with enrollments over 7,500 students. The total Fall Semester 1993 enrollment was 13,235 students, reflecting growth of 63.4 percent since 1987 (Kemp, 1994, p. 1). Overall 1993-1994 student body characteristics were reported by the university's Office of Institutional Research & Evaluation (1994, March) as follows: predominantly White/Non-Hispanic undergraduate students, the majority living off-campus, residing primarily in East Baton Rouge and St. Tammany parishes of South Louisiana. The students' average age during the reported year was 23.6 years. The majority of students carried a student class load of 12-15 hours a week. Approximately 60 per cent of the undergraduate students were female. Approximately 2000 students are annually enrolled in this university's school of nursing as declared nursing majors (Southeastern Louisiana University School of Nursing, 1992, p. x).

In the most recently published exit survey results of graduating seniors (1992-93), characteristics reflected a population that was 63.3% female, 95.9% white, and an average age of 26.1 years (Office of Institutional Research & Evaluation, 1994, January, p. 2). Among the responding graduating nursing seniors in the same survey report, they were 89.3% female, 98.2% white, had a mean age of 27.7 years, with a mean Cumulative GPA of 2.897 (SD = .3) - the highest among all colleges in the university (p. 1. 2).

The accessible population of experienced nurses was defined as those who were currently licensed by the state board of nursing to practice as Registered Nurses (RN), having practiced for at least the past five years in a clinical area, and who consented to participate. A list of random numbers generated by computer was
used to select the subjects for this population drawn from a current (1994) membership roster of the Baton Rouge District Nurses' Association (BRDNA).

The accessible population of expert nurses was defined as those who were currently licensed by the state board of nursing to practice as registered nurses, having practiced for at least the past five years in a clinical area, and who consented to participate. Each member of this population of nurses had received formal recognition from professional colleagues for exemplary performance in the practice of professional nursing. Subjects included in the experienced and expert sample groups met the additional criteria of minimal active clinical practice in the direct provision of patient care equivalent to one eight-hour shift once a week during the past year. Home address and registered nurse licensure status were verified using the 1994 Roster of Registered Nurses Qualified to Practice in Louisiana (Louisiana State Board of Nursing).

The expert and experienced nurse subject pool was derived from a large metropolitan area which includes the state capital -- the second largest city in the state. The city and surrounding area boast a wide spectrum of public and private health care facilities. A U.S. Public Health Service Hospital is also located in the region. Registered Nurses in this area are primarily employed in five major acute care hospitals, two psychiatric facilities, three smaller hospitals outside the city, a regional parish health unit, public schools, industrial medical departments, nursing homes, five schools of nursing, and numerous ambulatory and home care agencies.

The researcher used the following procedures to establish the frame of each of the accessible populations included in the study. The novice subjects were obtained from a roster of graduating seniors requested from the college dean of the school of nursing in a southern public university. The Dean provided written approval for the school's participation in this study (Appendix A). The census included all of those who met the criteria established for the accessible population

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
and indicated their willingness to participate. A convenience sample of 49 senior student volunteers was available during Fall of 1994 (the December graduating class). A minimal sample of 36 novice nurses from this group was established a priori, with the possible addition of students from the succeeding Spring, 1995 graduating class if necessary. Written permission to conduct this study was obtained from the appropriate university committee responsible for approving human research (Appendix B).

The frame of the accessible population of experienced nurses was established by randomly drawing 80 names from the 1994 membership roster of the BRDNA. In the event that a less than desired response rate was achieved, over-sampling was employed by randomly drawing an additional 22 names from the 1994 BRDNA membership roster. Initial letters of invitation to the study were sent to a total randomly drawn sample of 102 experienced professional nurses.

In order to establish the frame of the accessible population of expert nurses, the researcher obtained a list of all nurses honored for the past five years (1990 - 1994) by the Baton Rouge District Nurses Association (BRDNA) as outstanding nurses who exemplified the best in nursing. Since 1990, 25 nurses have been annually selected from written nominations submitted by their colleagues within the District for recognition of their outstanding professional achievements. These expert nurses represented a wide spectrum of practice specialty areas, employing institutions, avenues of educational preparation, and years of experience. All nominees had been screened by a nurse panel from among the executive board and membership of the BRDNA, a subsidiary of the American Nurses' Association. Nomination criteria reviewed by the panel included nursing specialty, place of employment, years in the nursing profession, and information regarding the nominees' professional accomplishments. Membership in the Baton Rouge District Nurses Association was not a requirement for the nominator or the nominee.
The sample included a census of all those designated expert nurses who met the criteria for inclusion and were willing to participate. All 75 designated expert nurses from 1994, 1993, and 1992 who could be located were invited to participate in the study. In addition, as the experienced nurse sample was being randomly drawn, the designated expert nurses from 1991 and 1990 who were randomly drawn from the membership roster of the BRDNA were kept as replacements in the event of frame errors. Initial letters of invitation to participate in the study were sent to a total sample of 80 designated expert professional nurses.

The final sample size of novice and expert subject groups (non-probability samples) and the experienced group (a random sample) was determined by the number from each frame who volunteered to participate. It had been determined a priori that data would be collected from a minimum number of at least 36 subjects in each group who completed study instruments. According to Ary, Jacobs, and Razaveih (1985), a sample of at least 30 in each group is recommended, as this number permits the use of large sample statistics (p. 147).

Instrumentation

This section addresses instrument development, instrument selection, validity, reliability, and practicality. A three part instrument was utilized for data collection. Part I of the instrument consisted of a measure of critical thinking ability: California Critical Thinking Skills Test (CCTST) developed by Peter A. Facione (1990). Although the publishers granted the researcher permission to include the CCTST instrument in the study appendix (see Appendix C), it was not included as the researcher could not guarantee maintenance of the proscribed test security were the study reproduced and placed in a university library or microfilmed for future reference use.

Part II of the instrument consisted of a measure of learning style preference. This instrument, the Learning Style Inventory, 1985 (LSI) was developed by David
A. Kolb (see Appendixes D and E). Part III of the instrument was the Participant Profile Form (see Appendix F). This was an investigator designed instrument constructed to obtain selected demographic information about the study population of nurses.

**Instrument: Part I**

**California Critical Thinking Skills Test: College Level**

A review of the literature pertaining to critical thinking instruments from 1970 to 1994 identified four primary instruments appropriate for adult populations. These included the Cornell Critical Thinking Test (1985), the Ennis-Weir Critical Thinking Essay Test (1985), the Watson-Glaser Critical Thinking Appraisal (Forms A and B, 1980), and the California Critical Thinking Skills Test: College Level (CCTST Forms A and B, 1990). The CCTST was the instrument selected for use in this study because of its increasingly extensive use with nursing populations, purported lack of gender bias, contemporary language and situations, relative ease of scoring, acceptable reliability, and apparent validity in terms of the Delphi Consensus regarding critical thinking.

The CCTST is the newest test of critical thinking skills and is available through California Academic Press. It is the only test designed to include the skills identified by the Delphi panel. This standardized instrument, consisting of 34 multiple choice items, targets core cognitive skills. It was designed for administration during one 50 minute class period. The items are presented in relation to short problem statements and scenarios using discipline-neutral content.

The test is designed to assess core critical thinking skills of post-secondary level persons who are native speakers of English. Spanish language versions of the CCTST and of the California Critical Thinking Disposition Inventory (CCTDI) became available during Fall, 1994. The CCTST skills included were identified by an expert national panel who participated for two years in a Delphi research project.
The panel included 46 persons who were recognized by their professional colleagues as having special expertise and experience regarding critical thinking. This project aimed at achieving an expert consensus regarding what to expect of college freshman and sophomores in terms of critical thinking (Facione, 1990).

Six scores are reported for the CCTST: An overall score on cognitive skills; and five subscores as follows: analysis, evaluation, inference, deductive reasoning and inductive reasoning. The initial three sub-tests reflect the Delphi conceptualizations in targeting the theoretical constructs named. The latter two sub-tests reflect the more traditional reasoning categories of inductive and deductive reasoning.

According to Facione (1994), a predecessor pilot instrument of the CCTST was constructed from a pool of 200 items developed over 20 years in a research program aimed at reliably and validly testing critical thinking. The CCTST was developed and validated at California State University (CSU), Fullerton through four experiments during the 1989-1990 academic year. The experiments involved 1169 college students, five courses, three departments, 20 instructors and 45 sections (Facione, 1991, p. 4). The test author asserts that construct, content, and concurrent validity have been established, and that testing is continuing through use by over 200 institutions in the United States and in five other countries. It has been used increasingly with nurse populations. Students' anecdotal responses regarding the test report it as being "interesting to take" (Facione, p. 18).

In terms of CCTST face validity, a variety of question formats are employed. The initial items require analysis of a single sentence. The evaluation questions offer short passages that invite determining inferential strength from reasons provided or evaluation of inferences as good or bad, and the appropriate rationale. The inference section provides questions offering statements and invite response to what these imply or warrant. Some question formats parallel that found in reading
comprehension tests or the Law Scholastic Aptitude Test (LSAT), Scholastic
Aptitude Test (SAT), or Graduate Record Exam (GRE) sections on analytic
reasoning.

The test concludes with more complex question formats in which deductive
and inductive modes of reasoning can be combined, wrong choices based on many
different types of fallacies can be made, and underdeveloped critical thinking
dispositions (attitudes) can lead toward wrong choices (Facione, 1991, p. 4).

In terms of concurrent validity, posttest scores in the 1989/90 CSU Fullerton
study were statistically analyzed using backward multiple regression methods. The
three variables remaining in the regression equation when the analysis reached its
limits were: SAT verbal, SAT math, and GPA scores, predicting 41% of the
variance in the posttest scores (Facione, p. 7). Three variables failing to remain in
the equation were the college student's age, units of college work completed, and
high school subject matter preparation. The CCTST results also positively
correlated with Nelson-Denny reading scores for vocabulary, comprehension, and
total score (r = .49, Facione, p. 8). A positive linear correlation between critical
thinking skills and age or number of college units earned was not found. According
to Facione, the validation studies confirmed with confidence the test does not
differentiate unfairly among women and men, nor among people based on ethnic or
racial heritage, nor among students based on academic major or level of critical
thinking confidence.

According to the test's author, the CCTST reliability coefficient (Kuder-
Richardson 20) was .69 on the pretest and .68 on the posttest, falling within the .65
to .70 range recommended for tests purporting to target a wide range of CT skills
(Facione, p. 5). In 1994, the CCTST reliability coefficient (Kuder-Richardson 20)
for the pretest was reportedly .70 and .71 for the posttest.
The CCTST Technical Report #4 (Facione, 1990b) provided pretest and posttest percentile norms for the overall test score and for each of the five sub-tests. These norms were based on analysis of the test forms completed by representative samples of college students used in the 1989/90 validation studies. Facione indicated that percentile norm scores of ordinal ranking could be misleading if the sample upon which they were derived was too small or was not normally distributed. In either case, this could be rectified by the conversion of percentile scores to normalized standard scores before undertaking parametric statistical analysis and interpretation.

The CCTST was not available in time for inclusion in the Eleventh Mental Measurements Yearbook (1992). Inclusion of the CCTST in a proposed 1994 Supplement to the Eleventh Mental Measurements Yearbook and in the 1995 Twelfth Mental Measurements Yearbook was confirmed by managing editor, Linda L. Murphy of the Buros Institute of Mental Measurements (personal communications July 28 and August 18, 1994). An advance copy of the CCTST reviews in the 1994 Supplement was subsequently obtained. Two reviewers were cited regarding their evaluation of the CCTST. One reviewer, Robert F. McMorris (Professor of Educational Psychology and Statistics of the State University of New York at Albany), reviewed the test's reliability scores and estimated subscore reliability, concluding that "the validity coefficients among subscores appear to this reviewer as reasonably supportive." He stated that total-score internal consistency appears to be close to .70, subscore reliability might be in the .50s, and reliability information does not support interpretation of differences for individuals, either for a profile or for gain. McMorris urged test users to remain cautious in interpreting results of this measure.

William B. Michael (Professor of Education and Psychology at University of Southern California at Los Angeles) summarized his critical review of the CCTST
by stating that "preliminary evidence indicates the CCTST possesses considerable content validity", and that additional effort is needed "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 potential of the CCTST is great."

Both reviewers questioned the 45 minute time frame of this instrument, i.e. how speeded is the test? Dr. Noreen Facione, co-developer of the CCTST, stated (personal communication, August 18, 1994) that the instrument is not literally a "timed" test, but was designed to be given in a usual class time period. When used as a research instrument, she suggested that it be consistently given to all study populations within the same time frame, i.e. a one hour time period. It could also be used as a mailed instrument with stipulations that the respondent complete it ALONE, in one sitting, during a specified period of time, with information that it is difficult but that females and males perform equally well on it. She indicated that the CCTST is increasingly being used on non-student adult populations and among nursing populations, although the published literature on such is yet scant. In summary, the evidence provided regarding the CCTST revealed acceptable validity, reliability, and practicality as a new measure of critical thinking appropriate for the nursing populations included for the purposes of this study.

Instrument: Part II

Learning Style Inventory 1985

A review of the literature was done pertaining to instruments designed to identify learning styles from 1970 to 1994. The primary relevant instruments cited include Canfield's Learning Styles Inventory (1980), Dunn, Dunn, and Price's Learning Style Inventory (1985, 1989), Silver and Hanson's Learning Style Inventory (1980, 1988), and Kolb's Learning-Style Inventories (1976, 1985).
The Learning-Style Inventory 1985 (LSI) by David Kolb (Appendix E) was selected as the instrument to measure learning style in this study. This is a longer, revised version of the original instrument designed to identify differences among individual learning styles and corresponding learning environments. The Jungian concept of styles or types and Experiential Learning Theory provide the theoretical foundation of the instrument. It is assumed that people learn from immediate experience, as well as from concepts and books, and that people learn differently, according to their preferred learning styles (Smith & Kolb, 1986, p. 11).

Kolb developed and validated the LSI over more than 15 years to measure individual learning style preferences, based on his conceptualization of experiential learning. He refers to a model that can be described as a four-stage cycle that begins with concrete experiences forming the basis for observations and reflections (Appendix G). This leads to the formation of abstract concepts and generalizations, and active testing of hypotheses by experimenting in new situations and experiences.

This learning cycle suggests two primary dimensions of learning: the first is a continuum of how one perceives new information/experiences, from concrete experiencing (CE)/feeling to the polar opposite of abstract conceptualization (AC)/thinking. The second dimension of learning involves a continuum of how one processes what was perceived, from reflective observation (RO)/watching to the polar opposite of active experimentation (AE)/doing (Smith & Kolb, 1986). Kolb asserts that the extent to which one favors particular stages of the cycle reflects that person's learning style preferences.

Kolb defined four learner types as Accommodator, Assimilator, Converger, and Diverger (Appendix H). These types are based on the extent to which individuals prefer learning according to the two primary dimensions of CE versus AC, and RO versus AE (Merritt, 1989, p. 9).
The revised edition of the LSI is a self-report inventory consisting of 12 clearly written, simple sentence-completion items. The respondent is asked to rank order four sentence endings in a row, one in each of four columns which correspond to the aforementioned four learning modes of CE, RO, AC, and AE of the experiential learning cycle. The respondent assigns a 4 to the phrase that describes how he learns best, assigns a 3 to the next best, and continues by assigning a 1 to the least best phrase. Totals are summed for each column. A raw score varying from 12 to 48 is possible relevant to each dimension.

Two additional combination scores reveal the extent to which each respondent emphasizes abstractness over concreteness (AC-CE) or action over reflection (AE-RO). The combination scores are computed by subtracting the CE score from the AC score, and the RO score from the AE score. A range from +36 to -36 is reported from these combination scores. These two scores are then plotted on a four-quadrant grid (refer to Appendix H) to determine the point of intersection, data point, in which the respondent falls. This data point thus falls into one of four quadrants, representing the four dominant learning styles termed Accommodator, Diverger, Converger, and Assimilator. According to the User's Guide for Learning Style Inventory, nurses tend to be found in the Accommodator learning style (Smith & Kolb, 1986 p. 85).

In summary, instrument scoring was accomplished by obtaining column totals for: CE, RO, AC, and AE. Two combination scores were obtained through subtraction: AC-CE and AE-RO. Each subject was finally classified into one of four predominant learning style types based on the latter two combination scores. Information from the LSI Grid was incorporated into the SPSS computer program to determine the final predominant learning style type.

The technical document provides a description of the validity relationship between LSI and career fields of study. The ipsative nature of the instrument has
been questioned, although Smith and Kolb (1986) assert that changes in the original version resulted in a more psychometrically sound measure of learning styles.

According to Gregg in the *Mental Measurements Yearbook* (Conoley & Kramer, 1989), the reliability of the four basic scales and the two combination scores "all show good internal reliability as measured by Cronbach's Standardized Scale Alpha" (p. 442). The Alpha reliability coefficients reportedly range between .73 - .88 (N = 268) (Kolb, 1985b, p. 4). The combination scores reflect almost perfect additivity (1.0) as measured by Tukey's Additivity test. The standardized percentile scores provided are based on a sample of 1,446 adults ranging between age 18 and 60. According to the author, the norming population was "ethnically diverse," representing a wide range of career choices and both genders.

Despite some detractors (Fox, 1984; Atkinson, 1988), the LSI was chosen for this study as a quick (10 minutes) and reliable self-administered instrument, easily scored, providing six scores that can be used by adult respondents of varying ages to evaluate their ability to learn from experience. As previously cited, this instrument has a history of use among nursing populations.

In summary, each study participant completing the LSI received six scores pertaining to learning style. The initial four were CE, RO, AC, and AE. The two combination scores obtained next (AC-CE and AE-RO) reflect emphasis on abstractness over concreteness during perception, and action over reflection during processing information. These last two scores related to learning mode were used to classify an individual into one of four predominant learning style types: Accommodator, Assimilator, Converger, and Diverger.

**Instrument: Part III**

**Participant Profile Form**

The third instrument, the Participant Profile Form was a demographic form developed by the investigator using information derived from the relevant literature.
regarding characteristics of professional nurses. The individual and work-related characteristics included: educational preparation, years of clinical nursing experience, predominant specialty area of clinical nursing practice, institutional setting of present clinical nursing position, years in present clinical nursing position, specialty area of present clinical nursing position, title of present nursing position, professional credentials other than registered nurse licensure, age, gender, ethnicity. Experiential information was also obtained from the novice nurses to ascertain whether they had prior clinical practice experience sufficient to possibly affect testing outcomes. Cumulative grade point average data was obtained from student academic records and was included for the novice group only.

Content validity of this demographic instrument was established in early November through review by a panel of experts. The panel consisted of three professional nurses who had been designated as expert nurses by their professional colleagues in the Baton Rouge District Nurses Association, and by three experienced professional nurse faculty who taught in a local baccalaureate nursing program. This panel of experts consisted of three nurses who held Doctorates in Nursing Science, and three nurses holding Masters in Nursing degrees. The panel also reviewed proposed cover letters for clarity, and for potential to encourage recipients to participate in the study. Document revisions were made as necessary based on the comments and suggestions of these six professional nurses. The expert panel members were excluded from the study population.

Limited field testing of the demographic instrument was completed during November, prior to formal data collection, with four designated expert and five novice nurses. Clarification of limited field testing with the novice students was done via telephone with the chair of the university committee (CUHARS) which approves human research activities. Among the designated nurse experts, two held doctorates (Ph.D.) and two held masters degrees. The novice nurses who
volunteered and consented to review the instrument were first semester senior baccalaureate nursing students from the same baccalaureate nursing program used in the study. None of participants in this field study were included in the final study population. Final changes were made in the Participant Profile Form as a result of information gained from field testing. Two alternate forms of the Profile instrument were finally used, one for the novice group (see Appendix I) and one for the experienced/expert nurse groups (see Appendix F). The content was similar in both forms except the form used for the novice population added a response item for "Nursing Student" under Level of Educational Preparation. It also asked for average number of working hours a week during the past year "if employed full time or part time in nursing". The University CUHARS Committee had approved its use for research with the nursing students. The alternate form used with the experienced and expert nurses asked, "During the past year, what is the average number of hours per week that you have worked in clinical nursing practice?" It did not include the response item for "Nursing Student," but asked if the respondent was currently enrolled as a student, and to "specify program." The demographic forms used with each of the three subject groups were color coded for ease in recognition by duplicating them on paper of three different colors.

Data Collection Procedure

The data for this study were collected on site and by return mail for the novice sample, and only by mail for the experienced and expert samples from November, 1994 through April, 1995. A description of the procedures used in data collection follows.

The investigator obtained permission from the Dean of Southeastern Louisiana University School of Nursing to include senior nursing students as the novice nurse sample in this study conducted during the later part of fall semester, 1994, and the spring semester of 1995. Written approval was granted by the
University's Committee on the Use of Humans and Animals as Research Subjects (CUHARS) as required. The investigator met with the graduating senior course coordinator and faculty within the School of Nursing early at the onset of the fall semester. This was done to establish tentative date(s) and time(s) to administer the research instruments to the novice nurse student population. It was determined that all data would be collected from the novice group on a single date in November, with an additional make-up date scheduled as needed. As the class schedule already included NLN Comprehensive and National Council Licensing Exam (NCLEX) Diagnostic testing dates, in-class time was not available for students to complete this project. Later in the semester, the Dean of the School of Nursing met during an informal session with the class and encouraged student participation in the research project.

On November 9, 1994, a week prior to the designated testing date, the investigator addressed the students in class to generally explain the study and to invite their participation. The majority of the class members verbalized interest in study participation. The investigator returned to the classroom the following week, on November 16, 1994, and again explained the project. Explanation of the voluntary nature of study participation, possible benefits, and measures taken to maintain confidentiality were described before cooperating students were asked to individually sign a consent to participate in the study (Appendix K). Based on feedback from the November 9th meeting, it was anticipated that most of the students would be present to participate on November 16th. However, the attendance at this voluntary session was lower due to a major accident impeding travel on the major highway access to the school of nursing, thereby preventing students from arriving at the appointed testing time. This ultimately led to a much extended data collection period for the novice group than had been originally expected.
A pre-coded data collection packet was prepared for each participating student and included: cover letter (Appendix J), consent forms (one to return and one for each student's own personal files, see Appendix K), written directions (Appendix L), the three research instruments, and a plain envelope and a blank note card. Students were instructed to self-address the envelope if they wished to receive an abstract of study results. They were asked to submit a permanent address on the note card if they were interested in participating in further research involving their class. The envelopes and note cards were collected separately from study materials, and were placed in a separate file for use after completion of the project. As data collection was done in the morning before class, refreshments (donuts and juice) were offered as a token of appreciation to the participating students. The students completed the consent form and three research instruments in an allotted time of approximately 90 minutes and returned them to a predetermined location at the school of nursing for analysis by the investigator. For ease in completing the CCTST Instrument on-site, the students placed their responses on a standard scantron form regularly used at the university, and included their optional comments on paper enclosed in the test booklet.

A second testing date/time (November 30, 1994) was established when students indicated their willingness to participate, but were unable to remain on campus to complete the forms on the first date. The same procedures were followed during the second testing time as had been used with the initial student group.

Although it had been anticipated that all students would complete test instruments on-site, several were unable to remain on campus to do so. They reported having appointments for employment interviews, child-care responsibilities, and other time constraints. Therefore, students who were unable to complete the instruments on site completed them at home, following the same
procedures as for the experienced and expert nurse subjects. They were provided an envelope containing directions, consent forms, all study materials, and a stamped, self-addressed return envelope. Those students failing to return these completed forms were sent a reminder letter in December (Appendix M), followed by a reminder post card in January (Appendix N) and three or more attempts by the researcher to contact them by telephone. Three students could not locate the initial instruments provided and requested replacements. Replacement instrument packets were subsequently mailed (two were personally delivered). Three students who returned incomplete or incorrectly completed forms were mailed a cover letter (Appendix O), directions, a duplicate copy of the incomplete form, and a stamped, self-addressed return envelope.

All instruments were appropriately coded before distribution in order to maintain participant anonymity. The principal investigator was the sole individual privy to coding information.

Response rates achieved for the novice sample were as follows. The novice sample consisted of 49 generic senior students enrolled in the Fall, 1994 graduating class of a southern university. Of the 49 invited students, 45 students (92%) agreed to participate and received research materials. Of the sample participating, 38 students (84%) returned the completed research instruments: 21 completed them on campus, and 17 completed them at home and returned them to the researcher. As two students returned incorrectly completed LSI instruments and were not included in the analyses, leaving a total of 36 novice participants for analyses related to learning style. As the minimum sample of 36 novice nurses established a priori was obtained, it was not necessary to obtain additional participants, as had been proposed, from the next class of last semester senior students during Spring 1995.

Data collection from the experienced nurse population entailed randomly drawing names from the current membership roster of the Baton Rouge District
Nurses Association. Address and licensure status for both experienced and expert nurses was verified using the 1994 roster of Registered Nurses from the Louisiana State Board of Nursing.

In order to collect data from the expert nurse population, a list of 75 professional nurses recognized as exemplary for the past three years was obtained from the BRDNA. All those for whom addresses could be found were included as participants.

The same methodology was used in survey procedures for both the experienced nurse and expert nurse samples. Because of the approaching holidays, initial letters inviting participation were mailed in two primary waves, early December and early January, to both the experienced (Appendix P) and designated expert (Appendix Q) nurse samples, explaining the study and the significance of their participation. A brightly colored, stamped, self-addressed response form (Appendix R) for direct return to the investigator at Louisiana State University was included, enabling these nurses to consent or refuse to participate in the study. Those refusing to participate were not contacted further.

Within one week, the investigator personally telephoned each affirmative respondent to provide further explanation regarding the study. These respondents were next mailed a cover letter (Appendix S), participant directions (Appendix T), all three study instruments, and a stamped, self-addressed return envelope. A small sealed packet of spiced tea was also enclosed. An abstract of the completed study was offered to all final participants who requested such by their addressing and returning an enclosed note card. Upon receipt, these note cards were placed in a separate file and were not reviewed until the study had been completed.

All expert and experienced participants returning completed materials were sent a thank you letter including background information regarding an enclosed commemorative stamp (Appendix U). A unique nursing memento, a U.S. Postal...
Service commemorative nursing stamp, was provided as an incentive and token of appreciation to all experienced and expert nurses who consented to participate and subsequently returned the study instruments. Novice subjects mailed replacement packets or forms also received a letter of thanks and a commemorative stamp.

Non-response follow-up procedures used for the experienced and expert nurses invited to participate in this study included the following:

1. Ten to 14 days after the initial mailing, nonrespondents were sent a brightly colored post card reminder (Appendix V) requesting their participation, inviting them to call the researcher collect if more information was desired. Nurses who failed to respond to this post card were not further contacted and were placed with the refusal group.

2. Ten to 14 days after consenting participants were sent envelopes of research instruments, a brightly colored post card reminder (Appendix W) was sent.

3. Following another ten days, a telephone call was made to all who consented to participate, were mailed instruments, and who failed to return completed instruments. Another set of the study instruments was provided to those who indicated a willingness to participate but who were unable to locate their original copies. At least three attempts, at three different times/days were made to contact these participants before a subject was declared as a non-contact and placed with the refusal group. A contact, for purposes of follow-up in this study, was defined as receiving an answer to a telephone call and either speaking to the nurse or leaving a message encouraging their response, or inviting their return call to the researcher at a specified phone number.

In that greater than the thirty-six (36) minimum affirmative responses established a priori were received in both the expert and the experienced groups, it was not necessary to telephone the initial nonresponders to determine their willingness to participate.
In summary, the final data included in analysis was that from the usable completed/returned instruments from 128 nurse participants: 38 novice, 42 experienced, and 48 expert professional nurses. Table 1 provides data describing the response rates of the study samples by nurse group.

Table 1

Response Rates Among Participating Professional Nurse Participants

<table>
<thead>
<tr>
<th>Participation Level</th>
<th>Nurse Response Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Novice</td>
</tr>
<tr>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Accessible/Invited</td>
<td>49</td>
</tr>
<tr>
<td>%</td>
<td>92a</td>
</tr>
<tr>
<td>Consented</td>
<td>45</td>
</tr>
<tr>
<td>%</td>
<td>78b</td>
</tr>
<tr>
<td>Returned Instruments</td>
<td>38</td>
</tr>
<tr>
<td>%</td>
<td>84c</td>
</tr>
</tbody>
</table>

Note. There were 128 nurse participants in the study.

aPercent of total accessible/invited.
bPercent returned of total accessible/invited.
cPercent returned of total consented.

Data Analysis

Data analysis procedures are described for each research objective. In all cases, the alpha level of statistical significance was set a priori at .05. Statistical analysis procedures entailed computer calculations using the Statistical Package for the Social Sciences Data Analysis System (SPSS, 1990; Hedderson & Fisher, 1993).
Coding, data entry, and data analysis were completed by the investigator. Nuances encountered pertaining to data analysis of specific objectives will be presented in greater detail in Chapter Four.

Whenever it was necessary to interpret the magnitude of findings presented as correlation coefficients, the descriptors developed by Davis (1971) were used as follows:

- .70 or higher indicated very strong association
- .50 - .69 indicated substantial association
- .30 - .49 indicated moderate association
- .10 - .29 indicated low association
- .01 - .09 indicated negligible association.

**Objective one** was to describe a sample of novice professional nurses on selected demographic variables. The Participant Profile Form was completed by respondents regarding demographic characteristics. The characteristics included the following: educational preparation, years of clinical nursing experience, predominant clinical specialty area, setting of present clinical nursing position, years in present clinical nursing position, specialty area of present clinical nursing position, title of present nursing position, professional credentials other than Registered nurse licensure, age, gender, ethnic origin. Cumulative grade point average data was obtained from student academic records after student participants provided their written consent allowing the researcher to do so.

Characteristics measured on a categorical scale of measurement, that is, nominal and ordinal scales of measurement, were summarized using frequencies and percentages. Those characteristics measured on a nominal scale were gender, ethnic origin, non-RN professional credential status, title of present position, specialty area of present clinical nursing position, present institutional setting, and predominant specialty area of clinical nursing practice. The characteristic measured on an ordinal
scale was educational preparation. Characteristics measured on a continuous scale of measurement, that is, the interval and ratio scales of measurement, were summarized using means and standard deviations. The ratio scale characteristics included age, years of clinical experience, and years in present clinical nursing position. The interval scale characteristic was cumulative grade point average for the novice group only.

**Objective two** was to describe a sample of **experienced** professional nurses on selected demographic variables. The Participant Profile Form queried respondents on their demographic characteristics. The characteristics included were the following: educational preparation, years of clinical nursing experience, predominant clinical nursing specialty area, present institutional setting, years in present clinical nursing position, specialty area of present clinical nursing position, title of present nursing position, non-RN professional credentials, age, gender, and ethnic origin.

Again, characteristics measured on a categorical scale of measurement, that is, nominal and ordinal scales of measurement, were summarized using frequencies and percentages. Those characteristics measured on a nominal scale were gender, ethnic origin, non-RN professional credential status, title of present position, specialty area of present clinical nursing position, present institutional setting, and predominant specialty area of clinical nursing practice. The characteristic measured on an ordinal scale was type of educational preparation.

Characteristics measured on a continuous scale of measurement, that is, the ratio scale of measurement, were summarized using means and standard deviations. These characteristics included age, years of clinical experience, and years in present clinical nursing position.

**Objective three** was to describe a sample of **expert** professional nurses on selected demographic variables. Responses to the Participant Profile Form provided
data on demographic characteristics. The characteristics were as follows: educational preparation, years of clinical nursing experience, predominant clinical nursing specialty area, present institutional setting, years in present clinical nursing position, specialty area of present clinical nursing position, title of present nursing position, non-RN professional credentials, age, gender, and ethnic origin.

Again, characteristics measured on a categorical scale of measurement, that is nominal and ordinal scales of measurement, were summarized using frequencies and percentages. Those characteristics measured on a nominal scale were gender, ethnic origin, non-RN professional credential status, title of present position, specialty area of present clinical nursing position, present institutional setting, and predominant specialty area of clinical nursing practice. The characteristic measured on an ordinal scale is type of educational preparation.

Objective four was to determine the critical thinking ability of a sample of novice nurses as measured by the CCTST in the areas of Overall Cognitive Skills (CT), Analysis, Inference, Evaluation, Inductive Reasoning, and Deductive Reasoning. As these abilities were measured on an interval scale, they were summarized with means and standard deviations.

Objective five hypothesized a positive relationship (one-tail test) between critical thinking ability reflected in Overall Cognitive Skills, as measured by the CCTST, and Cumulative Grade Point Average (GPA) in the study sample of novice nurses. As both variables were measured on an interval scale, the Pearson's Product-Moment Correlation Coefficient was used to measure the relationship between these two variables.

Objective six was to determine the critical thinking ability of a sample of experienced nurses as measured by the CCTST in the areas of Overall Cognitive Skills, Analysis, Interpretation, and Evaluation, Inductive Reasoning, and Deductive
Reasoning. As these abilities were measured on an interval scale, they were summarized using means and standard deviations.

Objective seven was to determine the critical thinking ability of a sample of expert nurses as measured by the CCTST in the areas of Overall Cognitive Skills, Analysis, Interpretation, Evaluation, Inductive Reasoning, and Deductive Reasoning. As these abilities were measured on an interval scale, they were summarized using means and standard deviations.

Objective eight was to compare samples of novice, experienced, and expert professional nurses on the following demographic characteristics: educational preparation, age, gender, and ethnic origin.

Inasmuch as comparisons were made between three independent groups (novice, experienced and expert nurses), the Chi-square procedure was used to compare these groups on each of the nominal variables of Gender and Ethnicity, and on the ordinal variable of Educational Preparation. The Analysis of Variance (ANOVA) procedure was used in comparing novice and expert nurse groups in terms of the interval variable, Age.

Objective nine hypothesized that the expert professional nurse sample would exhibit higher levels of critical thinking abilities, as measured by the CCTST, than would the novice and experienced professional nurse samples in specified areas. The specific areas to be tested included Overall Cognitive Skills, Analysis, Inference, Evaluation, Inductive Reasoning, and Deductive Reasoning. As each of these dependent variables was measured on the interval scale, the means for each variable were compared using the Analysis of Variance procedure for comparisons among the samples of novice, experienced, and expert professional nurses.

Objective ten was to determine the predominant learning style of a sample of novice professional nurses as measured by the Kolb Learning Style Inventory 1985. As the dependent variable of learning style was measured on a categorical
scale using this instrument, the data was described using frequencies and percentages.

Objective eleven was to determine the predominant learning style of a sample of experienced professional nurses as measured by the Kolb Learning Style Inventory 1985. Again, the dependent variable of learning style was measured on a categorical scale, the data was described using frequencies and percentages.

Objective twelve was to determine the predominant learning style of a sample of expert professional nurses as measured by the Kolb Learning Style Inventory 1985. As the dependent variable of learning style was measured on a categorical scale, the data was described using frequencies and percentages.

Objective thirteen was to compare novice, experienced and expert professional nurse samples on predominant learning style as measured by the Kolb Learning Style Inventory 1985. As the dependent variable of learning style was measured on a categorical scale, the Chi-square procedure was used in data analysis to determine if the variable of learning style and group were independent.

Objective fourteen hypothesized the existence of a model explaining a significant portion of the variance in overall critical thinking ability (CCTST Overall Cognitive Skills) of the professional nurse samples.

Analysis of this hypothesis was accomplished using multiple regression procedures, with critical thinking ability (Overall Cognitive Skills) as the dependent variable, and the other variables treated as independent variables. In order to address the hypothesized explanation, the following variables were entered into the regression analysis in the sequence noted:

1. Status level was entered first: Novice, experienced, and expert status.
2. LSI learning style categories were entered in the second step: Accommodator, Assimilator, Converger, and Diverger.
Finally, other potentially relevant demographic independent variables were allowed to enter the regression model through a stepwise analysis as appropriate: Ethnic group, masters degree level of education, professional certification, years of experience, and age. (Gender was not included in this part of the analysis as an independent variable due to an inadequate sample size of seven male participants in the entire study population.)
CHAPTER 4

FINDINGS

The purpose of this chapter is to present the data and explain the results of the study. The results are organized by the objectives of the study.

Demographic Characteristics

The first three objectives in this study were to describe novice, experienced, and expert professional nurses on selected demographic variables. Data for this section of the study, and for other demographic sections reported, was collected by subject response to items on the Participant Profile Form. Information was requested in the following twelve areas: 1) level of educational preparation, 2) professional credentials, 3) current employment status, 4) average number of hours/week worked in clinical nursing practice the past year, 5) total number of years of clinical nursing experience, 6) institutional settings of clinical nursing experience and number of years in each setting, 7) predominant clinical specialty and years employed in that area, 8) current clinical specialty and years employed in that area, 9) title and years in current position, 10) year of birth, 11) gender, 12) ethnic origin. An additional open-ended item (number 13) asked respondents to provide any other information they believed would contribute to success of the study.

Characteristics measured on a categorical scale of measurement, that is nominal and ordinal scales of measurement, were summarized using frequencies and percentages. Those characteristics measured on a nominal scale were gender, ethnic origin, non-RN professional credential status, title of present position, specialty area of present clinical nursing position, present institutional setting, and predominant specialty area of clinical nursing practice. The characteristic measured on an ordinal scale was level of educational preparation.
Characteristics measured on a continuous scale, that is an interval or ratio scale of measurement, were summarized using means and standard deviations. The characteristics measured on a ratio scale included age, years of clinical nursing experience, and years in present clinical position. The characteristic of grade point average (GPA) was measured on an interval scale for the purposes of this study. GPA was only included in a single objective that pertained to the novice population.

Objective One

The first objective was to describe novice professional nurses on selected demographic variables. The accessible novice population for this study consisted of 49 senior students enrolled in the Fall, 1994 graduating class of a public university in the state of Louisiana. Of the 49 students asked to voluntarily participate, 45 students (92%) agreed to participate in the study and received research materials. Of the sample participating, 38 students (84%) returned the completed research instruments.

Age of Respondents

Participants were asked to indicate their year of birth. Current age was then computed by subtracting year of birth from 1995. All 38 students responded to this item revealing a mean age of 31.2 years (SD = 7.5). This finding was higher than the average age of 26.1 years for graduating seniors and the average age of 27.7 years for graduating nursing seniors reported by the university for 1993 (Institutional Research & Evaluation, 1994, pp. 2, 1.2). The ages ranged from the youngest students at 23 years to the oldest student at 46 years of age. When examining age data in categories, the largest age group was found to be less than 25 years (n = 14 or 36.9%), and the smallest age group was 46 years or greater (n = 1 or 2.6%). The two groups of 26 to 30 years and 36 to 40 years were each found to have seven (18.4%) students. Table 2 presents an age distribution of the novice professional nurse participants.
Table 2

Age of Novice Professional Nurse Participants

<table>
<thead>
<tr>
<th>Years of Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25</td>
<td>14</td>
<td>36.9</td>
</tr>
<tr>
<td>26-30</td>
<td>7</td>
<td>18.4</td>
</tr>
<tr>
<td>31-35</td>
<td>4</td>
<td>10.5</td>
</tr>
<tr>
<td>36-40</td>
<td>7</td>
<td>18.4</td>
</tr>
<tr>
<td>41-45</td>
<td>5</td>
<td>13.2</td>
</tr>
<tr>
<td>46-50</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Ages ranged from 23 to 46 years (M = 31.2 years, SD = 7.5).

Gender of Respondents

Among the participating 38 students, 92% (n = 35) were female and 8% (n = 3) were male.

Ethnic Origin of Respondents

The majority of the 38 respondents indicated they were Caucasian (n = 34 or 89%), with the remaining respondents either African American (n = 3 or 8%) or Asian (n = 1 or 3%). None of the respondents indicated they belonged to the Native American, Hispanic, or another ethnic group.

Educational Level of Respondents

Respondents were asked to report for each level of educational preparation beyond the secondary level if they had completed that level and if so, the year each level was completed. The choices included the following: nursing student, diploma...
in nursing, associate degree in nursing, baccalaureate in nursing, other
baccalaureate, masters in nursing, other masters, doctorate, program if currently
enrolled, and other. Respondents were asked to specify their area of study when
indicating an other than nursing educational experience. Table 3 presents findings
related to educational level of the novice nurse population.

Table 3

Levels of Education Completed by Responding Novice Professional Nurses

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing student</td>
<td>38</td>
<td>100.0</td>
</tr>
<tr>
<td>Diploma</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>ADN</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>BSN</td>
<td>38</td>
<td>100.0</td>
</tr>
<tr>
<td>Other baccalaureate</td>
<td>3a</td>
<td>7.9</td>
</tr>
<tr>
<td>MSN</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other MS</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Doctorate</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Other education</td>
<td>3b</td>
<td>7.9</td>
</tr>
</tbody>
</table>

Note. Frequencies and percentages are not additive because students responded to
all applicable items.

a Other baccalaureate degrees held included dietetics, medical technology, and
political science.

b Two students reported earlier practical nurse education. One student reported an
associate degree in computer programming.

Among the three students reporting a prior baccalaureate degree, two of the
students reported completing such 6 and 21 years ago (M = 13.5 years, SD =
10.61 years ago). It should be noted that one student failed to indicate when the
degree was completed.
Professional Credentials of Respondents

Respondents were asked to indicate, other than for registered nurse (RN) licensure, any additional professional credentials held. Assessment of professional credentials was included for the novice group to learn if any had attained credentials prior to entering a nursing education program. The choices included the following: none, licensed practical nurse, respiratory therapist, certification, and other. None of the respondents in any of the three subpopulations reported preparation for/certification in respiratory care. Six (15.7%) of the students reported some form of certification, whereas 32 students (84.3%) reported that they did not hold other professional credentials. Table 4 presents findings related to professional credentials reported by the novice nurse group.

Table 4

<table>
<thead>
<tr>
<th>Credential</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No credentials</td>
<td>32</td>
<td>84.3</td>
</tr>
<tr>
<td>LPN licensure</td>
<td>2</td>
<td>5.3</td>
</tr>
<tr>
<td>RN licensure</td>
<td>2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.3</td>
</tr>
<tr>
<td>Certification</td>
<td>2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.3</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

<sup>a</sup>These respondents reported passing the RN licensure exam by the time they returned the research instruments.

<sup>b</sup>Listed were certified phlebotomy technician, and medical technologist certified by the American Society of Clinical Pathologists.

Employment Status of Respondents

Respondents were asked to indicate their current employment status: full-time in nursing, part-time in nursing, in a field other than nursing (specify), inactive
status/year, and other. In terms of current employment status, 17 (44.4%) of the 38 respondents to this item reported they were not employed, whereas more than half the class (21 or 55.3%) reported some level of employment. Table 5 provides information regarding current employment status among the employed novice respondents.

Table 5

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time in Nursing</td>
<td>2a</td>
<td>9.5</td>
</tr>
<tr>
<td>Part-time in Nursing</td>
<td>17</td>
<td>81.0</td>
</tr>
<tr>
<td>Not in Nursing</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Respondents returned instruments after graduation and reported employment.

Average Number of Working Hours Per Week in Nursing During Past Year

Among the 19 students (one-half of the novice sample) responding to the question "If employed full time or part time in nursing, what has been your average number of working hours a week during the past year?", the mean reported working hours per week in nursing was 22.3 hours (SD = 10.7 hours). The reported range of working was 8 to 43 hours a week.

Total Years of Clinical Nursing Experience

In terms of their total number of years of clinical nursing experience, the respondents were asked whether they had less than one year, 1 to 5 years, 6 to 10 years, 11 to 15 years, 16 to 20 years, 21-25 years, 26 to 30 years, or 31 or more (specify) years of experience. Of the 38 students responding to this item, responses
ranged from the < 1 year category to the 16 to 20 years category. Further data analysis revealed that among the two students reporting LPN licensure, one had 11 to 15 years of experience, and one had 16 to 20 years of experience. The remaining 95% of the novice population reported having five years or less of clinical nursing experience. This was an expected finding in that most nursing students have approximately 2-3 years of clinical experience as part of their basic educational program. Summarized in Table 6 are data on the clinical nursing experience reported by novice professional nurses.

Table 6

<table>
<thead>
<tr>
<th>Years Worked</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>20</td>
<td>52.6</td>
</tr>
<tr>
<td>1-5 years</td>
<td>16</td>
<td>42.2</td>
</tr>
<tr>
<td>6-10 years</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>11-15 years&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>16-20 years&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>2.6</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Years of experience in nursing ranged from 1 to 20 years.

<sup>a</sup>Included a student holding LPN licensure.

Institutional Settings and Years of Clinical Nursing Experience

Participants in this study were asked to indicate the institutional settings in which they had clinical nursing experience, and the number of years in each setting. Options included: community/public health, clinic/ambulatory care, hospice, hospital, home health, HMO/managed health, independent nursing practice, mental...
health facility, nursing education/school of nursing, nursing home/extended care facility, occupational health, physician's office, school health, other setting, specify. A separate item was included whereby one could mark student experience in affiliated agencies. This was done to distinguish student clinical experience from that gained through work experience.

The experience setting most frequently reported by the 38 student participants in this study was the hospital (n = 6 or 16%). Relatively few work settings were reported by the respondents in this group, with 14 work experience settings identified overall. Table 7 depicts the institutional settings of clinical work experience reported by the novice sample of nurses.

Table 7

<table>
<thead>
<tr>
<th>Setting</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Other Settings</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Home Health</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Mental Health</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

Note. There were 14 respondents in this group.

*aExcluding assigned student experience, the following settings were not reported by the responding group (the scope of practice required may not be appropriate for students or unlicensed personnel): Community/Public Health, Clinic/Ambulatory Care, Hospice, HMO (Health Maintenance Organization)/Managed Health, Independent Nursing Practice, Nursing Education, Occupational Health, or School Health.

In terms of the mean number of years of clinical nursing experience reported for institutional settings, there was a wide range of experience reflected in the

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
student group. Number of years of reported employment was from 2 to 16 years (see Table 8).

Table 8

<table>
<thead>
<tr>
<th>Institution</th>
<th>Nurses</th>
<th>Years of Clinical Experience</th>
<th>Number of Years Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Hospital</td>
<td>4</td>
<td>6.00</td>
<td>6.50</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>3</td>
<td>4.67</td>
<td>3.79</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Home Health</td>
<td>1</td>
<td>2.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Mental Health</td>
<td>1</td>
<td>7.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>1</td>
<td>7.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Note. Only employment clinical experience reported.

Predominant Clinical Specialty Area and Years of Clinical Nursing Experience

Respondents were asked to state their predominant clinical specialty area and the number of years employed in that area. Eighteen students identified a predominant clinical specialty area. Twelve clinical specialty areas emerged from the data analysis. The most prevalent category of predominant clinical specialty area reported by the novice respondents was Medical/Surgical/Adult Clinical Nursing (n = 6, or 33%). It should be noted that these are clinical areas of employment rather than of student lab experience. The contents of Table 9 reflect the wide variety of clinical specialty areas reported by the student respondents.
Table 9

Predominant Clinical Specialty Areas Reported by of Novice Professional Nurses

<table>
<thead>
<tr>
<th>Specialty Area</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical/Surgical/Adult Clinical Nursing</td>
<td>6</td>
<td>33</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Operating Room</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Pediatric/Child Health/NICU</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Clinic/College Health/HIV Clinic</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Emergency Room/Same Day Surgery</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Obstetric/Gynecology/Perinatal Labor-Delivery</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Psychiatric/Mental Health</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Surgery/Post Operative</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
<td><strong>102^a</strong></td>
</tr>
</tbody>
</table>

^aNumbers do not total 100% due to rounding error.

Although 18 students reported experience in a predominant clinical specialty area, there were 14 students who provided the number of years of experience in that specialty area. The mean number of years of clinical experience was 2.57 years (SD = 3.20 years). The range in years of reported employment in their predominant clinical specialty area was 1 to 12 years. Most of this group (n = 12 or 85.71%) reported experience of four years or less, with 64% (n = 9) reporting one or less years of experience (see Table 10).
Table 10

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1</td>
<td>9</td>
<td>64</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>99</strong>a</td>
</tr>
</tbody>
</table>

Note. Mean = 2.57 years, SD = 3.20 years.

aNNumbers do not total 100% due to rounding error.

Current Clinical Specialty Area and Years of Clinical Nursing Experience

Respondents were asked to indicate their current clinical specialty area and the number of years employed in that specialty area. Findings revealed that the earlier reported two categories of Psychiatric/Mental Health and Obstetric/Gynecology/Perinatal/Labor-delivery did not appear in this group, whereas Rehabilitation/Skilled Care was added to this group of specialty areas. Although 15 students reported a current clinical specialty area, there were 13 students who reported the number of years they had been employed in that current specialty area. There were 10 students (77%) who reported work in that specialty area for one year or less, and one each had been in that setting for 2, 4, and 12 years respectively. Experience ranged from under 1 year to 12 years, with a mean number of years employed in their current specialty area of 2.15 years (SD = 3.08). Table 11

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
reflects the current clinical specialty areas reported by the 15 students in the novice group.

Table 11

Current Clinical Specialty Area Reported by Novice Professional Nurses

<table>
<thead>
<tr>
<th>Specialty Area</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical/Surgical/Adult Clinical Nursing</td>
<td>4</td>
<td>26.0</td>
</tr>
<tr>
<td>Emergency Room/Same Day Surgery</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>Pediatric/Child Health/NICU</td>
<td>2</td>
<td>13.3</td>
</tr>
<tr>
<td>Clinic/College Health/HIV Clinic</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Operating Room</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Rehabilitation/Skilled Care</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Surgery/Post Operative</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Title and Length of Time in Current Nursing Position

Among the 19 students responding to this item regarding their current position title, only three categories emerged from data analysis: one (5%) was a licensed practical nurse, 14 (74%) were nurse aides/nurse techs/nurse interns, and four (21%) were registered nurse applicants. In terms of years in their current position, among 18 students responding to this item, 15 (83%) had been in their position one year or less. Two students (11%) had been in their position for 4 years, and one student (6%) had been in a position (LPN) for 16 years.
Supplemental Comments Provided by Novice Respondents

Three students provided additional demographic information in response to a final open-ended item on the Participant Profile Form. One student reported marital status and number/ages of children: married 21.5 years, with 3 adolescent children. Another student reported past employment of 17 years in an industrial plant. A third student reported past employment in a children's camp during one summer.

Cumulative College Grade Point Average

The cumulative grade point average (GPA) at graduation for each participating student was obtained from university academic records. The grade point average scale used at this school of nursing was: A = 4, B = 3, C = 2, D = 1, and 0 = F. The mean GPA calculated for the 38 students was 2.95 (SD = .25) on a 4.0 scale. GPA is used in admission determinations for this school of nursing. As the school maintains a waiting list of applicants for admission, students with higher GPA status are more likely to be admitted to the program.

Objective Two

The second objective was to describe the sample of experienced professional nurses on selected demographic variables. The sample of experienced nurses asked to voluntarily participate in this study included 102 randomly selected registered nurses. Six of the invited nurses refused to participate due to non-employment, retirement, and relocation to another state. Four of those invited to participate were ineligible (frame errors) as they failed to meet the a'priori criteria of having had at least five years of experience since graduation, and were recent graduates from 1991-1993. Among 102 experienced nurses invited to participate in the study, 48 of these nurses failed to return a Participant Response Form and were placed in the refusal group. Of the 44 nurses who agreed to participate and received study materials, 42 experienced nurses (96%) returned the completed research instruments. Following planned procedures regarding non-respondents, telephone
calls made to the two non-responding nurses revealed that one had experienced a serious injury, and the other could not be reached.

**Age of Respondents**

Respondents were asked to indicate their year of birth. Age was computed by subtracting birth year from 1995. The mean age for the experienced nurses was 47.21 years (SD = 8.67), the youngest age was 29 years, and the oldest nurse was 69 years of age. Participants in this sample were predominantly age 40 and older (n = 34 or 81%), and the age category with the greatest number of nurses was 41 to 45 years. Table 12 provides a summary of the age distribution of the experienced nurse sample.

**Table 12**

**Age of Experienced Professional Nurse Participants**

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤25</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>26-30</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>31-35</td>
<td>1</td>
<td>2.4</td>
</tr>
<tr>
<td>36-40</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td>41-45</td>
<td>13</td>
<td>30.9</td>
</tr>
<tr>
<td>46-50</td>
<td>8</td>
<td>19.0</td>
</tr>
<tr>
<td>51-55</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td>56-60</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>61-69(^{a})</td>
<td>3</td>
<td>7.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

*Note.* Age of respondents ranged from 29 to 69 years with a mean of 47.21 and standard deviation of 8.68.

\(^{a}\)One respondent reported age 64; two others reported age 69.
Gender of Respondents

All of the participating 42 experienced nurses in this study subpopulation were women. This was the only subpopulation group without male representation.

Ethnic Origin of Respondents

The majority ($n = 39$ or 92.9%) of the 42 experienced nurse respondents indicated they were Caucasian. Other ethnic groups reported by this group were African American ($n = 2$ or 4.8%) and Native American ($n = 1$ or 2.4%).

Educational Level of Respondents

Respondents were asked to report for each level of educational preparation beyond the secondary level, and year each was completed (see Table 13).

Table 13

Levels of Education Completed by Experienced Professional Nurses

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>ADN</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>BSN</td>
<td>32</td>
<td>76</td>
</tr>
<tr>
<td>Other BS</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>MSN</td>
<td>20</td>
<td>48</td>
</tr>
<tr>
<td>Other MS</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Doctorate</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Currently Enrolled as Student</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>Other Education</td>
<td>7</td>
<td>17</td>
</tr>
</tbody>
</table>

Note. Frequencies and percentages are not additive as respondents may have experienced several levels of education.

aEnrollment in BSN, MSN and doctoral programs was cited.

bOne practical nurse, one had college credit, several had nursing CE credits.
The data summarized in Table 13 reflects levels of educational preparation for the experienced nurse sample. Among the experienced nurses, the majority of the nurses (n = 32 or 76%) reported holding a baccalaureate degree in nursing, almost half (n = 20 or 48%) held master’s degrees, and over one third (n = 16 or 38%) had received diploma education in nursing. There were nine nurses (21%) who reported current enrollment in some level of formal academic education.

The experienced nurses also provided information regarding the year they had completed each level of education. The range of years reported since completion of education for this group ranged from 20 to 49 years ago. Table 14 presents summary information regarding number of years since completion of specific levels of education.

Table 14

<table>
<thead>
<tr>
<th>Education Level</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>No. Yrs. Since Grad.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>13</td>
<td>32.85</td>
<td>8.61</td>
<td>20 - 49</td>
</tr>
<tr>
<td>ADN\textsuperscript{b}</td>
<td>4</td>
<td>19.60</td>
<td>5.37</td>
<td>10 - 25</td>
</tr>
<tr>
<td>BSN\textsuperscript{c}</td>
<td>27</td>
<td>16.70</td>
<td>6.24</td>
<td>5 - 27</td>
</tr>
<tr>
<td>Other Baccalaureate</td>
<td>3</td>
<td>12.67</td>
<td>7.51</td>
<td>5 - 20</td>
</tr>
<tr>
<td>MSN\textsuperscript{d}</td>
<td>17</td>
<td>7.82</td>
<td>5.83</td>
<td>1 - 23</td>
</tr>
<tr>
<td>Other Masters</td>
<td>2</td>
<td>10.50</td>
<td>10.61</td>
<td>3 - 18</td>
</tr>
</tbody>
</table>

\textsuperscript{a}None of these nurses reported holding doctorate degrees.

\textsuperscript{b}Associate Degree in Nursing.

\textsuperscript{c}Bachelor of Science Degree in Nursing.

\textsuperscript{d}Master of Science Degree in Nursing.
Professional Credentials of Respondents

Respondents were asked to indicate, other than for RN licensure, any additional professional credentials held. The choices included the following: none, licensed practical nurse, respiratory therapist, certification, and other. None of the respondents in this group reported preparation for or certification in respiratory therapy. More than half the respondents (n = 26 or 61.9%) reported holding professional certification or other professional credentials. There were twelve categories of professional certification cited, including administration, adult, critical care, emergency, family, general, oncology, school, psychiatric/mental health, administration, ACLS, and PALS (Adult and Pediatric Life Support). Other credentials identified included membership in nursing honorary associations, civic awards for nursing service, "Who's Who in America," awards from nursing specialty organizations (such as Nurse of the Year). Table 15 presents credentials reported by these experienced nurses.

Table 15

Professional Credentials Reported by Experienced Professional Nurses

<table>
<thead>
<tr>
<th>Credential</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN licensure</td>
<td>42</td>
<td>100.0</td>
</tr>
<tr>
<td>Certification</td>
<td>20\textsuperscript{a}</td>
<td>47.6</td>
</tr>
<tr>
<td>Other credentials</td>
<td>6\textsuperscript{b}</td>
<td>14.3</td>
</tr>
<tr>
<td>No Credentials Identified</td>
<td>16</td>
<td>38.1</td>
</tr>
<tr>
<td>LPN licensure</td>
<td>2</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Note. Frequencies and Percentages are not additive as subjects may hold more than one credential.

\textsuperscript{a}Nurses identified certification in 12 separate categories.

\textsuperscript{b}Professional and civic awards were reported.
Employment Status of Respondents

All of the experienced nurses in the study were employed, with the majority reporting employment full-time in nursing (n = 36 or 86%). Table 16 reflects the data on employment status of the sample of experienced nurses.

Table 16
Current Employment Status Reported by Experienced Professional Nurses

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time in Nursing</td>
<td>36</td>
<td>86</td>
</tr>
<tr>
<td>Part-time in Nursing</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Not in Nursing</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Note. Numbers not additive due to employment in nursing and in non-nursing settings.

Average Number of Working Hours Per Week in Nursing During the Past Year

The experienced nurses were asked to provide their average number of hours per week employed in clinical nursing practice during the past year. The group reported working an average of 29.33 hours a week (SD = 15.3) in nursing. There were 14 nurses (33%) reporting working 40 hours a week. The expert group reported their nursing employment hours ranged from 8 to 60 hours a week.

Total Years of Clinical Nursing Experience

A wide range of clinical nursing experience was reported by the experienced nurse group. The number of years of experience ranged from 5 to 30 years. The employment category having the greatest number of these nurses (12) was that of 16 to 20 years. None of the experienced nurses had been employed for more than 30 years in nursing. This sample of nurses thus reflected considerable experience. Table 17 summarizes data on the clinical nursing experience reported by these experienced professional nurses.
Table 17

<table>
<thead>
<tr>
<th>Years Worked</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-5 years</td>
<td>1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>6-10 years</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>11-15 years</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>16-20 years</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>21-25 years</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>26-30 years</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>≥ 31 years</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>36&lt;sup&gt;b&lt;/sup&gt;</td>
<td>99&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

**Note.** Minimum criteria for experienced subject inclusion in this study was five years.

<sup>a</sup>Nurse had worked five years.

<sup>b</sup>Six nurses did not respond to this item.

<sup>c</sup>Percentage does not total 100% due to rounding error.

**Institutional Settings and Years of Clinical Nursing Experience**

The experienced nurses were asked to indicate the institutional settings in which they had clinical nursing experience, and their responses included all 14 settings provided on the demographic instrument. The most frequently reported setting of nursing experience was the hospital (n = 39 or 90%), followed by nursing education (n = 17 or 40%), and then home health (n = 13 or 31%). The responses reported least frequently (one each) were for independent nursing practice and the nursing home. Table 18 summarizes the data for the institutional experience settings reported by the sample of experienced professional nurses.
<table>
<thead>
<tr>
<th>Setting</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>38</td>
<td>90</td>
</tr>
<tr>
<td>Nursing Education/ School of Nursing(^a)</td>
<td>17</td>
<td>40</td>
</tr>
<tr>
<td>Home Health</td>
<td>13</td>
<td>31</td>
</tr>
<tr>
<td>Mental Health Facility</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>Clinic/Ambulatory Care</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>Community/Public Health</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Other Settings(^b)</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Hospice</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>HMO/Managed Health</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Independent Nursing Practice</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Nursing Home/Extended Care</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Note.** Frequencies and percentages were not additive because many nurses had experience in more than one setting.

\(^a\)Education combined: Schools of nursing and staff education.

\(^b\)Other settings identified were corrections, patient information services, Red Cross, and rehabilitation.

Participants were asked to indicate their number of years of clinical nursing experience. Of the sample of 42 experienced nurses who responded to this study, experience ranged from 1 year to 35 years. The category for the longest period of experience reported was community/public health setting (35 years, \(M = 11.14\),

SD = 14.31). The next most prevalent categories were the hospital (30 years, M = 11.95, SD = 7.91), and the mental health setting (20 years, M = 6.91, SD = 5.47). Table 19 presents data regarding clinical institutional work experience of the sample of experienced professional nurses.

Table 19

<table>
<thead>
<tr>
<th>Institution</th>
<th>Nurses</th>
<th>Years of Clinical Experience</th>
<th>Years Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Hospital</td>
<td>38</td>
<td>11.95</td>
<td>7.91</td>
</tr>
<tr>
<td>Nursing Education/</td>
<td>17</td>
<td>6.24</td>
<td>4.78</td>
</tr>
<tr>
<td>Nursing School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Health</td>
<td>13</td>
<td>1.85</td>
<td>1.14</td>
</tr>
<tr>
<td>Mental Health Facility</td>
<td>11</td>
<td>6.91</td>
<td>5.47</td>
</tr>
<tr>
<td>Clinic/Ambulatory Care</td>
<td>9</td>
<td>4.67</td>
<td>5.31</td>
</tr>
<tr>
<td>Community/Public Health</td>
<td>7</td>
<td>11.14</td>
<td>13.41</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>6</td>
<td>5.83</td>
<td>5.35</td>
</tr>
<tr>
<td>Other Setting</td>
<td>4</td>
<td>4.25</td>
<td>2.5</td>
</tr>
<tr>
<td>School Health</td>
<td>4</td>
<td>2.25</td>
<td>0.96</td>
</tr>
<tr>
<td>HMO/Managed Health</td>
<td>2</td>
<td>7.00</td>
<td>8.49</td>
</tr>
<tr>
<td>Hospice</td>
<td>2</td>
<td>13.00</td>
<td>8.49</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>2</td>
<td>5.00</td>
<td>4.24</td>
</tr>
<tr>
<td>Independent Nursing Practice</td>
<td>1</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Nursing Home/Extended Care</td>
<td>1</td>
<td>9.00</td>
<td>9.00</td>
</tr>
</tbody>
</table>

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Predominant Clinical Specialty Area and Years of Clinical Nursing Experience

Respondents were asked to indicate their predominant clinical specialty area (area in which they had worked the greatest number of years), and the number of years of experience in that area. Fourteen clinical specialty areas emerged following analysis of data from the 42 respondents. The most prevalent predominant clinical specialty category reported by the experienced nurses was psychiatric/mental health nursing (n = 7 or 17%), followed by three other categories (each n = 5 or 12%): 1) perinatal/gynecology/maternal-infant, 2) adult/medical/surgical, and 3) critical/coronary/burn care (see Table 20).

Table 20
Predominant Clinical Specialty Area Reported by Experienced Professional Nurses

<table>
<thead>
<tr>
<th>Specialty Area</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychiatric/Mental Health</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Critical/Coronary/Burn Care</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Medical/Surgical/Adult Clinical Nursing</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Perinatal/Gynecology/Maternal-Infant</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Community/Public Health/Disaster/Corrections</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Emergency Room/Same Day Surgery</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Pediatric/Child Health/NICU</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Oncology</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>General Medicine</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Geriatrics</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Family Nurse Practitioner</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

(table con'd.)
There were 11 areas not reported.

There were 41 experienced nurses who responded to the item requesting the number of years of experience in their predominant clinical specialty area. Among those nurses responding to this item, years of experience ranged from 5 to 35 years, with a mean of 13.85 (SD = 7.05) years of practice. One nurse did not respond to this item. The areas which were not reported by the experienced nurses included Clinic/College/HIV, Home Health/Hospice, Hemodialysis/Nephrology, Nursing Education, Orthopedics, Surgery/OR/Recovery, Physician's Office, PRN/Pool Nurse, Rehabilitation/Skilled Care, Research, and School Nursing.

**Current Clinical Specialty Area and Years of Clinical Nursing Experience**

Experienced nurses participating in this study were asked to indicate their current clinical specialty area and their years of employment in that area. Responses were obtained from 41 of the 42 experienced subjects, reflecting 20 specialty areas. The most frequently reported category was Psychiatric/Mental Health (n = 6 or 15%), followed by Adult/Medical/Surgical (n = 5 or 12%). The participating experienced nurses (n = 41) reported working in their current specialty area from 1 to 35 years, with a mean of 10.61 (SD = 8.65) years. One nurse did not respond to this item. There were 11 categories cited once by the participating nurses, and 6 categories not reported by this group. The complete list of current clinical specialty areas and their frequencies are reported in Table 21.
Table 21

Current Clinical Specialty Area Reported by Experienced Professional Nurses

<table>
<thead>
<tr>
<th>Specialty Area</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychiatric/Mental Health</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Medical/Surgical/Adult/Clinical Nursing</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Community/Public Health/Disaster/Corrections</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Perinatal/Gynecology/Maternal-Infant</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Nursing Administration</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Geriatrics</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Emergency Room/Same Day Surgery</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Oncology</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Pediatric/Child Health/NICU</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Critical/Coronary/Burn Care</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Family Nurse Practitioner</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>General Medicine</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hemodialysis/Nephrology</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Neurological Nursing</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Nursing Education</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Operating Room</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Rehabilitation/Skilled Care</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>School Nursing</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>41</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

*aOne nurse did not respond to this item.*
Title and Length of Time in Current Nursing Position

The participating nurses were asked to provide the title of their current nursing position. There were eight position titles emerging from data analysis of the 42 experienced registered nurse respondents. The most frequent response was Educator (faculty in a school of nursing, n = 10 or 24%). The next two categories were equally prevalent (n = 7 or 17%): Nurse Manager (a more direct supervisory role including unit director, charge nurse, team leader, supervisor, clinical coordinator) and Nursing Administrator (a high level management role including director of nursing, department director, vice-president). Table 22 summarizes the position titles of the responding 42 experienced nurses.

Table 22
Current Position Titles of Responding Experienced Nurses

<table>
<thead>
<tr>
<th>Position Titlea</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educator - Nursing School</td>
<td>10</td>
<td>23.8</td>
</tr>
<tr>
<td>Nurse Manager</td>
<td>7</td>
<td>16.7</td>
</tr>
<tr>
<td>Nurse Administrator</td>
<td>7</td>
<td>16.7</td>
</tr>
<tr>
<td>Staff Nurse</td>
<td>6</td>
<td>14.2</td>
</tr>
<tr>
<td>Clinical Nurse Specialist/ Nurse Practitioner</td>
<td>5</td>
<td>11.9</td>
</tr>
<tr>
<td>Public Health/School/ Employee Health Nurse</td>
<td>3</td>
<td>7.1</td>
</tr>
<tr>
<td>Educator - Staff Development</td>
<td>2</td>
<td>4.8</td>
</tr>
<tr>
<td>Case Manager</td>
<td>2</td>
<td>4.8</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100.0</td>
</tr>
</tbody>
</table>

aNoto reported were LPN, Nurse Aide/Tech/Senior Nurse Intern, RN Applicant.
The participating 42 experienced nurses reported holding the title of their current position from 1 to 19 years, with a mean of 4.14 (SD = 3.75) years. Nearly three-fourths of the group (n = 31 or 73.81%) had been in their position for five years or less, with 29% (n = 12) reportedly in their positions for one year or less.

**Supplemental Comments From Experienced Nurse Participants**

Four participants provided supplementary comments in response to the final open-ended item on the Participant Profile Form. One nurse referred to clinical nursing experience as "bedside" nursing, and reported doing this for 16 years, followed by two years in other nursing areas. Another respondent wrote of being committed to professional nursing and quality care. A third nurse elaborated on experience in four clinical settings, and on feeling "rusty" at taking exams like the CCTS. A final nurse commented on factors affecting thinking: "time of day and state of exhaustion/alertness of participant. Being 'fresh as a daisy' or 'dying to fall into bed' would have a direct bearing on one's mental capacity/ability."

**Objective Three**

The third objective was to describe expert professional nurses on selected demographic variables. The sample of expert nurses was obtained by asking 80 formally recognized exemplary nurses to voluntarily participate in the study. Six nurses refused to participate because they were retired (1), were not involved in clinical practice (1), or did not have time because of school or other constraints (4). The remaining 24 expert nurses who were invited to participate, but who failed to return a Participant Response Form, were placed in the refusal group. Of the 50 expert nurses who agreed to participate and were mailed study materials, 48 nurses (96%) returned the completed research instruments. Telephone calls to the two non-respondents revealed that one reportedly returned the materials, but the researcher never received them. The other non-respondent had unexpected surgery.
Age of Respondents

Respondents were asked to indicate their year of birth. Age was computed by subtracting indicated birth year from 1995. The mean age of the expert nurses was 48.67 years (SD = 8.86). The ages ranged from youngest nurse at 32 years to the oldest nurse at 68 years. Table 23 presents a summary of the age distribution for the expert professional nurse sample.

Table 23

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>26-30</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>31-35</td>
<td>2</td>
<td>4.1</td>
</tr>
<tr>
<td>36-40</td>
<td>9</td>
<td>18.8</td>
</tr>
<tr>
<td>41-45</td>
<td>9</td>
<td>18.8</td>
</tr>
<tr>
<td>46-50</td>
<td>7</td>
<td>14.6</td>
</tr>
<tr>
<td>51-55</td>
<td>8</td>
<td>16.7</td>
</tr>
<tr>
<td>56-60</td>
<td>9</td>
<td>18.8</td>
</tr>
<tr>
<td>61-65</td>
<td>3</td>
<td>6.2</td>
</tr>
<tr>
<td>68</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Age of respondents ranged from 32 to 68 years with a mean of 48.67 years and SD of 8.86 years.

Gender of Respondents

Among the participating 48 expert nurses in this study, the majority (n = 44 or 92%) reported they were female and two (4%) were male.
Ethnic Origin of Respondents

The majority of the 48 respondents in the expert nurse sample indicated they were Caucasian (n = 44 or 92%), with the remaining respondents either Native American (n = 3 or 6%) or African American (n = 1 or 2%). None of the respondents indicated they belonged to the Asian, Hispanic, or another ethnic group.

Educational Level of Respondents

Respondents were asked to report for each level of educational preparation beyond the secondary level, and the year each level was completed. They were asked to specify the area of study when reporting an other than nursing educational experience. Findings revealed that many of this group reported initial education for nursing at the diploma level (n = 20 or 42%). Additionally, over half (n = 29 or 60%) had completed a BSN degree, and 43% (n = 21) reported holding degrees at the masters and doctorate level. The only three participants holding doctorates in the entire study were in the expert group, and reported having EdD (2) and PhD (1) degrees. There were 8 respondents who (17%) reported current enrollment at the baccalaureate, masters, and doctorate levels of education (see Table 24).

Table 24
Levels of Education Completed by Expert Professional Nurses

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Student</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Diploma</td>
<td>20</td>
<td>42.0</td>
</tr>
<tr>
<td>ADN</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>BSN</td>
<td>29</td>
<td>60.0</td>
</tr>
<tr>
<td>Other BS</td>
<td>4^a</td>
<td>8.0</td>
</tr>
<tr>
<td>MSN</td>
<td>16</td>
<td>33.0</td>
</tr>
<tr>
<td>Educational Level</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Other MS</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>Doctorate</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>Other Education</td>
<td>15</td>
<td>31.3</td>
</tr>
<tr>
<td>Currently enrolled</td>
<td>8</td>
<td>17.0</td>
</tr>
<tr>
<td>Other past education</td>
<td>7</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Note. Each respondent may have had more than one education level.

aBS in professional arts, education, and nursing education, BA in health arts.

bRNs enrolled in BS, MSN and doctorate programs.

cAD in criminology, military corpsman, practical nurse, college courses, professional workshops, military reserve courses.

Table 25 provides a summary of the levels of education and the reported number of years since completion for the expert nurse sample.

Table 25
Number of Years Since Completion of Reported Levels of Education for Expert Professional Nurses

<table>
<thead>
<tr>
<th>Education Level</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>No. Yrs. Since Grad.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>19</td>
<td>27.74</td>
<td>10.88</td>
<td>8 - 45</td>
</tr>
<tr>
<td>AD in Nursing</td>
<td>4</td>
<td>19.0</td>
<td>7.25</td>
<td>12 - 29</td>
</tr>
<tr>
<td>BS in Nursing</td>
<td>28</td>
<td>20.6</td>
<td>10.90</td>
<td>0 - 44</td>
</tr>
<tr>
<td>Other Baccalaureate</td>
<td>3</td>
<td>17.7</td>
<td>11.70</td>
<td>9 - 31</td>
</tr>
<tr>
<td>MS in Nursing</td>
<td>16</td>
<td>12.1</td>
<td>5.80</td>
<td>3 - 24</td>
</tr>
<tr>
<td>Other Masters</td>
<td>2</td>
<td>14.0</td>
<td>14.01</td>
<td>4 &amp; 24</td>
</tr>
<tr>
<td>Doctorate</td>
<td>3</td>
<td>7.67</td>
<td>6.51</td>
<td>1 - 14</td>
</tr>
</tbody>
</table>
Professional Credentials of Respondents

Respondents were asked to indicate, other than for RN licensure, any additional professional credentials held. The choices included the following: none, licensed practical nurse, respiratory therapist, certification, and other. None of the respondents in this group reported having preparation/certification in respiratory therapy. Most of the expert respondents (n = 46 or 96%) reported holding professional certification or other professional credentials (see Table 26).

Table 26

Professional Credentials Reported by Expert Professional Nurses

<table>
<thead>
<tr>
<th>Credential</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN</td>
<td>48</td>
<td>100</td>
</tr>
<tr>
<td>Certification</td>
<td>26(^a)</td>
<td>54</td>
</tr>
<tr>
<td>Other Credentials</td>
<td>20(^b)</td>
<td>42</td>
</tr>
<tr>
<td>No Credentials Identified</td>
<td>15</td>
<td>31</td>
</tr>
<tr>
<td>LPN</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Note. Frequencies and Percentages are not additive as respondents may have several levels of credentials.

\(^a\)Nurses identified certification in 20 separate categories.

\(^b\)Local and national awards, licensed counselor, professional awards (Who's Who in American Nursing, Sigma Theta Tau International Honorary Nursing Society), academic and civic awards were reported.

There were 20 separate categories of professional certification cited, including administration, adult/general, chemical dependency, college health, critical care, diabetes, emergency, enterostomal therapy, family nurse practitioner, gerontology, intravenous therapy, inpatient obstetrics, nephrology, nurse midwifery, occupational health, oncology, operating room, orthopedics, rehabilitation, woman's health. Other credentials, awards recognitions identified included membership in...
nursing honorary associations, civic awards for nursing service, "Who's Who in American Nursing," awards from nursing specialty organizations (such as Nurse of the Year). One of the expert nurses reported co-authoring a chapter in a nursing textbook.

Employment Status of Respondents

Among the 48 expert nurse respondents to the item regarding their employment, all respondents were employed. The majority of the nurses (n = 43 or 90%) reported full-time employment in nursing. Table 27 presents data regarding employment status for the expert nurse group.

Table 27
Current Employment Status Reported for Expert Professional Nurses

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time in Nursing</td>
<td>43</td>
<td>90%</td>
</tr>
<tr>
<td>Part-time in Nursing</td>
<td>4a</td>
<td>8%</td>
</tr>
<tr>
<td>Not in Nursing</td>
<td>1b</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>48</td>
<td>100%</td>
</tr>
</tbody>
</table>

aTwo nurses reported retirement from hospital employment in 1993 & 1994 but remained active in nursing in home health or other settings on a part-time basis.

bOne nurse was employed in health care research.

Average Number of Working Hours Per Week in Nursing During the Past Year

The expert nurses were asked to provide their average number of hours per week employed in clinical nursing practice during the past year. The 48 participating expert nurses reported working a mean of 34.31 hours a week (SD = 17.88) in nursing. Nearly one-half (n = 20 or 42%) of this group reported working 40 hours a week. The expert group reported their nursing employment hours ranged from 8 to 98 hours a week.
Total Years of Clinical Nursing Experience

The responding expert nurses indicated they had from 6 to 30 years of clinical nursing experience. The employment category having the greatest number of these nurses was that of 21 to 25 years. None of the expert nurses had been employed for more than 30 years in nursing. Eight nurses did not respond to this item. Table 28 summarizes data on the years of clinical nursing experience reported by the expert professional nurse sample.

Table 28

Years of Clinical Nursing Experience Reported by Expert Professional Nurses

<table>
<thead>
<tr>
<th>Years Worked</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1 year</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>1-5 years</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>6-10 years</td>
<td>2</td>
<td>5.0</td>
</tr>
<tr>
<td>11-15 years</td>
<td>10</td>
<td>25.0</td>
</tr>
<tr>
<td>16-20 years</td>
<td>10</td>
<td>25.0</td>
</tr>
<tr>
<td>21-25 years</td>
<td>11</td>
<td>27.5</td>
</tr>
<tr>
<td>26-30 years</td>
<td>7</td>
<td>17.5</td>
</tr>
<tr>
<td>31 or more years</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Total  40a  100.0

Note. Minimum criteria for expert nurse subject inclusion in study was five years.

aEight expert nurses did not respond to this item.

Institutional Settings and Years of Clinical Nursing Experience

The expert nurses were asked to indicate the institutional settings in which they had clinical nursing experience. This group of 48 nurses indicated they had experience in 11 of the 14 settings provided on the Participant Profile Form. The
three areas not reported by this group were HMO/managed health, independent nursing practice, and school health. The most frequently reported setting of clinical nursing experience was the hospital \( (n = 46 \text{ or } 96\%) \), followed by nursing education \( (n = 17 \text{ or } 35\%) \), and then home health \( (n = 11 \text{ or } 23\%) \). Least frequent experience settings were hospice, mental health, and occupational health, each with two respondents \( (4\% \text{ each}) \). Data obtained regarding expert nurse experience settings is summarized in Table 29.

**Table 29**

Institutional Settings of Work Experience Reported by Expert Professional Nurses

<table>
<thead>
<tr>
<th>Setting</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>46</td>
<td>96</td>
</tr>
<tr>
<td>Nursing Education/ School of Nursing(^b)</td>
<td>17</td>
<td>35</td>
</tr>
<tr>
<td>Home Health</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Other Settings(^c)</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Clinic/Ambulatory Care</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Community/Public Health</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>Nursing Home/Extended Care</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Hospice</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Mental Health Facility</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

*Note.* Frequencies and percentages were not additive because many nurses had experience in more than one setting.

\(^a\) Settings not indicated were HMO, Independent Nursing Practice, Schools.

\(^b\) Education combined: Schools of nursing and staff education.

\(^c\) Other settings included: Military, health research facility.
Participants were asked to indicate their number of years of clinical nursing experience in each setting. Of the sample of 48 experienced nurses who responded to this study, their reported experience ranged from 1 year to 38 years in a variety of settings. The category in which the nurses had the longest period of experience was the hospital (38 years, $M = 14.17$, $SD = 10.20$), followed by nursing education (31 years, $M = 12.44$, $SD = 9.83$), and the physician's office (30 years, $M = 6.44$, $SD = 9.24$). The discrepancy between the 30 years maximum clinical experience reported in Table 28 and the longest period of experience of 38 years reported in Table 30 to follow, may be explained by a subject response from among the eight non-respondents in Table 28. Table 30 presents mean years of experience reported by the participating 48 expert nurses.

Table 30

<table>
<thead>
<tr>
<th>Institution</th>
<th>Nurses</th>
<th>Years of Clinical Experience</th>
<th>No. of Years Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$n$</td>
<td>$M$</td>
</tr>
<tr>
<td>Hospital</td>
<td>46</td>
<td>14.17</td>
<td>10.20</td>
</tr>
<tr>
<td>Nursing Home/Extended Care</td>
<td>2</td>
<td>3.00$^a$</td>
<td>3.46</td>
</tr>
<tr>
<td>Clinic/Ambulatory Care</td>
<td>7</td>
<td>8.00</td>
<td>5.60</td>
</tr>
<tr>
<td>Hospice</td>
<td>2</td>
<td>7.00</td>
<td>1.41</td>
</tr>
<tr>
<td>Nursing Education/Nursing School</td>
<td>16</td>
<td>12.44</td>
<td>9.83</td>
</tr>
<tr>
<td>Community/Public Health</td>
<td>6</td>
<td>6.17</td>
<td>5.78</td>
</tr>
<tr>
<td>Physician’s Office</td>
<td>9</td>
<td>6.44</td>
<td>9.24</td>
</tr>
</tbody>
</table>

(table con'd.)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
### Predominant Clinical Specialty Area and Years of Clinical Nursing Experience

Respondents were asked to indicate their predominant clinical specialty area (area in which they had worked the greatest number of years), and the number of years of experience in that area. Sixteen clinical specialty areas emerged following analysis of data from all 48 respondents. Four clinical areas not reported by this group as their predominant area were: surgery/post-operative, research, nursing education, and oncology. The most prevalent predominant clinical specialty category reported by the expert nurses was medical/surgical/adult clinical nursing \((n = 11 \text{ or } 23\%)\), followed by perinatal/gynecology/maternal-infant nursing \((n = 5 \text{ or } 10\%).\) Expert nurses also indicated the number of years spent working in their predominant clinical specialty. The number of years in that specialty area ranged from 4 to 38 years with a mean of 16.28 years and SD = 7.69. Table 31 summarizes information regarding predominant clinical areas identified, including four areas of lowest predominance, and the number of years experience.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Nurses</th>
<th>Years of Clinical Experience</th>
<th>No. of Years Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>2</td>
<td>13.50</td>
<td>16.24</td>
</tr>
<tr>
<td>Home Health</td>
<td>10</td>
<td>4.80a</td>
<td>3.97</td>
</tr>
<tr>
<td>Other Setting</td>
<td>8</td>
<td>6.88</td>
<td>6.77</td>
</tr>
<tr>
<td>Mental Health Facility</td>
<td>1</td>
<td>4.00a</td>
<td>4.00</td>
</tr>
<tr>
<td>School Health</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>HMO/Managed Health</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Independent Nursing Practice</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

\(^a\)One nurse did not respond to this item.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Table 31
Predominant Clinical Specialty Area of Expert Professional Nurses

<table>
<thead>
<tr>
<th>Specialty Areaa</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical/Surgical/Adult Clinical</td>
<td>11</td>
<td>22.8</td>
</tr>
<tr>
<td>Perinatal/Gynecology/Maternal-Infant</td>
<td>5</td>
<td>10.3</td>
</tr>
<tr>
<td>Critical Care</td>
<td>4</td>
<td>8.3</td>
</tr>
<tr>
<td>Home Health/Hospice</td>
<td>4</td>
<td>8.3</td>
</tr>
<tr>
<td>Operating Room</td>
<td>4</td>
<td>8.3</td>
</tr>
<tr>
<td>Emergency Room/Same Day Surgery</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>Psychiatric/Mental Health</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>Community/Public Health</td>
<td>2</td>
<td>4.2</td>
</tr>
<tr>
<td>General Medicine</td>
<td>2</td>
<td>4.2</td>
</tr>
<tr>
<td>Clinic/College Health/HIV Clinic</td>
<td>2</td>
<td>4.2</td>
</tr>
<tr>
<td>Pediatric/Child Health/NICU</td>
<td>2</td>
<td>4.2</td>
</tr>
<tr>
<td>Rehabilitation/Skilled Care</td>
<td>2</td>
<td>4.2</td>
</tr>
<tr>
<td>Nursing Administration</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note. Reported number of years in predominant specialty area ranged from 4 to 38 years, M = 16.28, SD = 7.69. One expert nurse did not provide this data.

aAreas not reported were: Family nurse practitioner, geriatrics, hemodialysis/nephrology, school nurse, surgery/post-operative, research, nursing education, neurology, oncology, PRN/pool nurse.

There were 47 expert nurses responding to the item requesting number of years in their predominant clinical specialty. The number of years in that specialty
area ranged from 4 to 38 years, with a mean of 16.28 years (SD = 7.69). One expert nurse did not respond to this item.

**Current Clinical Specialty Area and Years of Clinical Nursing Experience**

Expert nurses participating in this study were asked to indicate their current clinical specialty area and their years of employment in that area. Responses were obtained from 46 study participants, reflecting 19 specialty areas. Two nurses did not respond to this item.

The most frequently reported category was that for medical/surgical/adult clinical nursing (n = 7 or 15%), followed by perinatal/gynecology/maternal-infant (n = 5 or 11%), and clinic/ambulatory care (n = 4 or 9%). There were five categories cited once by the participating nurses, and eight categories not reported by this group. Among those not reported were the categories of surgery/postoperative and nursing administration. Table 32 summarizes the data reported on current clinical specialty areas of expert nurses.

**Table 32**

**Current Clinical Specialty Area of Expert Professional Nurses**

<table>
<thead>
<tr>
<th>Specialty Areaa</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical/Surgical/Adult Clinical Nursing</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Perinatal/Gynecology/ Maternal-Infant</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Clinic/College Health/HIV Clinic</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Home Health/Hospice</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Operating Room</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Psychiatric/Mental Health</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Community/Public Health</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

(table con'd.)
Among 46 expert nurses responding to the item requesting the number of years experience in their current clinical specialty, the reported range was from 2 to 38 years, with a mean of 13.98 years (SD = 8.68 years). Two expert nurses did not respond to this item.

**Title and Length of Time in Current Nursing Position**

The participating nurses were asked to provide the title of their current nursing position. There were eight position titles emerging from data analysis of 46 expert nurse respondents (two nurses did not respond to this item). Position titles

<table>
<thead>
<tr>
<th>Specialty Areaa</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Care</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Emergency Room/Same Day Surgery</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>General Medicine</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Geriatrics</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Oncology</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Pediatric/Child Health/NICU</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Rehabilitation/Skilled Care</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Nursing Education</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Physician's Office</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Research</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>46</strong></td>
<td><strong>98b</strong></td>
</tr>
</tbody>
</table>

aAreas not reported were: Surgery/post operative, nursing administration, PRN/pool nurse, family nurse practitioner, hemodialysis/nephrology, school, neurology.

bPercentage did not total 100 due to rounding error.
not reported by this group was for Case Manager and Public Health Nurse. The most frequent response was Nurse Manager (n = 16 or 35%), followed by Educator/School of Nursing (n = 12 or 26%). Nurse Manager was a more direct supervisory role, including unit director, clinical coordinator, charge nurse, supervisor and team leader responses. Nurse Administrator was a high level management role including positions as director of nursing, department directors, and vice president of clinical operations. When educators from both school of nursing and staff development were combined (n = 16 or 35%), their numbers equaled that for nurse manager (see Table 33).

**Table 33**

<table>
<thead>
<tr>
<th>Position Title</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse Manager</td>
<td>16</td>
<td>35</td>
</tr>
<tr>
<td>Educator - Nursing School</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>Nurse Administrator</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Educator - Staff Development</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Staff Nurse</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Chief Clinical Research</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Clinical Nurse Specialist/ Nurse Practitioner</td>
<td>1(^a)</td>
<td>2</td>
</tr>
<tr>
<td>PRN/Pool Nurse</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>46(^b)</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

*Note.* Nurse Manager was a more direct supervisory role (charge nurse), whereas Nurse Administrator was a high level administrative role (director of nursing).

\(^a\) Enterostomal Therapist

\(^b\) Two nurses did not respond to this item.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
The length of time these 46 nurses reported having been in their current titled positions ranged from 1 to 30 years, with a mean of 8.15 years (SD = 6.63 years). The largest frequency response category reported was for 3 years (n = 8 or 17%). Two nurses did not respond to this item.

Supplemental Comments from Expert Nurse Participants

Five participants provided supplemental comments in response to the final item at the end of the Participant Profile Form. Two expert nurses wrote of concurrent long-term employment in both a hospital setting and in a nursing education setting. Another nurse reported having five and one-half years experience as a military corpsman preceding RN education. A fourth respondent clarified a current employment setting, and the final nurse wrote of working full time for seven years in two nursing jobs to assist in financing children's college educations.

Determination of Critical Thinking Ability

The fourth, sixth, and seventh objectives of this study were to determine the critical thinking ability of each of the three study samples as measured by the CCTST in the areas of Overall Cognitive Skills (Overall CT), Analysis, Evaluation, Inference, Inductive Reasoning and Deductive Reasoning. The fifth objective was a research hypothesis regarding grade point average and overall cognitive skills (Overall CT). As the critical thinking abilities were measured on an interval scale, they were summarized with means and standard deviations.

Percentile rankings were also derived for corresponding CCTST raw scores obtained for each nurse sample. These percentiles were based upon the suggested percentile rankings of the test norm population provided by the instrument's developers.

Objective Four

The fourth objective was to determine the critical thinking ability of novice nurses as measured by the CCTST. All 38 of the novice professional nurses were
included in this analysis. The CCTST yields an overall measure of critical thinking ability and a separate measure for each of the five subscores: Analysis, Evaluation, Inference, Inductive Reasoning, and Deductive Reasoning. The data presented in Table 34 were calculated from the raw data collected from the novice sample. Table 34 provides the mean, standard deviation, the lowest and highest overall scores for the Overall CT and for each of the CCTST subscores.

Table 34
CCTST Raw Score Results for Novice Professional Nurses

<table>
<thead>
<tr>
<th>CCTST Scale</th>
<th>Raw Score Means</th>
<th>Lowest</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Deviation</td>
<td>Score</td>
<td>Score</td>
</tr>
<tr>
<td>Overall CT</td>
<td>16.29&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Analysis</td>
<td>4.42</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Evaluation</td>
<td>5.87</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Inference</td>
<td>6.00</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Inductive Reasoning</td>
<td>7.32</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Deductive Reasoning</td>
<td>7.32</td>
<td>4</td>
<td>15</td>
</tr>
</tbody>
</table>

Note. Analysis included all 38 novice subjects.

<sup>a</sup>Reported statistical analysis of the CCTST norm sample reflected an Overall CT mean raw score of 15.89 and standard deviation of 4.46 on the 34 item test (Facione & Facione, 1993, p. 7). However, for purposes of description, the raw scores are probably less meaningful than the scores converted to percentile rankings. For that reason, mean percentile rankings were computed for each CCTST scale on the basis of suggested percentile rankings provided by the test developers regarding the norm population.
used to develop the instrument (Facione & Facione, 1993). The results of data analysis regarding the mean, standard deviation, and lowest and highest scores on the percentile ranking for the CCTST data in the novice sample are presented in Table 35.

Table 35
CCTST Percentile Rank Scores for Novice Professional Nurses

<table>
<thead>
<tr>
<th>CCTST Scale</th>
<th>Lowest % Rank</th>
<th>Highest % Rank</th>
<th>Mean % Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>Overall CT</td>
<td>11</td>
<td>98</td>
<td>56.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23.25</td>
</tr>
<tr>
<td>Analysis</td>
<td>4</td>
<td>99</td>
<td>58.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>27.86</td>
</tr>
<tr>
<td>Evaluation</td>
<td>11</td>
<td>98</td>
<td>62.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23.14</td>
</tr>
<tr>
<td>Inference</td>
<td>3</td>
<td>99</td>
<td>54.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>25.59</td>
</tr>
<tr>
<td>Inductive Reasoning</td>
<td>13</td>
<td>98</td>
<td>65.26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21.73</td>
</tr>
<tr>
<td>Deductive Reasoning</td>
<td>12</td>
<td>99</td>
<td>49.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24.02</td>
</tr>
</tbody>
</table>

Note. Analysis included all 38 novice subjects.

Examination of the data in Table 35 reveals that overall, the sample of novice nurses had the highest scores on the subscale, Inductive Reasoning, with a mean percentile ranking of 65.26 (SD = 21.73). Slightly less than this was the mean percentile ranking for the subscale of Evaluation (62.58, SD = 23.14). In addition, the novice nurse group had mean percentile rankings above 50 on all but one of the six critical thinking measures, namely that for Deductive Reasoning. The only score that fell below the 50th percentile overall was also that of Deductive Reasoning (percentile M = 49.11, SD = 24.02).
Objective Five

Hypothesis Regarding GPA and Overall Cognitive Skills

The fifth objective of the study was stated as a research hypothesis as follows: A positive relationship exists between critical thinking ability as reflected in Overall Cognitive Skills, as measured by the CCTST, and the cumulative grade point average (GPA) in the study population of novice nurses. Correlations between critical thinking and grade point average have been reported in the literature on critical thinking (Facione & Facione, 1993, p. 15).

The Pearson's Product Moment Correlation Coefficient was used to measure the relationship between the two variables, grade point average and CCTST Overall Cognitive Skills. The correlation between GPA and Overall Cognitive Skills was found to be $r = .37$ ($p$ one-tail = .01). These findings reveal a significant positive relationship between GPA and Overall Cognitive Skills. According to Davis' Descriptors (1971), this was described as a moderate association. This was interpreted to mean that for the 38 novice nurses in this study, those with higher grade point averages tended to score higher on the Overall Cognitive Skills measure of CCTST. The research hypothesis regarding a positive relationship between GPA and overall critical thinking ability was, therefore, supported by the data obtained from this novice nursing sample.

Objective Six

The sixth objective was to determine the critical thinking ability of experienced nurses as measured by the CCTST, including Overall CT and the five subscales of Analysis, Evaluation, Inference, Inductive Reasoning, and Deductive Reasoning. All 42 participating nurses from the randomly selected experienced sample were included in the data analysis. Table 36 presents the data calculated from the raw data and includes the mean, standard deviation, lowest, and highest of the Overall CT score and each of the subscores.
Table 36
CCTST Raw Score Results for Experienced Professional Nurses

<table>
<thead>
<tr>
<th>CCTST Scale</th>
<th>Raw Score Means</th>
<th>Lowest Score</th>
<th>Highest Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Deviation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall CT</td>
<td>17.02&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>4.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td>4.31</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>1.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td>6.69</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>2.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inference</td>
<td>6.02</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>1.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inductive Reasoning</td>
<td>8.17</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>2.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deductive Reasoning</td>
<td>7.00</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>2.70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Data analysis included all 42 experienced subjects.

<sup>a</sup>Reported statistical analysis of the CCTST norm sample reflected an Overall CT mean raw score of 15.89 and standard deviation of 4.46 on the 34 item test (Facione & Facione, 1993, p. 7).

Percentile rankings were also computed for each CCTST scale on the basis of suggested percentile rankings provided by the test developers regarding the norm population. Examination of these data reveal that overall the experienced nurses had the highest scores on the subscale, Inductive Reasoning, with a mean percentile ranking of 74.69 (SD = 21.80). The experienced group also had mean percentile rankings above 50 on all scales except for one of the six critical thinking measures. The score that fell below the 50th percentile overall (also the subscale with the the lowest percentile ranking) was that of Deductive Reasoning (percentile M = 45.60, SD = 28.60). This experienced nurse group's second highest percentile ranking was on the scale for Evaluation (M = 70.69, SD = 22.95). Table 37 summarizes...
the results of this analysis displaying mean, standard deviation, and lowest and highest scores on the percentile ranking for the Overall Cognitive Thinking (CT) and for each of the subscales on the CCTST Scale.

Table 37

CCTST Percentile Rank Scores for Experienced Professional Nurses

<table>
<thead>
<tr>
<th>CCTST Scale</th>
<th>Lowest % Rank</th>
<th>Highest % Rank</th>
<th>Mean % Rank</th>
<th>Stand. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall CT</td>
<td>3</td>
<td>99</td>
<td>60.74</td>
<td>26.31</td>
</tr>
<tr>
<td>Analysis</td>
<td>1</td>
<td>99</td>
<td>56.64</td>
<td>29.18</td>
</tr>
<tr>
<td>Evaluation</td>
<td>11</td>
<td>99</td>
<td>70.69</td>
<td>22.95</td>
</tr>
<tr>
<td>Inference</td>
<td>11</td>
<td>99</td>
<td>54.00</td>
<td>28.18</td>
</tr>
<tr>
<td>Inductive Reasoning</td>
<td>7</td>
<td>99</td>
<td>74.69</td>
<td>21.80</td>
</tr>
<tr>
<td>Deductive Reasoning</td>
<td>6</td>
<td>99</td>
<td>45.60</td>
<td>28.60</td>
</tr>
</tbody>
</table>

Note. Data analysis included all 42 experienced subjects.

Objective Seven

The seventh objective was to determine the critical thinking ability of expert nurses as measured by the CCTST in Overall Cognitive Skills and the five subscales of Analysis, Evaluation, Inference, Inductive and Deductive Reasoning. Analysis of expert group raw score means for Overall CT ($M = 17.48$, $SD = 3.60$) was higher than that reported for the norm sample on the same subscale ($M = 15.89$, $SD = 4.46$). Table 38 presents data calculated from the raw data and includes the mean, standard deviation, lowest, and highest of the overall scores and each of the subscores.
Table 38

CCTST Mean Raw Scores for Expert Professional Nurses

<table>
<thead>
<tr>
<th>CCTST Scale</th>
<th>Raw Score Means</th>
<th>Lowest Score</th>
<th>Highest Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Deviation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall CT</td>
<td>17.48&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>3.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td>4.42</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>1.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td>6.94</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>2.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inference</td>
<td>6.13</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>1.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inductive Reasoning</td>
<td>8.46</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>1.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deductive Reasoning</td>
<td>7.29</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>2.21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Data analysis included all 48 expert nurse subjects.

<sup>a</sup>Reported statistical analysis of the CCTST norm sample reflected an Overall CT mean raw score of 15.89 and standard deviation of 4.46 for the 34 item test (Facione & Facione, 1993, p. 7).

Mean percentile rankings for the expert group were also computed for each CCTST scale on the basis of suggested percentile rankings provided by the test developers regarding the norm population. Overall, the expert group was above the 50th percentile rank on all scales. The lowest ranking scale was that for Deductive Reasoning, near the 50th percentile (percentile $M = 50.25$, $SD = 24.62$). The highest mean percentile ranking was above the 75th percentile for the Inductive Reasoning scale (percentile $M = 78.00$, $SD = 18.60$). This group's second highest percentile ranking was on the Evaluation measure ($M = 72.92$, $SD = 22.54$).

Table 39 presents the CCTST percentile rankings for all 48 participating expert professional nurses included in the data analysis regarding critical thinking.
Table 39

CCTST Percentile Rank Scores for Expert Professional Nurses

<table>
<thead>
<tr>
<th>CCTST Scale</th>
<th>Lowest % Rank</th>
<th>Highest % Rank</th>
<th>Mean % Rank</th>
<th>Stand. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT Overall</td>
<td>6</td>
<td>96</td>
<td>65.25</td>
<td>24.23</td>
</tr>
<tr>
<td>Analysis</td>
<td>4</td>
<td>9</td>
<td>58.67</td>
<td>28.34</td>
</tr>
<tr>
<td>Evaluation</td>
<td>23</td>
<td>99</td>
<td>72.92</td>
<td>22.54</td>
</tr>
<tr>
<td>Inference</td>
<td>11</td>
<td>97</td>
<td>57.00</td>
<td>23.81</td>
</tr>
<tr>
<td>Inductive Reasoning</td>
<td>22</td>
<td>99</td>
<td>78.00</td>
<td>18.60</td>
</tr>
<tr>
<td>Deductive Reasoning</td>
<td>2</td>
<td>99</td>
<td>50.25</td>
<td>24.62</td>
</tr>
</tbody>
</table>

Note. Data analysis included all 48 expert subjects.

Objective Eight

The eighth objective sought to compare novice, experienced, and expert professional nurses on the following demographic characteristics: educational preparation, age, gender, and ethnicity. As all of the novice nurse sample received bachelor of science degrees in December 1994, and none reported any higher level of education, they were not included in the comparison regarding educational preparation.

Analysis of study findings regarding educational levels for the samples of experienced and expert nurses revealed that three-fourths (n = 68 or 77%) of these nurses held bachelor's degrees, and just under half (n = 40 or 44%) held a master's degree. Chi-square analysis was used to detect any significant differences among the groups regarding educational preparation. There were no significant differences
in education level found between the experienced and expert nurse groups (see summary Table 40).

Table 40

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Experienced Nurses</th>
<th>Expert Nurses</th>
<th>Row Total</th>
<th>X² Valuea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>p</td>
</tr>
<tr>
<td>Diploma</td>
<td>16</td>
<td>20</td>
<td>36</td>
<td>.12</td>
</tr>
<tr>
<td></td>
<td>38</td>
<td>42</td>
<td>40</td>
<td>.73</td>
</tr>
<tr>
<td>ADN</td>
<td>6</td>
<td>4</td>
<td>10</td>
<td>.80</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>8</td>
<td>11</td>
<td>.37</td>
</tr>
<tr>
<td>BSN</td>
<td>32</td>
<td>29</td>
<td>61</td>
<td>2.55</td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>60</td>
<td>68</td>
<td>.11</td>
</tr>
<tr>
<td>Other BS</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>.83</td>
</tr>
<tr>
<td>Masters in Nursing</td>
<td>20</td>
<td>16</td>
<td>36</td>
<td>1.90</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>33</td>
<td>40</td>
<td>.17</td>
</tr>
<tr>
<td>Other Masters</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>.89</td>
</tr>
<tr>
<td>Doctorate</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>2.72</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>.10</td>
</tr>
<tr>
<td>Column Total</td>
<td>42</td>
<td>48</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Percent</td>
<td>47</td>
<td>53</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Note. The novice group was not included in this comparison because they all had only one level of education, baccalaureate.

aOne degree of freedom.

In terms of age comparisons, analysis of variance (ANOVA) was used to determine if there were significant age differences among the novice, experienced and expert professional nurse groups. A significant F value was found, indicating at least one significant difference existed among the three groups, F (2, 125) = 53.66,
Table 41 presents the analysis of variance information regarding the significant age finding.

### Table 41

**Analysis of Variance for Respondents' Age by Sample Nurse Group**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2</td>
<td>3808.10</td>
<td>53.66</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>125</td>
<td>70.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Groups included novice, experienced and expert nurses for total of 128.

*Finding was significant beyond the .001 level.

Tukey's post hoc multiple comparison test was used to follow up the significant F value to determine specifically which groups were different. Results of this procedure revealed that the experienced and expert groups were significantly older than the novice group, but they were not different from one another. For the entire sample of 128 subjects, the minimum age was 23 years and maximum age was 69 years, with a mean age of 43 years (SD = 11.39 years). Table 42 provides the mean ages for the three groups and identifies the significant comparisons.

### Table 42

**Mean Age in Years for Novice, Experienced, and Expert Professional Nurse Study Participants**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>38</td>
<td>31.16^c</td>
<td>7.52</td>
</tr>
<tr>
<td>Experienced</td>
<td>42</td>
<td>47.21^d</td>
<td>8.67</td>
</tr>
<tr>
<td>Expert</td>
<td>48</td>
<td>48.67^e</td>
<td>8.86</td>
</tr>
</tbody>
</table>

*(table con'd.)*
Group | Number | Mean | Standard Deviation
---|---|---|---
Total | 128 | 42.99 | 11.39

**Note.** \( F (2 \text{ & } 125) = 53.66, \ p = < .001. \)

\( a, b \) Means not sharing a common superscript are significantly different at \( p < .05 \) or less (Tukey Test).

\( c \) Maximum age was 46, minimum was 23 years.

\( d \) Maximum age was 69, minimum was 29 years.

\( e \) Maximum age was 68, minimum was 32 years.

\( f \) Overall sample mean = 42.99, \( \text{SD} = 11.39 \), maximum = 69, minimum = 23.

Possible differences in gender frequency between the groups were also investigated. Table 43 summarizes findings regarding the gender data obtained from the novice, experienced, and expert groups.

**Table 43**

**Gender of Novice, Experienced and Expert Professional Nurse Participants**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Novice Nurses</th>
<th>Experienced Nurses</th>
<th>Expert Nurses</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n )</td>
<td>( n % )</td>
<td>( n )</td>
<td>( n % )</td>
</tr>
<tr>
<td>Females</td>
<td>35</td>
<td>92</td>
<td>42</td>
<td>100</td>
</tr>
<tr>
<td>Males</td>
<td>3</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Column Total</td>
<td>38</td>
<td>42</td>
<td>48</td>
<td>128</td>
</tr>
<tr>
<td>Percent</td>
<td>30</td>
<td>33</td>
<td>38</td>
<td>100</td>
</tr>
</tbody>
</table>

**Note.** \( \chi^2(2) = 3.62, \ p = .16, \) not significant.
Regarding the gender data in Table 43, there were no males in the experienced group. There were 121 females (95%) and 7 males (6%) in the total study population of nurses. The males were almost equally represented in the novice (n = 3) and expert (n = 4) groups. Chi-square analysis did not, however, reveal significant differences among the groups, $\chi^2(2) = 3.62, p = .16$.

An examination of information regarding the participants' ethnicity revealed that the majority of the nurses were Caucasian (N = 117 or 91%), whereas the non-Caucasian population numbered 11 (9%). The smallest group represented overall was Asian, with one person (.1%) from the novice population. As seen in Table 44, a Chi-square analysis, $\chi^2(6) = 6.68, p = .35$, indicated there were no significant differences among the three study populations regarding ethnic background of the subjects.

**Table 44**

<table>
<thead>
<tr>
<th>Ethnic Group</th>
<th>Novice</th>
<th>Experienced</th>
<th>Expert</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>African American</td>
<td>3/8</td>
<td>2/5</td>
<td>1/2</td>
<td>6/5</td>
</tr>
<tr>
<td>Asian</td>
<td>1/3</td>
<td>0/0</td>
<td>0/0</td>
<td>1/1</td>
</tr>
<tr>
<td>Caucasian</td>
<td>34/90</td>
<td>39/93</td>
<td>44/92</td>
<td>117/91</td>
</tr>
<tr>
<td>Native American</td>
<td>0/0</td>
<td>1/2</td>
<td>3/6</td>
<td>4/3</td>
</tr>
<tr>
<td>Column Total</td>
<td>38/30</td>
<td>42/33</td>
<td>48/38</td>
<td>128/100</td>
</tr>
</tbody>
</table>

**Note.** $\chi^2(6) = 6.68, p = .35.$
Objective Nine

Comparison of Levels of Critical Thinking Ability Among Groups of Nurses

The researcher hypothesized that expert professional nurses would exhibit higher levels of critical thinking abilities, as measured by the CCTST, than would novice and experienced professional nurses in the following areas of Cognitive Skills: Overall CT, Analysis, Inference, Evaluation, Inductive Reasoning, and Deductive Reasoning. Overall, the mean percentile rankings for each of the study samples revealed that all three groups were above the 50th percentile on all scales except for that of Deductive Reasoning. All three samples scored the lowest mean percentile ranking on Deductive Reasoning. The highest percentile ranking category for each of the samples was for Inductive Reasoning. In general, the trend was that the expert group was above the 50th percentile on all CCTST scale scores, and above the 75th percentile on the Inductive Reasoning scale (percentile $M = 78.00$, $SD = 18.60$).

The CCTST Test Manual (Facione & Facione, 1993), recommended that, for small study samples or for samples that are not normally distributed, test scores be converted to normalized standard scores before parametric statistical analysis and interpretation are undertaken. The Kolmogorov-Smirnov (K-S) Goodness of Fit Test (Glass & Hopkins, 1984, p. 285; Hays, 1988, p. 816) was employed to determine normality of study population distributions regarding Overall Cognitive Skills of the CCTST. Results of the K-S tests revealed that each of the three nursing samples and the overall study sample were not significantly different from a normally distributed population. Outcomes of the Kolmogorov-Smirnov Goodness of Fit Test regarding CCTST Overall Cognitive Skills for each population were as follows: Novice: $K-S Z = .718$, $p = .680$; Experienced: $K-S Z = .672$, $p = .757$; Expert: $K-S Z = .632$, $p = .819$; Total study sample ($N = 128$): $K-S Z = 1.055$, $p = .216$. 

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
According to the CCTST publishers, California Academic Press (Dr. N. Facione, personal communication, June 6, 1995), unless the observed study population substantially deviates from a normalized distribution, normalized scores will differ little from non-normalized scores. Although the K-S test results revealed that all of the populations in the study were normally distributed, the researcher elected to convert the CCTST raw scores to percentile scores for analysis because of the small sample sizes (n = 38, 42, & 48) included in the study population.

Analysis of variance (ANOVA) was used to determine if there were significant differences in the critical thinking measures among the novice, experienced, and expert nurse groups. The groups were not found to be significantly different on the overall critical thinking measure. In addition, no significant differences were found on four of the five sub-scales. However, on the subscale of Inductive Reasoning, a significant F value was found, F (2 & 125) = 4.22, p = .02, indicating that at least one significant difference existed among the three groups. To confirm these findings, ANOVAs were also calculated on raw score means for each of the measures with overall similar outcomes (see Appendix X for raw score test results). Table 45 presents ANOVA information regarding the significant Inductive Reasoning finding using percentile scores.

Table 45

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>1796.20</td>
<td>4.22</td>
<td>.02</td>
</tr>
<tr>
<td>Within groups</td>
<td>125</td>
<td>425.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. ANOVA results from data analysis of Inductive Reasoning raw scores were similar, F = 3.79, p = .03.
To determine specifically which groups were different, the Tukey's post hoc multiple comparison test was used to follow up the significant \( F \) value. Findings of this procedure revealed that the expert nurse group was significantly higher on the Inductive Reasoning score than the novice nurse group, but that no other pairwise comparisons were significant. Table 46 presents the critical thinking mean percentile scores of all three study samples and the significant finding regarding Inductive Reasoning.

**Table 46**

Mean Percentile Critical Thinking Scores for Novice, Experienced, and Expert Nurses

<table>
<thead>
<tr>
<th>CCTST Scale</th>
<th>Novice Mean % (SD)</th>
<th>Experienced Mean % (SD)</th>
<th>Expert Mean % (SD)</th>
<th>( F )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Cognitive Skills (CT)</td>
<td>56.34 (23.25)</td>
<td>60.74 (26.31)</td>
<td>65.25 (24.23)</td>
<td>1.39</td>
<td>.25</td>
</tr>
<tr>
<td>Analysis</td>
<td>58.34 (27.86)</td>
<td>56.64 (29.18)</td>
<td>58.67 (28.34)</td>
<td>.06</td>
<td>.94</td>
</tr>
<tr>
<td>Evaluation</td>
<td>62.58 (23.14)</td>
<td>70.69 (22.95)</td>
<td>72.92 (22.54)</td>
<td>2.32</td>
<td>.10</td>
</tr>
<tr>
<td>Inference</td>
<td>54.37 (25.59)</td>
<td>54.00 (28.18)</td>
<td>57.00 (23.81)</td>
<td>.18</td>
<td>.83</td>
</tr>
<tr>
<td>Deductive Reasoning</td>
<td>49.11 (24.02)</td>
<td>45.60 (28.60)</td>
<td>50.25 (24.62)</td>
<td>.39</td>
<td>.68</td>
</tr>
<tr>
<td>Inductive Reasoning</td>
<td>65.26(^{a}) (21.73)</td>
<td>74.69(^{b}) (21.80)</td>
<td>78.00(^{b}) (18.60)</td>
<td>4.22</td>
<td>.02</td>
</tr>
</tbody>
</table>

Note. ANOVA df = 2 & 125.

\(^{a,b}\) Means not sharing a common superscript are significantly different at \( p < .05 \) or less (Tukey Test).

The hypothesis that expert nurses would exhibit higher levels of critical thinking abilities than novice and experienced professional nurses, as measured by
the CCTST, was only partly supported by the results of this study. The expert nurses were found to exhibit higher mean percentile critical thinking scores than the novice nurses on all measures of critical thinking, but the difference was significant only for the subscale of Inductive Reasoning. According to the CCTST Test Manual (Facione & Facione, 1993), the Inductive subscale "means an argument's conclusion is purportedly warranted, but not necessitated, by the assumed truth of its premises" (p. 4).

The lowest scores for all three groups were on the measure for Deductive Reasoning. The expert nurses' critical thinking percentile means were higher than those of the experienced group on all critical thinking measures, but they were not significantly different from the experienced nurse group on any CCTST scale.

Determination of Learning Style

Objectives ten, eleven and twelve were to determine the predominant learning style of novice, experienced, and expert professional nurses respectively, using the Kolb Learning Style Inventory, 1985 (LSI). As two students returned incorrectly completed LSI tests, these two data sets were excluded from the determination of learning style part of the data analysis. There were 36 complete LSI instruments included in data analysis for the novice group. All 42 participants in the experienced nurse group correctly completed the LSI instrument, therefore all 42 of these instruments were included in data analysis for the experienced nurse group. As one member of the expert sample returned an incorrectly completed LSI instrument, it was excluded from data analysis and the 47 completed LSI instruments were used in final analysis for the expert nurse group. A total of 125 correctly completed LSI instruments were included in data analysis pertaining to learning styles in this study.

Procedures for scoring the LSI were followed in accordance with information provided in the LSI Self-Scoring Inventory and Interpretation Booklet (McBer &
Company, 1985). Subscale scores were computed by summing instrument column totals for Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). Next, two combination scores, AC-CE (CE score subtracted from AC score) and AE-RO (RO subtracted from AE score) were computed. These two resulting combination scores were used to determine a "data point" for placement of each subject in one of four predominant learning style quadrants of the LSI scales.

**Objective Ten**

The tenth objective was to determine the predominant learning style of novice professional nurses as measured by the LSI. Results of data analysis regarding the 36 novice participants indicated that the Assimilator learning style slightly predominated (n = 11 or 30.6%). The Assimilator learning style purportedly demonstrates ability in the modes of reflective observation and of abstract conceptualization, therefore using observational and thinking skills. The second most predominant style among the novice group was that of Accommodator (n = 10 or 27.8%), followed by Converger and Diverger styles (see Table 47).

**Table 47**

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assimilator</td>
<td>11</td>
<td>30.6</td>
</tr>
<tr>
<td>Accommodator</td>
<td>10</td>
<td>27.8</td>
</tr>
<tr>
<td>Converger</td>
<td>8</td>
<td>22.2</td>
</tr>
<tr>
<td>Diverger</td>
<td>7</td>
<td>19.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>36(^a)</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

\(^a\)Incorrectly completed instruments from two students were omitted from data analysis.
**Objective Eleven**

The eleventh objective was to determine the predominant learning style of experienced professional nurses as measured by the LSI. Results of data analysis regarding the 42 experienced nurses indicated a predominant learning style of Assimilator (n = 18 or 42.9%). The second most predominant style for this group of nurses was that of Converger (n = 10 or 23.8%), followed by Accommodator and Diverger styles (see Table 48).

**Table 48**

Learning Styles of Experienced Professional Nurses

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assimilator</td>
<td>18</td>
<td>42.9</td>
</tr>
<tr>
<td>Converger</td>
<td>10</td>
<td>23.8</td>
</tr>
<tr>
<td>Accommodator</td>
<td>8</td>
<td>19.0</td>
</tr>
<tr>
<td>Diverger</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Objective Twelve**

The twelfth objective of this study was to determine the predominant learning style of expert professional nurses as measured by the LSI. Overall, the nurses in this group were found to have fairly equally distributed learning styles. The slightly predominant learning style emerging from data analysis of the expert group was that of Accommodator (n = 13 or 27.7%). This learning style purportedly demonstrates ability in the modes of Active Experimentation and Concrete Experience, therefore learning primarily from "hands-on" experience emphasizing personal involvement with people, relying on ability to be open-minded and adaptable to change. The second most predominant style for the expert nurses followed closely and was
termed Diverger (n = 12 or 25.5%), with the remaining respondents equally divided between Assimilator and Converger learning styles (see Table 49).

Table 49

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodator</td>
<td>13</td>
<td>27.7</td>
</tr>
<tr>
<td>Diverger</td>
<td>12</td>
<td>25.5</td>
</tr>
<tr>
<td>Assimilator</td>
<td>11</td>
<td>23.4</td>
</tr>
<tr>
<td>Converger</td>
<td>11</td>
<td>23.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>47\textsuperscript{a}</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

\textsuperscript{a}An incorrectly completed instrument from one expert nurse was omitted from data analysis.

Objective Thirteen

Comparisons of Nursing Groups on Predominant Learning Style

Initial data analysis of each of the sample groups revealed predominance of the Assimilator style among the novice and experienced nurses, and a slightly predominant Accommodator style for the expert nurse group. Objective thirteen sought to compare novice, experienced, and expert professional nurses on predominant learning style as measured by the LSI. As the dependent variable of learning style was measured on a categorical scale, the Chi-square procedure was used in data analysis to determine if the variable learning style and nurse group were independent. Data analysis revealed no significant association between the variable of learning style and novice, experienced or expert group: $X^2(6, \ N = 125) = 7.20$, $p = .55$. Table 50 presents overall summary data regarding the learning styles identified for the entire sample of professional nurses in the study.
### Table 50

**Predominant Learning Style of Professional Nurses Studied**

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Professional Nurse Group</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Novice</td>
<td>Experienced</td>
<td>Expert</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td><strong>Accommodator</strong></td>
<td>10</td>
<td>28</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>22</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>19</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>31</td>
<td>18</td>
<td>43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>36^c</td>
<td>29</td>
<td>42</td>
<td>47</td>
</tr>
</tbody>
</table>

*Note.* Test statistic: $X^2(6, N = 125) = 7.20, p = .55$. Data from three respondents (2 novice and 1 expert) were excluded from the analysis due to missing values.

^aColumn percentage.

^bRow marginals.

^cColumn marginals.

---

**Exploratory Model Explaining Critical Thinking in Nurses**

**Objective Fourteen**

The final objective in this study hypothesized a model explaining a significant portion of the variance in professional nurses' overall critical thinking ability as measured by the CCTST: Overall Cognitive Skills. This hypothesis was tested using multiple regression analysis, with critical thinking ability (CCTST: Overall Cognitive Skills, percentile means) as the dependent variable, and the other
variables treated as independent variables. The independent variables included in this analysis were status level of nurse (novice, experienced, and expert), four learning style (LSI) categories (Accommodator, Assimilator, Converger, and Diverger), and demographic variables. The demographic variables included: age, ethnicity, years of experience, certification, and master's degree education. (Gender was not included due to an inadequate sample size of 7 males in the study).

Variables treated as independent variables were entered into the regression analysis in two successive steps (blocks), followed by stepwise entry of the remaining variables because of the exploratory nature of this part of the study. The independent variables entered in the first regression step were status of nurse group: experience and expert status. As status was regarded as categorical, the single category of novice nurse status level was designated as the reference group in the analysis. The variables entered in the second step were the four categories of predominant learning style, with the Diverger style designated as the reference group in this analysis. Finally, the demographic variables were added stepwise in the regression equation. In this multiple regression analysis, variables were added that increased the explained variance by one percent or more as long as the regression equation remained significant.

As the coding of categorical data requires the development of mutually exclusive and exhaustive categories, a binary (0,1) coding process of dummy variables ("dummy coding") was used to construct variables used in the multiple regression analysis (Hardy, 1993; Hays, 1988). In this process, the respondents of a particular category are assigned a code of 1; and respondents not in that category are coded as 0. In this study, two variables were constructed from data regarding status level of nurses. Variables created were whether or not respondents were experienced, and whether or not respondents were experts. According to Hardy (1993), for each categorical variable, a single category must be designated as a
reference group and the category not named as a dummy variable serves as the reference group (p. 8). In this step of the regression, the novice group served as the reference group. Dummy coding was also used for the variable, learning styles, with the Diverger category serving as the reference group.

The variables entered into the regression model first were dummy coded variables of status level of nurses: experienced and expert. These variables explained a total of 2.18% of the variance \( (F = 1.3921, p = .25) \) in overall critical thinking ability of professional nurses in the study sample. Status level of nurses was, therefore, not found to be a significant explanation for the variance in critical thinking ability as expressed by the overall CCTST measure.

Variables entered into the regression model in the second phase were the four dummy coded learning style categories: Accommodator, Assimilator, Converger, and Diverger as the reference group. All four learning style variables remained in the regression model, explaining a total of 4.19% of the variance \( (F = 1.6609, p = .15) \) in overall critical thinking ability, but were not found to be significant contributors in explaining the variance in critical thinking ability (CT Overall).

The remaining demographic independent variables were then entered stepwise into the regression model: ethnic group, master's degree education, professional certification, years of experience, and age. None of these demographic variables remained in the regression model.

The final equation, consisting of five variables, explained 6.37% of the variance in overall critical thinking ability of professional nurses. The five contributing variables entered into the equation were as follows: nurse status level (expert, experienced), and three dominant learning styles (Converger, Accommodator, Assimilator). The regression model, however, did not explain a significant portion of variance related to critical thinking in this sample. The results of the final multiple regression analysis are presented in Table 51.
### Table 51

**Multiple Regression Analysis of Critical Thinking for Study Sample of Professional Nurses**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>MS</th>
<th>F-ratio</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>5</td>
<td>990.0226</td>
<td>1.661</td>
<td>.15</td>
</tr>
<tr>
<td>Residual</td>
<td>122</td>
<td>596.0810</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Variables in the Equation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Multiple R</th>
<th>$R^2$ Change</th>
<th>F Change</th>
<th>p Change</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert$^a$</td>
<td>.1476</td>
<td>.0218</td>
<td>1.392</td>
<td>.252</td>
<td>.1297</td>
</tr>
<tr>
<td>Experienced$^b$</td>
<td>.1476</td>
<td>.0218</td>
<td>1.392</td>
<td>.252</td>
<td>.0838</td>
</tr>
<tr>
<td>Converger$^c$</td>
<td>.2524</td>
<td>.0419</td>
<td>1.822</td>
<td>.147</td>
<td>.2593</td>
</tr>
<tr>
<td>Accommodator$^d$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assimilator$^e$</td>
<td>.2524</td>
<td>.0419</td>
<td>1.822</td>
<td>.147</td>
<td>.2593</td>
</tr>
</tbody>
</table>

#### Variables Not in the Equation

<table>
<thead>
<tr>
<th>Variables</th>
<th>t</th>
<th>Sign t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of Experience$^f$</td>
<td>-.007</td>
<td>.994</td>
</tr>
<tr>
<td>Age$^g$</td>
<td>-1.926</td>
<td>.057</td>
</tr>
<tr>
<td>Ethnic</td>
<td>-.455</td>
<td>.650</td>
</tr>
<tr>
<td>Education/Masters$^i$</td>
<td>.345</td>
<td>.730</td>
</tr>
<tr>
<td>Certification$^j$</td>
<td>.689</td>
<td>.492</td>
</tr>
</tbody>
</table>

*One expert subject's CCTST responses were incomplete and were thus excluded.

$^a$Designated expert nurse.

$^b$Experienced nurse.

$^c$Predominant learning style of Converger.
dPredominant learning style of Accommodator.

ePredominant learning style of Assimilator.

fNumber of years of clinical experience.

gBirth year subtracted from 1995.

hEthnic group.

iReported masters degree education.

jEarned professional credentials beyond RN licensure.
CHAPTER 5
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Purpose and Study Objectives

This exploratory study included an ex post facto research design using a descriptive survey technique. The purpose of this study was to compare samples of novice, experienced and expert professional nurses in terms of their critical thinking ability. The study also sought to identify the influence of learning styles and other selected demographic characteristics on the critical thinking ability of professional nurses. The specific research objectives and hypotheses designed to guide the researcher in addressing the purpose of the study were to:

1. describe a sample of novice professional nurses on selected demographic characteristics;
2. describe a sample of experienced professional nurses on selected demographic characteristics;
3. describe a sample of expert professional nurses on selected demographic characteristics;
4. determine the critical thinking ability of a sample of novice nurses as measured by the California Critical Thinking Skills Test: College Level, 1990 (CCTST).
5. test the hypothesis of a positive relationship between critical thinking ability as reflected on the Overall Cognitive Skills scale of the CCTST and cumulative grade point average in the study sample of novice nurses.
6. determine the critical thinking ability of a sample of experienced nurses as measured by the CCTST.
7. determine the critical thinking ability of a sample of expert professional nurses as measured by the CCTST.
8. compare the sample novice, experienced, and expert professional nurses on selected demographic characteristics.

9. test the hypothesis that a sample of expert professional nurses would exhibit higher levels of critical thinking abilities, as measured by the CCTST, than would samples of novice and experienced professional nurses in each of the following areas: Overall Cognitive Skills, Analysis, Inference, Evaluation, Inductive Reasoning, and Deductive Reasoning.

10. determine the predominant learning style of a sample of novice professional nurses as measured by the Kolb Learning Style Inventory, 1985 (LSI).

11. determine the predominant learning style of a sample of experienced professional nurses as measured by the Kolb LSI.

12. determine the predominant learning style of a sample of expert professional nurses as measured by the Kolb LSI.

13. compare the sample of novice, experienced, and expert professional nurses on predominant learning style as measured by the Kolb LSI.

14. test the hypothesis that a model exists which explains a significant portion of the variance in overall critical thinking ability (CCTST Overall Cognitive Skills) of professional nurses, and the variables of expert status and learning style preference are significant contributors to that model.

Population and Samples

The target population for this study was professional nurses. Three samples of professional nurses were selected for use in this study, representing three levels of experience and skill: novice, experienced and expert nurses. A minimum sample of 36 nurses for each experience level was determined a priori. A convenience sample of 38 novice nurses, a random sample of 42 experienced nurses, and a purposive sample of 48 expert nurses comprised the overall study sample of 128 professional nurses.
Instrumentation

The instrument used in this study consisted of three parts. The first part of the instrument consisted of the California Critical Thinking Skills Test (1990) which was used to measure respondents' Overall Cognitive Skills and five subskills. The second part of the instrument consisted of the Kolb Learning Style Inventory (1985). This instrument was used to determine respondents' predominant learning style. The third part of the instrument was a researcher developed Participant Profile Form which included questions regarding demographic information. Cumulative grade point average information was additionally obtained from the novice participants' university academic records.

Data Collection

After obtaining informed consent, data were collected from the novice sample through on-site administration of the study instruments at the group's school of nursing. Some of the novice participants \( n = 17 \) were unable to remain on campus to complete the study instruments. They subsequently completed them at home, and returned them by mail - following the same process as for the experienced and expert samples.

Data were collected from the experienced and expert nurse samples by mailed questionnaire. The initial mailing consisted of a cover letter and a stamped, self-addressed Participant Response Form for return. The researcher contacted all consenting respondents by telephone within one week after return of the Participant Response Form. The purpose and expectations of study participation were explained, along with verification of address and eligibility criteria. Consenting respondents were next mailed a cover letter, directions, the research instruments, a self-addressed stamped envelope, and a small packet of spiced tea. Results of the study were made available to all participants upon request if they provided their mailing address on an enclosed note card. A letter of thanks and a U.S. Postal
Service commemorative nursing stamp were mailed to all those who returned study instruments.

Non-response follow-up procedures for the novice sample entailed a follow-up letter, a post card, then each remaining non-respondent was contacted by telephone to encourage their participation in the study. Forty-nine senior nursing students were asked to participate. There were 45 (92%) students who agreed to participate, and 38 (78%) students who completed all three research instruments. There was an 84% response rate among those students who consented and returned instruments.

Non-response follow-up procedures for the experienced and expert nurse samples included a post card following the initial letter, a post card following the research materials sent to consenting participants, and each remaining non-respondent received a telephone contact to encourage their participation in the study. There were 102 experienced nurses who were initially asked to participate. Among the 44 (43%) experienced nurses who agreed to participate, 42 (41%) returned completed instruments. There were 80 expert nurses initially asked to participate in the study, with 50 (63%) consenting to complete instruments, and 48 (60%) returning completed materials. For those experienced and expert nurses who consented to participate and received research instruments, however, there was a 96% return response rate.

**Data Analysis**

Descriptive statistics were used to describe the demographic characteristics of study participants. The Chi-square and ANOVA tests were used for comparisons as appropriate. Pearson's Product Moment Coefficient of Correlation was used to examine relationships. Multiple regression analysis was used in analysis of the hypothesis of a model explaining a significant portion of the variance in critical thinking ability of professional nurses. An alpha level of .05 was set a priori to
establish statistical significance in this study. Data analysis was completed by computer using the SPSS Data Analysis System (SPSS, 1990).

Findings

The following is a summary of the major findings pertaining to each of the objectives guiding the study:

The first objective of the study was to describe a sample of novice professional nurses on selected demographic characteristics. It was determined that the students ranged in age from 23 to 46 years, with a mean age of 31.2 years. They were predominantly female (92%), with only 3 (8%) indicating they were male. The majority of the respondents were Caucasian (89%), with the remaining students identifying themselves as African American (8%) or Asian (3%). Other educational levels reported by this group were 3 with baccalaureate degrees, 2 with practical nurse education, and 1 with an associate degree. The mean number of years since completion of prior degrees was reported as 13.5 years ($SD = 10.61$ years). Six students (16%) reported holding some form of professional credentials, i.e. licensed practical nurse, phlebotomy technician, medical technologist, and registered nurse (2 students returned instruments after graduation, following their RN licensure exam). Approximately 55% of the students were employed and reported a mean of 22.3 working hours a week during the past year. In terms of clinical working experience, the respondents reported a minimum of 1 year and a maximum of 20 years of work experience. The two students with LPN experience reported 11 and 20 years of experience. The remaining 95% of the novice sample reported having 5 years or less of clinical nursing experience.

The hospital was cited most frequently (16%) by the novice group as their employment setting, with the physicians' office (8%) as the next frequent setting of employment. The most prevalent predominant clinical specialty area of employment reported by the novice sample was Medical/Surgical/Adult clinical
nursing (33%). A wide variety of clinical specialty areas of employment experience were reported by the novice group, with a mean of approximately 2.6 years of clinical experience reported. Medical/Surgical/Adult clinical nursing was also the most frequently reported (26% of students) current clinical experience specialty area, with 77% of the sample reporting experience in that setting for one year or less. Only 3 current position titles emerged when this information was requested: nurse aide/tech/intern (74%), RN applicant (21%), and LPN (5%). Among the students, 83% of the students had been in their position for one year or less.

The mean grade point average calculated for the novice sample was 2.95 (SD = .25) on a 4.0 scale. The minimum GPA mean score was 2.51, and maximum GPA mean score was 3.52.

The second objective was to describe a sample of experienced professional nurses on selected demographic characteristics. It was determined that the mean age for the experienced nurses was 47.21 years (SD = 8.67), with age of respondents ranging from 29 to 69 years. Participants in this sample were all women and were predominantly age 40 and above (n = 34 or 81%). The majority of these nurses indicated they were Caucasian (n = 39 or 93%), with three other nurses reporting they belonged to the African American and Native American groups.

Regarding education, the majority (n = 32 or 76%) of the experienced nurses reported holding a baccalaureate degree in nursing, almost half had masters degrees (n = 20 or 48%), and over one-third (n = 16 or 38%) had completed a diploma program in nursing. Those with a diploma had completed it a mean of 32.85 years ago (SD = 8.61 years ago), those with a BSN degree had completed it a mean of 16.7 years ago (SD = 6.24 years ago), and those with a MSN degree had completed it a mean of 7.82 years ago (SD = 5.83 years ago). There were 9 nurses (21%) who reported current enrollment in some level of formal education program. More than half the experienced respondents (n = 26 or 62%) reported holding
professional certification, or other credentials, in twelve different categories. These credentials were supplementary to RN nurse licensure.

All of the experienced nurses were employed, with the majority (n = 36 or 86%) reporting full-time employment in nursing. This nurse sample reported working an average of 29.3 (SD = 15.3) hours a week, with 33% (14) reporting working 40 hours a week, and overall employment hours ranging from 8 to 60 hours a week. In terms of clinical nursing experience, their experience ranged from 5 to 30 years, with most nurses reporting working for 16 to 20 years. It was determined that 90% (n = 39) of the nurses reported the hospital as their most frequent work setting, followed by nursing education (n = 17 or 40%), and then home health (n = 13 or 31%). These nurses reported the category for their longest period of experience as community/public health (35 years), followed by the hospital (30 years), and the mental health setting (20 years). Respondents in the experienced nurse sample reported working in 14 predominant clinical nursing specialty areas, with the most prevalent being that of psychiatric/mental health nursing (n = 7 or 17%). Three other categories of equal prevalence reported were: a) perinatal/gynecology/maternal-infant, b) adult medical/surgical, and c) critical/coronary/burn care. Length of time reported in their predominant clinical area ranged from 5 to 35 years, with a mean of 13.85 (SD = 7.05) years of practice.

In terms of their current clinical specialty area, the most frequently reported category, among the 20 specialty areas reported for this group, was again psychiatric/mental health (n = 6 or 15%), followed by adult medical/surgical nursing (n = 5 or 12%). Mean number of years of employment in their current specialty area was reportedly 10.61 years (SD = 8.65 years).

Finally, the experienced nurse sample reported 8 clinical work position titles, with nearly one-fourth indicating they were Educators (nursing school faculty = 10 or 24%), followed equally (n = 7 or 17% each) by Nurse Manager (middle level
management, i.e. charge nurse) and Nursing Administrator (high level management, i.e. director of nursing). Nearly three-fourths of this nurse sample (n = 31 or 74%) had been in their position for 5 years or less, with over one-fourth (n = 12 or 29%) reportedly in their positions for one year or less.

The third objective was to describe a sample of expert professional nurses on selected demographic characteristics. It was determined that the age range for the expert nurse sample was 32 to 68 years, with mean age of 48.67 years (SD = 8.86). The majority of these nurses reported they were female (n = 44 or 92%) and two (4%) reported they were male. The group was predominantly Caucasian (n = 44 or 92%), with 4 respondents (8%) indicating they belonged to the Native American and African American groups.

In terms of educational preparation for the expert nurse sample, findings revealed that 42% (n = 20) had completed their initial nursing education at the diploma level. Over one-half of the nurses (n = 29 or 60%) had completed a BSN degree, and 43% (n = 21) reported holding degrees at the master and doctorate levels. The only 3 participants holding doctorates in the entire study sample were in the expert nurse group. These nurses reported holding the Ed.D. (2) and Ph.D. (1) degrees. There were 8 (17%) respondents who reported current enrollment at the baccalaureate, masters, or doctorate levels of education. Those nurses initially graduating with a diploma had completed it a mean of 27.74 years ago (SD = 10.88), and two had completed it 45 years ago. Those with ADN degrees had completed their programs a mean of 19 (SD = 7.25) years ago, BSN degree completions were a mean of 20.6 (SD = 10.9) years ago, MSN degree completions were a mean of 17.7 (SD = 12.1) years ago, and doctorates were a mean of 7.67 (SD = 6.51) years ago. Regarding professional credentials beyond RN licensure, most of the expert respondents (n = 46 or 96%) reported holding professional certification (20 separate categories) or other professional credentials.
Findings regarding employment for the expert nurse sample indicated that the majority of nurses (n = 43 or 90%) reported full time employment in nursing, averaging 34.31 (SD = 17.88) hours a week in clinical nursing during the past year. Nearly one-half (n = 20 or 42%) of this group reported working 40 hours a week, with a range from 8 to 98 hours a week reported. The nurses indicated having from 6 to 30 years of clinical nursing experience, with the employment category of greatest prevalence being that of 21 to 25 years. The most frequently reported setting of clinical nursing experience was the hospital (n = 46 or 96%), followed by nursing education (n = 17 or 35%), and home health (n = 11 or 23%). Clinical experience ranged from 1 to 38 years in a variety of settings, especially the hospital (38 years, M = 14.17, SD = 10.20), nursing education (31 years, M = 12.44, SD = 9.83), and the physician's office (30 years, M = 6.44, SD = 9.24). (Discrepancies in ranges for years of clinical work experience reported may be due to non-respondent response to one item and subsequent response to a related item).

Regarding predominant clinical special area reported by the expert nurse sample, there were 16 specialty areas reported, with the most prevalent category being adult medical/surgical nursing (n = 11 or 23%), followed by perinatal/gynecology/maternal-infant nursing (n = 5 or 10%). The nurses reported experience in their specialty area ranging from 4 to 38 years, with a mean of 16.28 (SD = 7.69) years.

In terms of their current clinical specialty area, responses reflected 19 specialty areas, especially adult medical/surgical nursing (n = 7 or 15%), followed by perinatal/gynecology/maternal-infant nursing (n = 5 or 11%), and clinic/ambulatory care nursing (n = 4 or 9%). The reported range in their current specialty area was from 2 to 38 years, with a mean of 13.98 (SD = 8.68) years.

Regarding the title of their current nursing position, the expert nurse sample reported 8 position titles. The most frequent response was that of Nurse Manager.
(n = 16 or 35%; middle level management), followed by Educator/School of Nursing (n = 12 or 26%). When educators from both schools of nursing and staff development were combined (n = 16 or 35%), their numbers equaled that for nurse manager. These nurses reported having been in their current titled positions ranging from 1 to 30 years, with a mean of 8.15 years (SD = 6.63 years). The most frequent category reported by the expert nurses was for 3 years (n = 8 or 17%).

The fourth objective was to determine the critical thinking ability of a sample of novice nurses as measured by the California Critical Thinking Skills Test, 1990 (CCTST). The CCTST yields an overall measure of critical thinking ability and five subscores. Raw scores were converted to percentile rankings, means, and standard deviations. The novice nurses had a mean percentile score for Overall Cognitive Skills of 56.34 (SD = 23.25). This group scored their highest on the subscale of Inductive Reasoning (mean percentile ranking = 65.26, SD = 21.73). In addition, the novice nurse group had mean percentile rankings above 50 on all but one of the six critical thinking measures, namely that of Deductive Reasoning (percentile mean = 49.11, SD = 24.02).

The fifth objective was in the form of a research hypothesis that a positive relationship exists between critical thinking ability as reflected in Overall Cognitive Skills, as measured by the CCTST, and the cumulative GPA in the study sample of novice nurses. A significant positive relationship between GPA and Overall Cognitive Skills was found using Pearson's Product Moment Correlation Coefficient (r = .37, p one-tail = .01). This was described as a moderate association according to Davis' Descriptors. The research hypothesis regarding a positive relationship between GPA and overall critical thinking ability was, therefore, supported.

The sixth objective was to determine the critical thinking ability of a sample of experienced nurses as measured by the CCTST. Raw scores were converted to percentile rankings for data analysis. Examination of these data revealed that the
experienced nurses' mean percentile score for Overall Cognitive Skills was 60.74 (SD = 26.31). This group scored highest on the subscale for Inductive Reasoning (mean percentile rank = 74.69, SD = 21.80). They also scored above the 50th percentile rank on all critical thinking measures except for that of Deductive Reasoning (mean percentile rank = 45.60, SD = 28.60).

The seventh objective was to determine the critical thinking ability of a sample of expert professional nurses as measured by the CCTST. Mean percentile rankings were also computed for each CCTST scale with the finding that the expert sample scored above the 50th percentile rank on all scales. The mean percentile score for Overall Cognitive Skills was 65.25 (SD = 24.23). The lowest ranking scale was that for Deductive Reasoning (percentile mean = 50.25, SD = 24.62), and the highest ranking scale was that for Inductive Reasoning (percentile mean = 78, SD = 18.60).

The eighth objective of the study was to compare the samples of novice, experienced, and expert professional nurses on selected demographic characteristics. In terms of educational preparation, the entire sample of novice nurses received the BS degree in Nursing in December, 1994. Three of these students also had prior baccalaureate degrees. As the novice group all had the same basic level of nursing education, they were not included in the Chi-square analysis used to detect any significant differences among groups regarding level of educational preparation. Results of the Chi-square analysis revealed no significant differences in education level found between the experienced and expert nurse samples. Analysis of findings regarding education levels for both samples of expert and professional nurses were that three-fourths (n = 68 or 76%) of these nurses held baccalaureate degrees, and just under one-half (n = 40 or 44.4%) held a masters degree.

ANOVA was used to determine if there were significant age differences among the novice, experienced and expert professional nurse samples. A significant
An examination of data reported for ethnic origin by study participants revealed that the majority of the nurses were Caucasian (N = 117 or 91%), with 9% (N = 11) indicating another ethnic origin. Analysis of data obtained regarding the participants' ethnic background revealed no significant differences among the three study samples, Chi-square (6) = 6.68, p = .35.

The ninth objective tested the hypothesis that a sample of expert professional nurses would exhibit higher levels of critical thinking abilities, as measured by the CCTST, than would the novice and experienced professional nurse samples on Overall Cognitive Skills and also on each of the subscales of Analysis, Inference, Evaluation, Inductive Reasoning, and Deductive Reasoning. Analysis of variance (ANOVA) was used to determine if there were significant differences in the critical thinking measures among the novice, experienced, and expert professional nurse samples. Raw scores were converted to percentile means for this analysis.

The groups were not found to be significantly different on the Overall Cognitive Skills measure, nor on the subscales for Analysis, Evaluation, Inference, and Deductive reasoning. A significant F value was found, however, on the subscale for Inductive Reasoning, F (2, 125) = 4.22, p = .02. The Tukey's post hoc multiple comparison test was used to follow up the significant F value for...
Inductive Reasoning in determining specifically which groups were different. Findings of this procedure revealed that the expert nurse sample scored significantly higher on Inductive Reasoning than the novice sample, but that the expert and experienced nurse samples were not significantly different from one another on this measure.

Although not statistically significant, all of the samples, except for the experts, scored below the 50th percentile mean on the measure for Deductive Reasoning (the expert sample mean = 50.25, SD = 24.62). The novice sample scored higher than the experienced sample on several measures, including analysis, inference, and deductive reasoning, but these findings were not statistically significant.

The tenth objective was to determine the predominant learning style of a sample of novice professional nurses as measured by the Kolb Learning Style Inventory-1985 (LSI). Results of data analysis involving 36 novice participants indicated that the predominant learning style was Assimilator (n = 11, or 31%), followed by Accommodator (n = 10, or 28%), then by Converger (n = 8, or 22%), and Diverger (n = 7, or 19%). Although the Assimilator learning style was the most prevalent style found in this novice sample, all four styles were evident among the student participants.

The eleventh objective was to determine the predominant learning style of a sample of experienced professional nurses as measured by the Kolb LSI. Results of data analysis of the 42 experienced nurses in the study sample revealed the Assimilator (n = 18, or 43%) style to be most prevalent, with the Converger (n = 10, or 24%), Accommodator (n = 8, or 19%), and Diverger (n = 6, or 14%) styles following in order of lesser prevalence.

The twelfth objective was to determine the predominant learning style of a sample of expert professional nurses as measured by the Kolb LSI. The
Accommodator learning style (n = 13, or 28\%) was found to slightly predominate among the expert nurse sample in this study. Of lesser prevalence were the Diverger (n = 12, or 25.5\%), followed equally by the Assimilator and Converger styles (n = 11, or 23\%).

The thirteenth objective was to compare the novice, experienced, and expert professional nurses on predominant learning style as measured by the Kolb LSI. A Chi-square analysis was used in making this comparison. This data analysis revealed no significant association between the variable of learning style and novice, experienced or expert sample of nurses, Chi-square (6 df, N = 125) = 7.20, p = .55.

The fourteenth objective tested the hypothesis that a model exists which explains a significant portion of the variance in overall critical thinking ability (CCTST Overall Cognitive Skills) of professional nurses, and the variables of expert status and learning style preference are significant contributors to that model. Multiple regression analysis was completed with critical thinking ability (CCTST Overall Cognitive Skills measure) as the dependent variable and nursing status (novice, experienced, and expert) entered first as independent variables. Considered alone, nursing status explained 2.18\% of the variance in critical thinking Overall Cognitive Skills. The four learning style categories were next entered as independent variables, explaining an additional 4.19\% of the variance in critical thinking. A series of selected demographic variables were then entered stepwise as independent variables. The independent variables included age, ethnic origin, master's degree education, professional certification, and years of experience in clinical practice. Only two variables, expert status and Assimilator learning style, remained in the equation and contributed 6.37\% of the variance explaining critical thinking in these samples of nurses. The final model, however, was not found to be statistically significant (F = 1.6609, p = .15).
Conclusions, Implications and Recommendations

The following conclusions, implications and recommendations were derived from the findings of the study:

Objective One

1. There were many non-traditional students comprising the novice group.

This conclusion is based on the finding that the sample of novice nurses reported several earlier levels of post-secondary education (three held baccalaureate degrees, two had practical nurse education, and one held an associate degree). Additionally, the mean number of years reported since completion of a prior degree was 13.5 years. Finally, the students ranged in age from 23 to 46 years, with a mean age of 31.2 years. These results corroborate the recent findings of Upcraft (in Weimer & Menges, in press) regarding greater diversity in the characteristics of contemporary college students.

An implication of this finding is that these nursing students bring a broader range of adult experiences and learner needs to both classroom and clinical laboratory settings. Based on this conclusion, the researcher recommends that nurse educators at this institution consider the needs of non-traditional students in planning educational programs. It is further recommended that such educators employ adult education principles and teaching strategies which recognize and integrate prior student experiences.

2. There were few male students in the novice group.

This conclusion is based on the finding that only 3 (8%) of the students indicated they were male. An implication of this finding is the recognition that nursing remains a predominantly female profession, despite increasing numbers of males entering nursing programs in recent years.

3. There was a relatively low representation of ethnic minority students in this novice sample.
This conclusion resulted from the finding that 11% of the students identified themselves as African American (8%), or Asian (3%). The majority of the respondents reported they were Caucasian (89%).

4. There were many undergraduate students gainfully employed in addition to their full-time student status.

This conclusion is based on the finding that 55% of the sample reported they were employed, working a mean of 22 hours a week during the past year. An implication of this finding is that responsibilities beyond those imposed by the academic setting may compete for the students' time and attention.

5. The novice sample of students generally reflected a high level of academic performance.

This conclusion is based on the finding that the group's mean grade point average was 2.95 on a 4.0 (A) scale. Additionally, their minimum GPA mean score was 2.51, and maximum GPA mean score was 3.52. As GPA is used in admission determinations for this school, and the school maintains a waiting list of applicants, students with higher GPA status are likely to be admitted to this nursing program.

Objectives Two and Three

The experienced and expert professional nurses in the study sample reflected relatively high levels of post-secondary education.

This conclusion is based on the findings that 76% of the experienced and 60% of the expert nurses had completed baccalaureate degrees, and 48% of the experienced and 43% of the expert nurses held masters degrees. Additionally, three experts had completed doctorate degrees. Finally, nurses from both groups reported current enrollment in formal education programs, i.e. among the experienced nurses, 21% were currently enrolled and 17% of the experts reported current enrollment. Both samples of experienced and expert nurses appear to value continued formal education. Educational institutions may wish to consider offering
additional advanced degree programs, as well as developing continuing education programs in the Baton Rouge area.

Objective Four

The graduating nursing students in this study performed relatively well on most measures of critical thinking, and performed less well on the measure of Deductive Reasoning. The CCTST sub-scale for Deductive Reasoning means that the "assumed truth of the premises purportedly necessitates the truth of the conclusion" (Facione & Facione, 1993, p. 4).

This conclusion is based on the finding that the novice group percentile mean scores were generally above the 50th percentile on all measures of critical thinking when compared to the population used to establish norms for the CCTST. Regarding Overall Cognitive Skills, their mean percentile score was 56.34. They scored slightly below the norm group in terms of their Deductive Reasoning score (45.60), but scored well above the norm group on their Inductive Reasoning score (65.26). According to the Faciones' (1993), The CCTST subscale for Inductive Reasoning means that "an argument's conclusion is purportedly warranted, but not necessitated, by the assumed truth of its premises" (p. 4).

The researcher recommends further research elucidating the construct of critical thinking among nursing students. A longitudinal study design could be used with a sample of novice nurses to measure the development of their critical thinking abilities over a period of time. Such research could also clarify subskills of relative strength or weakness in student groups. It might also be fruitful to consider inclusion of measures related to cognitive development such as described in the research by Belenky et al. (1986) regarding women and by Perry (1970) regarding college students. Comparisons of undergraduate students in several different academic majors might also help to identify possible domain-specific critical thinking attributes. Additionally, the California Critical Thinking Dispositions
Inventory might be used to further explore attitudes/dispositions contributing to the development of critical thinking in students.

**Objective Five**

There is a relationship between academic cumulative grade point average and overall critical thinking ability among the nursing students in the present study.

This conclusion is based on the finding that a significant positive relationship between GPA and Overall Cognitive Skills (CCTST) was found using Pearson's Product Moment Correlation Coefficient ($r = .37, p$ one-tail = .01). These results corroborate earlier findings reported in both the general and the nursing literature (Facione & Facione, 1993; Gross, Takazawa, & Rose, 1987; Tiessen, 1987) whereby students with a higher grade point average tend to score higher on objective measures of critical thinking.

Based on the conclusion of a positive relationship between GPA and overall critical thinking ability in the student sample, the researcher recommends that nursing faculty incorporate teaching-learning strategies which promote the development of critical thinking abilities particularly among students with lower GPAs. This might be effectively done in the clinical laboratory setting where individual instruction frequently occurs.

**Objectives Six and Seven**

Experienced and expert professional nurses in this study performed above the norm on all measures of critical thinking, and tended to perform best on Inductive Reasoning, and least well on Deductive Reasoning measures.

This conclusion is based on the finding that the experienced nurses' mean Overall Cognitive Skills percentile score was 60.74, with an Inductive Reasoning score of 74.69, and Deductive Reasoning score of 45.60. The expert nurses' Overall Cognitive Skills score was 65.25, their Inductive Reasoning score was 78.00, and their Deductive Reasoning score was 50.25.
An implication of this finding is the need to further explore critical thinking subskills, replicate the findings, to elucidate areas of strength and weakness in critical thinking abilities within nursing. Such exploration may identify a need for greater emphasis on instructional methods for promoting the development of Deductive Reasoning within undergraduate nursing populations, especially if Deductive Reasoning were considered to be an attribute valued by nurses.

Objective Eight

With the exception of age and level of education completed for the novice group, the three sample groups in this study did not differ in terms of selected demographic characteristics.

This conclusion is based on the finding that results of Chi-square analysis revealed no significant differences in education level found between the experienced and expert nurse groups. Tukey's post hoc multiple comparison test followed up the significant F value found using ANOVA regarding age, but revealed that the experienced and expert groups were not significantly different from one another regarding age. There was a significant difference, however, between the ages of the expert and novice groups (p = < .001). The expert group was significantly older than the novice group. Chi-square analysis of data obtained regarding gender and ethnic origin revealed no significant differences among the three study samples on these measures.

Objective Nine

Overall, the critical thinking measures in this study failed to distinguish the sample of expert nurses from the experienced and novice nurse samples. Nurses in the current study performed relatively similarly on five of the six critical thinking skills measured.

This conclusion is based on finding no significant differences between the experienced and expert groups on any of the critical thinking measures. Significant
differences in critical thinking were found only pertaining to the novice and expert sample groups. The expert nurse group scored significantly higher ($p = .02$) on the Inductive Reasoning scale when compared to the novice sample. It may be concluded, therefore, that the hypothesis of expert nurses exhibiting higher levels of critical thinking abilities than novice and experienced professional nurses, as measured by the CCTST, was only partially supported by the results of this study. Lack of significant differences between nurse samples may be an indication of little difference between groups, or may indicate that the instrument used was not sufficiently discriminating. One might also question the adequacy of a paper and pencil test in measuring a performance construct.

Implications of this conclusion are that the construct of critical thinking measured by the CCTST may not be the same construct (may not be a valid measure) which the nursing profession identifies as an essential attribute of professional nursing knowledge or performance. Additionally, the CCTST may be an instrument of greater utility in measuring critical thinking gains on the preservice level, but of lesser utility in measuring critical thinking on a more advanced practice level.

A recommendation for further study would be that of further clarifying the significant finding related to the expert nurse group's higher score on the Inductive Reasoning scale. Measures of Inductive Reasoning in performance, rather than using a written test, might also be productively explored.

As a significant difference was found between the novice and expert nurse samples regarding Inductive Reasoning, this construct could also be further explored and engendered in the novice group. As a positive relationship between GPA and overall critical thinking ability was found in the novice sample, the effects of engendering improvement in the Inductive Reasoning subskill especially for students with lower GPA's might be explored.
A particularly fruitful design might be that reported by Fonteyn (1991), and Fonteyn (personal communication, May 11, 1995), Fonteyn and Grobe (1994), and Fonteyn, Kuipers, and Grobe (1993). This research entails a descriptive design using a think-aloud technique and protocol analysis in a laboratory setting using a simulated patient case situation with highly experienced critical care nurses. Examination of subjects' reasoning processes led the investigators to identify "if-then" rules that could be used to develop expert systems regarding patient care. Such a design might be productively employed with expert nurses in differing clinical specialty areas, and not only with critical care nurses.

**Objectives Ten, Eleven, Twelve and Thirteen**

The nurses in this study were similar in reflecting all four learning styles, although the expert group tended to display a greater balance among all learning styles measured.

This conclusion is based on data analysis using the Chi-square procedure. No significant association was found between the variable of learning style and status group of nurses. The three sample groups reflected all four learning styles measured by the LSI. The novice and experienced nurses, however, had a higher representation of the Assimilator style, and the experts had more Accommodators (28%) than Assimilators. The expert group was also found to have more "balanced" styles, i.e. Diverger was 26%, and Assimilator and Converger styles were each 23%.

In an earlier study conducted among a group of nursing students at the same university, Booth (1989) also found the Assimilator learning style to be the most prevalent. The Assimilator learning style, according to Smith and Kolb (1986), demonstrates ability in the modes of reflective observation and of abstract conceptualization - perceiving new information abstractly and processing it reflectively. They "excel at inductive reasoning and the creation of models and
theories," and are goal setters and systematic planners (Smith & Kolb, 1986, p. 72). This is consistent with the finding that the group scored highest on the Inductive Reasoning scale of the CCTST. This finding is inconsistent, however, with Smith and Kolb's placement of nurses generally in the Diverger learning style, perceiving information concretely and processing it reflectively (1986, p. 74).

The expert group was found to be slightly higher on the Accommodative learning style, taking in new information concretely and processing it actively. According to Smith and Kolb, they are known for their ability to get things done, adapting to changing immediate circumstances (1986, p. 75). They are also risk takers and often take leadership roles. This is consistent with the demographic finding that their most frequent title was that of Nurse Manager (35%), followed by Educator (26%). In addition, they appear to be more balanced regarding learning styles implying they may be flexible in adapting to a variety of learning environments.

Based on the conclusion that the nurses in this study reflected a variety of learning styles, the researcher recommends that nurse educators, whether in undergraduate or continuing education settings, design learning activities which incorporate a variety of perceptual and processing modalities.

**Objective Fourteen**

A model was not found explaining a significant portion of the variance in overall critical thinking ability among professional nurses, considering selected variables included in this study.

This conclusion is based on the finding that the final model entered into the regression analysis in the present study was not found to be statistically significant. An implication of this conclusion is that there may be other factors yet unidentified that are significant contributors to critical thinking variability. In addition, the instrument used in measuring critical thinking ability in this study may not be a valid

---

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
measure of the construct of critical thinking within the nursing domain. The instrument has 34 items, with relatively few items (9 to 16) reflecting the 5 subskill categories.

Based on the conclusion that a model was not found explaining a significant portion of the variance in overall critical thinking ability among professional nurses, the researcher recommends additional research to further elucidate the construct of the Inductive Reasoning component of critical thinking ability as a characteristic of nursing expertise. For instance, a longitudinal study including more domain-specific objective measures of nursing performance might be fruitful. An in-depth qualitative study involving identified nursing experts monitored during a simulation requiring critical thinking subskills might also be useful.

In summary, the present study extended the body of knowledge regarding critical thinking ability in nursing by exploring differences in the ability among three levels of professional nurses: novices, experienced, and expert nurses. A significant contribution was that of further elucidating some differences related to specific subscales of critical thinking evident in the expert sample, namely that of Inductive Reasoning. The present research also contributed to validating earlier findings of an association between students' cumulative grade point academic average and overall cognitive skills. The effects of experience, certification, and age were also found to be contributors, although non-significant, in the development of critical thinking ability. Results of the current study did not reveal a significant relationship between any measure of critical thinking ability and predominant learning style.
REFERENCES


182


Conoley, J. C., & Kramer, J. J. (Eds.) (1989). *The tenth mental measurements yearbook.* Lincoln, NE: The Buros Institute of Mental Measurements, University of Nebraska Press.


Dungan, J. M. (1986, November). Relationship of critical thinking and nursing process utilization. Paper presented at the University of Minnesota School of Nursing Research Conference, Minneapolis, MN.


Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.


Prestholdt, C. A. (1990). Dominant learning style preference among levels of baccalaureate nursing students at Southeastern Louisiana University. Unpublished manuscript, Louisiana State University, Baton Rouge.


APPENDIX A

Letter of Approval From Dean
August 4, 1994

Ms. Cynthia Prestholdt
Assistant Professor
Southeastern Louisiana University
4849 Essen Lane
Baton Rouge, LA 70809

Dear Cynthia:

Permission is hereby granted for including our December graduating seniors as the novice subject population in your study on critical thinking, contingent upon approval of the study by the Southeastern Louisiana University Committee on the Use of Humans and Animals and with permission of the individual students as you so indicated. I appreciated you taking the time to fully brief me on the study.

Your study to investigate comparisons of critical thinking ability in novice and in expert professional nurses has tremendous potential value for our School of Nursing as we are mandated to document the demonstration of critical thinking outcomes. This study may prove valuable as we look at processes, particularly since you are including learning style influences.

If I can assist you in any way to complete your study, please ask.

Very truly yours,

Ellienne T. Tate
Dean
APPENDIX B
Letter of Approval From University
Human Research Committee
CAMPUS CORRESPONDENCE
Office of Sponsored Research and Contracts
Southeastern Louisiana University
Phone: (504) 549-5312
FAX: (504) 549-5094

TO: Cynthia Prestholdt
FROM: Dr. Emily Bontram, Interim Chair
DATE: September 1, 1994
RE: CUHARS Action on Project Proposal

This memo is to inform you of CUHARS action with regard to your proposal:

Title: "Critical Thinking Ability in Novice and Expert Professional Nursing"

This proposal was given: Expedited Review: X
Full Committee Review: ______

The result was: Deferred Approval: ______
Conditional Approval: X
Full Approval: X 9/30/94
Approval Denied: ______

If anything other than Full Approval is recommended, it is your responsibility, as investigator, to be sure that all conditions for approval are met before the project begins.

Committee Comments:
1. Research can begin as soon as CUHARS sees the Consent Form and we see completed forms that are currently being field-tested.
2. You need a Consent Form before you field-test!
APPENDIX C
Publisher's Letter Regarding CCTST
June 18, 1995

Cynthia Prestholdt  
Southeastern Louisiana University  
Baton Rouge Center  
4849 Essen Lane  
Baton Rouge, LA 70809

Dear Ms. Prestholdt,

In response to your inquiry requesting permission to put a copy of the CCTST in your dissertation as an appendix. Yes, you may do so. Please understand that the security of the CCTST is of prime consideration. In granting this permission we are assuming that you will not also be printing the answer choices in your dissertation. We are also assuming that your dissertation's appendix containing the CCTST will by read and reviewed by your doctoral dissertation committee and perhaps other advanced research scholars, but otherwise will not be made available by you or others to graduate or undergraduate students or others who can reasonably be counted as potential CCTST test takers.

Permission to use the instruments in your study does not include permission for duplication of all or any part of the instruments beyond the creation of the dissertation appendix mentioned above. If your intention is to use only a portion of the CCTST instrument in your study, or to alter the CCTST in any way, you will need to communicate your exact testing plan and negotiate a special permission for your project.

Most sincerely yours,

[Signature]
Rudy Sanchez  
Managing Editor
APPENDIX D
Publisher's Letter Regarding LSI
June 12, 1995

Cynthia Prestholdt, RN, MS
Assistant Professor
Southeastern Louisiana University
School Of Nursing
Baton Rouge Center
4849 Essen Lane
Baton Rouge, LA 70809

Dear Ms. Prestholdt:

You may have permission to include a copy of the Learning Style Inventory, the Cycle of Learning and the Learning Type Grid in the appendices of your dissertation. Please include our copyright notation, © Experience Based Learning, 1981, revised 1985. Developed by David A. Kolb. Reproduced with permission from McBer & Company, Inc., 116 Huntington Avenue, Boston, MA 02116. 617-425-4500.

We have so many doctoral candidates use the Learning Style Inventory with nurses. I would be very interested in reading about your study. If you can, will you please forward a copy of your dissertation to McBer & Company, Training Resources Group, when it is completed? Thank you.

Sincerely,

Tamara Friedman
Permissions Editor

116 Huntington Avenue • Boston, Massachusetts 02116 • (617) 437-7080 • Fax: (617) 435-0073

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
APPENDIX E
Kolb LSI Instrument (1985)

Learning-Style Inventory: Instructions

The Learning-Style Inventory describes the way you learn and how you deal with ideas and day-to-day situations in your life. Below are 12 sentences with a choice of four endings. Rank the endings for each sentence according to how well you think each one fits with how you would go about learning something. Try to recall some recent situations where you had to learn something new, perhaps in your job. Then, using the space provided, rank a "4" for the sentence ending that describes how you learn best, down to a "1" for the sentence ending that seems least like the way you would learn. Be sure to rank all the endings for each sentence unit. Please do not make ties.

Example of completed sentence set:

<table>
<thead>
<tr>
<th>When I learn:</th>
<th>4. I like to deal with my feelings</th>
<th>1. I like to watch and listen</th>
<th>2. I like to think about ideas</th>
<th>3. I like to be doing things</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When I learn:</td>
<td>I like to deal with my feelings</td>
<td>I like to watch and listen</td>
<td>I like to think about ideas</td>
<td>I like to be doing things</td>
</tr>
<tr>
<td>2. I learn best when:</td>
<td>I trust my hunches and feelings</td>
<td>I listen and watch carefully</td>
<td>I rely on logical thinking</td>
<td>I work hard to get things done</td>
</tr>
<tr>
<td>3. When I am learning:</td>
<td>I have strong feelings and reactions</td>
<td>I am quiet and reserved</td>
<td>I tend to reason things out</td>
<td>I am responsible about things</td>
</tr>
<tr>
<td>4. I learn by:</td>
<td>feeling</td>
<td>watching</td>
<td>thinking</td>
<td>doing</td>
</tr>
<tr>
<td>5. When I learn:</td>
<td>I am open to new experiences</td>
<td>I look at all sides of issues</td>
<td>I like to analyze things, break them down into parts</td>
<td>I like to try things out</td>
</tr>
<tr>
<td>6. When I am learning:</td>
<td>I am an intuitive person</td>
<td>I am an observing person</td>
<td>I am a logical person</td>
<td>I am an active person</td>
</tr>
<tr>
<td>7. I learn best from:</td>
<td>personal relationships</td>
<td>observation</td>
<td>rational theories</td>
<td>a chance to try out and practice</td>
</tr>
<tr>
<td>8. When I learn:</td>
<td>I feel personally involved in things</td>
<td>I take my time before acting</td>
<td>I like ideas and theories</td>
<td>I like to see results from my work</td>
</tr>
<tr>
<td>9. I learn best when:</td>
<td>I rely on my feelings</td>
<td>I rely on my observations</td>
<td>I rely on my ideas</td>
<td>I can try things out for myself</td>
</tr>
<tr>
<td>10. When I am learning:</td>
<td>I am an accepting person</td>
<td>I am a reserved person</td>
<td>I am a rational person</td>
<td>I am a responsible person</td>
</tr>
<tr>
<td>11. When I learn:</td>
<td>I get involved</td>
<td>I like to observe</td>
<td>I evaluate things</td>
<td>I like to be active</td>
</tr>
<tr>
<td>12. I learn best when:</td>
<td>I am receptive and open-minded</td>
<td>I am careful</td>
<td>I analyze ideas</td>
<td>I am practical</td>
</tr>
</tbody>
</table>

Copyright © 1981 David A. Kolb, revised 1985. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, xerography, recording, or any information storage and retrieval system, without permission in writing from McBer & Company.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
APPENDIX F

Participant Profile Form For Experienced and Expert Nurses
PARTICIPANT PROFILE FORM

Please provide the following information about yourself. Leave blank those items that do not apply to you. Providing this information is entirely voluntary and return of this completed form constitutes your consent to participate. This information will be held in strict confidence.

1. Indicate YOUR LEVEL OF EDUCATIONAL PREPARATION

LEVEL OF EDUCATION
(mark all that apply)

____ Diploma in Nursing
____ Associate Degree in Nursing
____ Baccalaureate in Nursing
____ Other Baccalaureate
specify:
____ Masters in Nursing
specify:
____ Other Masters
specify:
____ Doctorate
specify:
____ Currently Enrolled as Student, specify PROGRAM:
____ Other Education, specify:

For each item marked indicate the YEAR COMPLETED

2. YOUR PROFESSIONAL CREDENTIALS: (mark all that apply)

____ Registered Nurse  _____ Licensed Practical Nurse
____ Respiratory Therapist
____ Certification:
Date(s):
____ Other Credentials, Professional Awards, Recognitions, specify:

3. YOUR CURRENT EMPLOYMENT STATUS:

____ Full-time in nursing
____ Part-time in nursing
____ In a field other than nursing, specify:
____ Inactive status since: (year) __________
____ Other, specify:

4. DURING THE PAST YEAR, WHAT IS THE AVERAGE NUMBER OF HOURS PER WEEK THAT YOU HAVE WORKED IN CLINICAL NURSING PRACTICE? _________ Hours/Week.

Explain as necessary:

****** COMPLETE OTHER SIDE **********
5. YOUR TOTAL NUMBER OF YEARS OF CLINICAL NURSING EXPERIENCE:

- Less than 1 year: ____________
- 1 - 5: ____________
- 6 - 10: ____________
- 11 - 15: ____________
- 16 - 20: ____________
- 21 - 25: ____________
- 26 - 30: ____________
- 31 or more: ____________

6. INSTITUTIONAL SETTINGS OF YOUR CLINICAL NURSING EXPERIENCE

<table>
<thead>
<tr>
<th>SETTING</th>
<th>NUMBER OF YEARS IN EACH SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community/Public Health</td>
<td>____________ years</td>
</tr>
<tr>
<td>Clinic/Ambulatory Care</td>
<td>____________ years</td>
</tr>
<tr>
<td>Hospice</td>
<td>____________ years</td>
</tr>
<tr>
<td>Hospital</td>
<td>____________ years</td>
</tr>
<tr>
<td>Home Health</td>
<td>____________ years</td>
</tr>
<tr>
<td>HMO/Managed Health</td>
<td>____________ years</td>
</tr>
<tr>
<td>Independent Nursing Practice</td>
<td>____________ years</td>
</tr>
<tr>
<td>Mental Health Facility</td>
<td>____________ years</td>
</tr>
<tr>
<td>Nursing Education or School of Nursing</td>
<td>____________ years</td>
</tr>
<tr>
<td>Nursing Home or Extended Care Facility</td>
<td>____________ years</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>____________ years</td>
</tr>
<tr>
<td>Physicians Office</td>
<td>____________ years</td>
</tr>
<tr>
<td>School Health</td>
<td>____________ years</td>
</tr>
<tr>
<td>Other Setting, specify:</td>
<td></td>
</tr>
</tbody>
</table>

7. Indicate YOUR PREDOMINANT CLINICAL SPECIALTY (Area in which you have worked the greatest number of years.):

Years employed in that SPECIALTY AREA: ____________

8. Indicate YOUR CURRENT CLINICAL SPECIALTY AREA:

Years employed in CURRENT SPECIALITY AREA: ____________

9. TITLE OF YOUR CURRENT POSITION:

Years in current position: ____________

10. YEAR OF BIRTH: 19__

11. YOUR GENDER: _____Female _____Male

12. YOUR ETHNIC ORIGIN:

- African-American: _____
- Asian: _____
- Caucasian: _____
- Native American: _____
- Hispanic: _____
- Other: specify:

13. PLEASE INCLUDE ANY OTHER INFORMATION THAT YOU THINK WOULD CONTRIBUTE TO THE SUCCESS OF THIS PROJECT:
APPENDIX G

Kolb Cycle of Learning (1985)


207

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
The Cycle of Learning

Concrete Experience (CE)  
("Feeling")

Active Experimentation (AE)  
("Doing")

Reflective Observation (RO)  
("Watching")

Abstract Conceptualization (AC)  
("Thinking")

Published by McBer & Company.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Learning-Style Type Grid

Percentiles 0

10

20

30

40

50

60

70

80

90

100

AE-RO

Converger

Assimilator

Accommodator

Diverger

Published by McBer & Company.
APPENDIX I

Participant Profile Form For Novice Nurses
PARTICIPANT PROFILE FORM

DIRECTIONS: Please answer the following questions about yourself by checking (x) the appropriate space and/or by adding the requested information.

Your participation in this project is completely voluntary. Information provided will be held in strict confidence. Persons choosing not to participate will in no way be penalized. Your return of this completed instrument will constitute consent to participate. Thank you very much for your cooperation!

1. LIST YOUR EDUCATIONAL PREPARATION AND INDICATE THE YEAR COMPLETED FOR EACH ITEM CHECKED (CHECK ALL THAT APPLY):

   EDUCATION                        YEAR COMPLETED
   ________________________________________________________________
   _______ Nursing Student _________________________________
   _______ Diploma in Nursing ________________________________
   _______ Associate Degree in Nursing __________________________
   _______ Baccalaureate in Nursing _____________________________
   _______ Other Baccalaureate (Specify) _______________________
   _______ Masters in Nursing ________________________________
   _______ Other Masters (Specify) _____________________________
   _______ Doctorate (Specify) _________________________________
   _______ Program if Currently Enrolled (Specify): _____________
   _______ Other (Specify): ____________________________________

2. OTHER THAN RN LICENSURE, LIST ANY ADDITIONAL PROFESSIONAL CREDENTIALS HELD (CHECK ALL THAT APPLY):

   _______ None
   _______ Licensed Practical Nurse
   _______ Respiratory Therapy
   _______ Certification (Specify): ______________________________
   _______ Other (Specify): ____________________________________

3. YOUR CURRENT EMPLOYMENT STATUS:

   Full time in the field of nursing: _____________________________
   Part time in the field of nursing: _____________________________
   In a field other than nursing (specify): _______________________
   Inactive status: ______ Other (specify): _______________________

4. IF EMPLOYED FULL TIME OR PART TIME IN NURSING, WHAT HAS BEEN YOUR AVERAGE NUMBER OF WORKING HOURS A WEEK DURING THE PAST YEAR? __________ Hours/Week.

*************** Turn page over and continue ***************
5. YOUR TOTAL NUMBER OF YEARS OF CLINICAL NURSING EXPERIENCE:

- Less than 1 year
- 1 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30
- 31 or more

6. INSTITUTIONAL SETTINGS OF YOUR CLINICAL NURSING EXPERIENCE

<table>
<thead>
<tr>
<th>Setting</th>
<th>Number of Years in Each Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community/Public Health</td>
<td>years</td>
</tr>
<tr>
<td>Clinic/Ambulatory Care</td>
<td>years</td>
</tr>
<tr>
<td>Hospice</td>
<td>years</td>
</tr>
<tr>
<td>Hospital</td>
<td>years</td>
</tr>
<tr>
<td>Home Health</td>
<td>years</td>
</tr>
<tr>
<td>HMO/Managed Health</td>
<td>years</td>
</tr>
<tr>
<td>Independent Nursing Practice</td>
<td>years</td>
</tr>
<tr>
<td>Mental Health Facility</td>
<td>years</td>
</tr>
<tr>
<td>Nursing Education or School of Nursing</td>
<td>years</td>
</tr>
<tr>
<td>Nursing Home or Extended Care Facility</td>
<td>years</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>years</td>
</tr>
<tr>
<td>Physicians Office</td>
<td>years</td>
</tr>
<tr>
<td>School Health</td>
<td>years</td>
</tr>
<tr>
<td>Other Setting, specify</td>
<td>years</td>
</tr>
</tbody>
</table>

7. Indicate YOUR PREDOMINANT CLINICAL SPECIALTY (area in which you have worked the greatest number of years):

Years employed in that SPECIALTY AREA: 

8. Indicate YOUR CURRENT CLINICAL SPECIALTY AREA:

Years employed in CURRENT SPECIALITY AREA:

9. TITLE OF YOUR CURRENT POSITION:

Years in current position:

10. YEAR OF BIRTH: 19

11. YOUR GENDER: Female Male

12. YOUR ETHNIC ORIGIN:

African-American Asian Caucasian
Native American Hispanic Other specify:

13. PLEASE INCLUDE ANY OTHER INFORMATION THAT YOU THINK WOULD CONTRIBUTE TO THE SUCCESS OF THIS PROJECT:
APPENDIX J

First Cover Letter to Novice Nurses
Dear Graduating Senior:

Congratulations on achieving near-completion of your baccalaureate degree in nursing! As you well know, the dynamic environment of health care delivery today presents many challenges to our profession and to those who educate its future practitioners. The ability to think critically has become a significant attribute in the practice of professional nursing today. As a "novice" nurse, about to launch your professional career, you are hereby invited to participate in an innovative research project designed to explore critical thinking in selected novice and experienced professional nurses.

The primary purpose of this project is to compare novice and experienced-professional nurses in terms of their critical thinking ability. The study additionally seeks to identify the influence of learning styles and other selected individual demographic characteristics on the critical thinking ability of professional nurses.

Your participation in this project will provide valuable, new information about the nature of critical thinking ability and factors mediating the development of this ability. This will help faculty better design educational experiences to maximize opportunities for individual learning success.

This project has been approved by Dean Tate of the SLU School of Nursing, and by the SLU Committee on the Use of Humans and Animals in Research Studies (CUMARS).

You are participating in the first known project on critical thinking among nurses in our area and your help is gratefully appreciated. I hope the outcome of this research will benefit you and your future nursing colleagues. Warm wishes for your success in nursing!

Sincerely,

Cynthia Prestholdt, RN, MS
Assistant Professor,
Principal Investigator
APPENDIX K

Consent to Participate in a Research Study
CONSENT TO PARTICIPATE IN A RESEARCH STUDY
at
SOUTHEASTERN LOUISIANA UNIVERSITY
School of Nursing - Fall, 1994

Title: CRITICAL THINKING ABILITY
IN NOVICE AND EXPERT PROFESSIONAL NURSES

Principal Investigator: Cynthia Prestholdt, RN, MS
Assistant Professor, SLU
Phone: (504) 765-2324, -2325

Co-Investigator:
Michael F. Burnett, Ph.D., Professor, Interim Director,
LSU School of Vocational Education
Phone: (504) 388-5748

I have been asked to voluntarily participate in this project because I am a graduating senior currently enrolled in a selected required nursing course at SLU.

I understand that my responses to a critical thinking test, a learning style instrument, and provision of other descriptive data, including my cumulative grade point average, will be used to gather information regarding critical thinking, learning style, and related factors. Instrument and demographic profile form completion should take no more than 90 minutes.

I am aware that information from this project will be submitted in a doctoral dissertation. My responses will be protected and reported only in summary data, my name will not be used.

I understand that I have the right to be provided with answers to any questions about this project which may arise. All of my initial questions have been answered.

I understand that I may withdraw from participation in this study at any time without interfering with my course grade or my relationship with SLU.

I understand that my participation will not result in any expense to me, and I will not be paid to participate.

I have received a copy of this consent form. I understand that I may receive a copy of the summary results of this project if I request such from the Principal Investigator by including my name and mailing address on the envelope provided.

Signature: _______________________________ Date: ____________
APPENDIX L

Participant Directions for Novice Nurses
PARTICIPANT DIRECTIONS

CONTENTS:
* Letter with two consent forms, printed on colored paper:
  white copy (to keep) and green copy (to return).
* Learning Style Inventory
* Participant Profile Form (printed on green paper)
* Scantron form and California Critical Thinking Skills
  Test booklet with blank note sheet enclosed between pp. 9
  & 10.
* Small blank note card  * Blank envelope

CONSENT FORMS:
Please read, SIGN AND DATE the consent form printed on GREEN
PAPER - place this with all the materials and return inside
the enclosed booklet. KEEP THE WHITE CONSENT FORM ONLY.
DO NOT PLACE YOUR NAME OR SOCIAL SECURITY NUMBER ON ANY TEST
FORM MATERIALS - YOUR NAME SHOULD ONLY BE PLACED ON THE
GREEN COPY OF THE CONSENT FORM. PLEASE CHECK THAT THE SAME
CODE NUMBER, i.e. N 08, IS ON ALL RETURNED MATERIALS. Code
numbers are used to provide anonymity.

FOLLOW THE DIRECTIONS PRINTED ON EACH OF THE FORMS:
QUESTIONS REGARDING INDIVIDUAL TEST ITEMS CANNOT BE ANSWERED
LEARNING STYLE INVENTORY:
Follow the directions printed on the form. There are no
right or wrong answers. Responses reflect your preferred way
to learn. Please rank each question 1 through 4 ACROSS.
NOTE THAT A RANK OF 4 DESCRIBES THE BEST WAY YOU FEEL YOU
LEARN, DOWN TO 1, WHICH SEEMS LEAST LIKE THE WAY YOU LEARN.

GREEN PARTICIPANT PROFILE FORM:
Again, follow the directions printed on the form. Include
your experience in ANY health care-related setting. Respond
as requested, leave BLANK any areas that do not apply to you.

CALIFORNIA CRITICAL THINKING SKILLS TEST:
Use the Scantron and a #2 pencil in answering these 34 items.
Thoughtfully choose your best response. FINISH THIS SECTION
ALONE, IN ONE UNINTERRUPTED SITTING, TAKING NO MORE THAN 60
MINUTES FOR COMPLETION. "OPTIONAL BACKGROUND QUESTIONS"
PAGE 10: NUMBERS 1-7: Complete using the plain paper enclosed
ENVELOPE: Address the white envelope to yourself IF YOU WISH
TO HAVE A COPY OF THE STUDY RESULTS MAILED TO YOU. SPRING '95
MAILING ADDRESS CARD: Write your name and a permanent
address on this card if you choose to participate in future
studies involving your class of December, 1994.
CLIP all materials together, with signed green consent paper
on the top - KEEP THE WHITE CONSENT PAPER for your records.

RETURN booklet of materials to designated box in room... OR
RETURN TO C. PRESTHOLDT AT PINNING, COMMENCEMENT OR BY
MAILING TO SLU AT THE BATON ROUGE CENTER (ENCLOSED ENVELOPE).
THANKS FOR PARTICIPATING! CONGRATULATIONS!! HAPPY HOLIDAYS!!!
APPENDIX M

Second Cover Letter to Novice Nurses
Dear:

Congratulations upon your graduation! My best wishes for your success! I am writing in regard to the critical thinking project discussed in your final classes. If you have already returned the completed forms, thank you for doing so.

If you have not yet completed the forms, please DO consider becoming a part of this study. SUCCESS OF THIS IMPORTANT NURSING RESEARCH DEPENDS UPON YOUR RESPONSE. PLEASE RETURN YOUR COMPLETED RESEARCH MATERIALS AS SOON AS POSSIBLE - BY MAIL OR DELIVER TO THE BATON ROUGE CENTER OFFICE. Do not hesitate to call me if further information is necessary regarding your participation.

Sincerely,

[Signature]

Cynthia Prestholdt, RN, MS
Phone: Days: (504) 765-2324
Other times & Collect: (504) 766-5147

SLU School of Nursing
Baton Rouge Center
4849 Essen Lane
Baton Rouge, LA 70809
APPENDIX N

Follow-up Post Card to Students
Dear (Date)

As a graduating nursing senior, you recently received a packet of research materials to be completed in a study involving critical thinking. If you have already returned the completed study forms, thank you for doing so.

If you have not yet returned the forms, please DO become a study participant by returning the completed materials by _______________________. SUCCESS OF THIS IMPORTANT PROJECT DEPENDS UPON YOUR HELP.

Please call if you have misplaced your materials and I will mail a replacement. Do call if further information is needed regarding this study.

Sincerely,

Cynthia Prestholdt, RN, MS

Phone: Days:(504) 765-2324, -2325 Evenings:(504) 766-5147
SLU School of Nursing; Baton Rouge Center
4849 Essen Lane Baton Rouge, LA 70809
APPENDIX O

Follow-up Letter to Novice Nurses
Dear

Greetings!! I hope this finds you enjoying both personal and professional success!!

I am currently entering coded data into the computer for analysis as part of my dissertation research process. I am writing you at this time because I found that the Learning Style Inventory form you completed earlier was incomplete. I have, therefore, enclosed another copy, and am requesting that you take about 5-10 minutes to complete the form. Please return it in the stamped self-addressed envelope by Monday, April 10th, or before. I have enclosed the directions I've been using with my other research participants. Please note that you are to rank your responses from 1 to 4, using each number once within each sentence set - do not make ties within each sentence set. Note example on Inventory. If you have any questions, please call me during the evening at (504) 766-5147 (if you have moved out of town, you may call collect if necessary), or during the days at (504) 765-2324.

It is most important that I process a complete data set on each study participant, thus your assistance in returning your form would be much appreciated. I will also be sending you a small token of appreciation upon receipt of your completed form.

Sincerely,

Cynthia Prestrholdt, RN, MS
Assistant Professor
School of Nursing
Southeastern Louisiana University
4849 Essen Lane
Baton Rouge, LA 70809
APPENDIX P

Cover Letter to Experienced Nurses
December 7, 1994

Dear,

We are writing to you as a member of the Baton Rouge District Nurses' Association. It is because of your nursing experience and respect for the profession that we are requesting your help.

As an experienced registered nurse, you recognize the importance of identifying attributes related to excellence in nursing practice. The ability to think critically is recognized as an important factor in nursing excellence, but what influences the development of critical thinking ability in nurses? You are invited to help answer that question by participating in an important research study, designed by and for nurses, to learn about the factors that foster critical thinking ability in nurses. Your nursing experience places you in a unique position to provide helpful information about this important ability. Indeed, your personal participation is critical to the success of this timely project.

Your participation merely involves completing one set of written materials to be mailed to you. They may be completed at your convenience at home. Confidentiality of all responses will be maintained and results will be reported as group data only, without identifying individuals. Participants may request a summary of the results. As a holiday gesture and a token of our appreciation, a unique nursing collectible will be sent to everyone returning the completed research materials.

You can assist us in the success of this project by:

- Immediately completing the enclosed NURSE PARTICIPANT RESPONSE FORM, printed on colored paper.
- Promptly returning this completed stamped, self-addressed response form, whether or not you choose to participate.

After receiving your positive response, Cynthia Prestholdt will contact you by phone to answer your questions and discuss your role in this project.

We look forward to your early response. Should you have questions, please call Cynthia Prestholdt at 766-5147 after 6:00 PM (also collect). Thank you for contributing your valuable time and expertise to the improvement of our profession.

Sincerely,

Cynthia Prestholdt, RN, MS
Graduate Student and
Primary Researcher
Louisiana State University

Michael F. Burnett, PhD
Professor and
Co-Researcher
Louisiana State University
APPENDIX Q

First Cover Letter to Expert Nurses
December 1, 1994

Dear

You have been formally recognized as an exemplary nurse by your professional colleagues in the Baton Rouge District Nurses' Association. Congratulations on this noteworthy accomplishment! Your recognized nursing expertise is our reason for contacting you and requesting your help.

As a professional nurse, you recognize the importance of identifying those qualities related to excellence in nursing practice. The ability to think critically is recognized as an important factor in nursing excellence, but what influences the development of critical thinking ability in nurses? You are invited to help answer that question by participating in an important research study, designed by and for nurses, to learn about the factors that foster critical thinking ability in nurses. Your recognized nursing expertise places you in a unique position to provide helpful information about this important ability. Indeed, your personal participation is critical to the success of this timely project.

Your participation merely involves completing one set of written materials to be mailed to you. They may be completed at your convenience at home. Confidentiality of all responses will be maintained and results will be reported as group data only, without identifying individuals. Participants may request a summary of the results. As a holiday gesture and a token of our appreciation, a unique nursing collectible will be sent to everyone returning the completed research materials.

You can assist us in the success of this project by:

- Immediately completing the enclosed NURSE PARTICIPANT RESPONSE FORM, printed on colored paper.
- Promptly returning this completed stamped, self-addressed response form, whether or not you choose to participate.

After receiving your positive response, Cynthia Prestholdt will contact you by phone to answer your questions and discuss your role in this project.

We look forward to your early response. Should you have questions, please call Cynthia Prestholdt at 766-5147 after 6:00 PM (also collect). Thank you for contributing your valuable time and expertise to the improvement of our profession.

Sincerely,

Cynthia Prestholdt, RN, MS
Graduate Student and
Primary Researcher
Louisiana State University

Michael F. Burnett, PhD
Professor and
Co-Researcher
Louisiana State University

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
APPENDIX R

Nurse Participant Response Form
NURSE PARTICIPANT RESPONSE FORM

PLEASE PROVIDE THE FOLLOWING INFORMATION and MAIL THIS FORM whether or not you choose to participate.  
All information will be kept strictly confidential.

I AM CURRENTLY EMPLOYED AS A REGISTERED NURSE AT:

(Leave blank if not currently employed as a registered nurse)

OVER THE PAST FIVE YEARS, THE NUMBER OF CONSECUTIVE YEARS I HAVE PRACTICED AS A REGISTERED NURSE WAS: ______ years.

DURING THE PAST YEAR, THE AVERAGE NUMBER OF HOURS PER WEEK SPENT IN DIRECT CLINICAL NURSING PRACTICE RELATED TO MY EMPLOYMENT WAS ABOUT: _______ Hours/week.

PRINT NAME: __________________________ 

MAILING ADDRESS: __________________________ 

________________________________________________________________________ 

I CAN BE REACHED AT THE FOLLOWING PHONE NUMBERS:

DAYTIME: __________________________

EVENING: __________________________ 

THE BEST TIMES TO REACH ME BY PHONE ARE:

DAYS ___________ TIME _________________

YES, I AM INTERESTED IN PARTICIPATING IN THIS PROJECT. Please contact me with further information about my participation. 

NO, I DO NOT WISH PARTICIPATE IN THIS PROJECT AT THIS TIME. COMMENTS?

Please re-fold, staple or tape together with return address on the outside. Thank you very much for your response! PLEASE MAIL PROMPTLY.

QUESTIONS MAY BE ADDRESSED TO:
Cynthia Prestholdt, RN, MS 
Phone: (504) 765-2324, -2325, -2326 (Week Days) 
(504) 766-5147 (Evenings/Weekends & Collect) 
LSU SCHOOL OF VOCATIONAL EDUCATION 
BATON ROUGE, LOUISIANA 70803 - 5477
APPENDIX S

Second Cover Letter to Experienced and Expert Nurses
December 1994

Dear

Thank you for agreeing to help with an innovative project exploring the development of critical thinking ability in professional nurses.

Participation in this project is strictly voluntary; completion and return of the research forms constitutes your consent to participate. Your anonymity will be safeguarded and study results will be presented as group data only.

Your participation involves completing the three enclosed research forms as soon as possible (preferably before December 31). Please schedule a quiet, uninterrupted time at home to complete the forms. It is extremely important that you complete these materials alone, without assistance from anyone. Consulting with others could compromise the accuracy of the results.

Carefully follow all directions printed on each form. There are no right or wrong answers. The Learning Style Inventory and Participant Profile Form are self-explanatory. The California Critical Thinking Skills Test should be completed in no more than one 60 minute time period.

Promptly return the completed research materials in the stamped, pre-addressed envelope. Remember to enclose the request card with your materials if you want a summary of the results.

Thank you very much for contributing your valuable time and effort to a study which should be beneficial to professional nurses. In gratitude for returning the completed forms, you will soon receive a unique nursing collectible. Please contact me at (504) 766-5147 (evenings and collect) if you have questions regarding this project.

Sincerely,

Cynthia Prestholdt, RN, MS
Graduate Student and
Primary Researcher
APPENDIX T

Participant Directions for Experienced and Expert Nurses
PARTICIPANT DIRECTIONS

ENCLOSURES:

- Letter and Participant Directions
- Learning Style Inventory
- Participant Profile Form
- California Critical Thinking Skills Test booklet
- Blank index card for requesting summary report
- Stamped, pre-addressed return envelope

**DO NOT WRITE YOUR NAME ON ANY TEST FORMS**
Code numbers have been assigned to provide anonymity.

**FOLLOW THE DIRECTIONS PRINTED ON EACH OF THE FORMS**

**DO NOT CONSULT WITH OTHERS IN COMPLETING THESE MATERIALS**

**LEARNING STYLE INVENTORY:**
Follow the directions printed on the form. There are no right or wrong answers; responses simply reflect your preferred way of learning.

For each item, rank the four options for ways you learn. Rank each option in descending order, where a "4" BEST describes the way you learn, and a "1" describes the way that is LEAST like the way you learn.

**PARTICIPANT PROFILE FORM:** (on colored paper)
Follow the directions on the form.
Leave blank any areas that do not apply.

**CALIFORNIA CRITICAL THINKING SKILLS TEST:**
Finish this instrument alone, in one uninterrupted sitting.
**Please take NO MORE THAN 60 MINUTES to complete this test.**
Thoughtfully choose your best responses.
Complete "Optional Background Questions" on page 10.

**RESULT REQUEST CARD (OPTIONAL):**
If you wish a copy of the study results mailed to you, write your name and mailing address on the index card and return with your completed research forms. This card will be immediately separated from the other forms -- **before** any processing of your research material.

**PLACE ALL THREE COMPLETED FORMS, AND OPTIONAL REQUEST CARD, IN THE PRE-ADDRESSED ENVELOPE AND MAIL PROMPTLY**

Thank you for your participation!
Your appreciation gift will be mailed to you soon.
APPENDIX U

Participant Appreciation Letter
January 1995

Dear,

Thank you for returning the completed study forms exploring the development of critical thinking ability in professional nurses. If you requested a summary of the study results, an abstract will be mailed to you later this spring.

In gratitude for your participation in this nursing research project, a Clara Maass commemorative stamp is enclosed. In 1976, on the 100th anniversary of her birth, the United States honored Clara Maass by issuing a commemorative stamp for her contributions to nursing and to humanity.

Clara Louise Maass (1876-1901) graduated from the Trefz Training School for Nurses of the Newark (N.J.) German Hospital in 1895. She completed a term of service as a volunteer contract nurse with the U.S. Army during the Spanish-American War. She later responded to Major William Gorgas's call for nurses in Havana, where experiments on yellow fever were being conducted. She nursed victims of this disease and then participated in the research by allowing herself to be bitten by mosquitoes in 1901. The attack proved fatal, and she died ten days later of yellow fever at age twenty-five. Clara Maass was the only American and the only woman to die during these experiments. The experiments were terminated following her death and the disease was ultimately conquered. Miss Maass was buried in New Jersey with full military honors. A commemorative stamp was issued in her honor by Cuba in 1951. Then, in 1976, Clara Maass was the first individual American nurse to be honored by a United States commemorative stamp. She was one of the earliest nurses to be involved in experimental research. (See M.P. Donahue (1985) Nursing: The Finest Art. St. Louis: C.V. Mosby, pp.331-333.)

The enclosed stamp may be framed and kept as a memento of your own contribution to contemporary nursing research.

Sincerely,

Cynthia Prestholdt, RN, MS
Graduate Student and
Primary Researcher

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
April , 1995

Dear

Thank you for returning the completed study forms exploring the development of critical thinking ability in professional nurses. If you requested a summary of the study results, an abstract will be mailed to you later this spring.

In gratitude for your participation in this nursing research project, a Clara Barton commemorative stamp is enclosed.

Clara Barton (1821-1912) was born in North Oxford, Massachusetts. She had been a school teacher and Patent Office Clerk before working on behalf of missing Civil War soldiers and independently operating a large-scale war relief effort providing medical supplies and basic necessities to the Army and hospitals. Known as the "little lone lady in black silk," she personally nursed in federal hospitals and with the armies on the battlefield, and cared for the wounded of the Confederate armies. Her impartiality was expressed through nursing care provided to blacks and whites, Northerners and Southerners. More than once, bullets made holes in her dress and the men she was nursing were shot in her arms. She eventually became one of the most prominent lay nurses of the Civil War. She also served with the International Red Cross during the Franco-Prussian War and was decorated with the Iron Cross by the Kaiser. She returned to the United States and crusaded for the establishment of the American Red Cross in 1881, and served as it's president until 1904. Her work embodied the ideals now characteristic of the Red Cross. [See M.P. Donahue, (1985). Nursing: The Finest Art. St. Louis: C.V. Mosby, pp. 294-297.]

The enclosed stamp may be framed and kept as a memento of your own unique contribution to professional nursing.

Sincerely,

Cynthia Prestholdt, RN, MS  
Graduate Student and  
Nurse Researcher
APPENDIX V

Initial Post Card to Experienced and Expert Nurses
INITIAL POST CARD TO EXPERIENCED AND EXPERT NURSES

Dear (Date)

As an experienced professional nurse, you recently received a letter requesting your participation in a research study involving critical thinking. If you have already returned the response form, thank you for doing so.

If you have not yet returned the form, please DO consider becoming a part of this important study. SUCCESS OF THIS IMPORTANT PROJECT DEPENDS UPON YOUR RESPONSE. In any case, please return your response form, whether or not you intend to participate, by ______________________.

Call or write if further information is needed regarding this study.

Sincerely,

Cynthia Prestholdt, RN, MS
Phone: Daytime:(504) 765-2324 or 2325, Evenings:(504) 766-5147
LSU School of Vocational Education, Baton Rouge, Louisiana 70803-5477
APPENDIX W

Follow-up Post Card to Experienced and Expert Nurses
FOLLOW-UP POSTCARD TO EXPERIENCED AND EXPERT NURSES

Dear

As an experienced professional nurse, you recently received a packet of research materials to be completed in a study involving critical thinking. If you have already returned the completed study forms, thank you for doing so.

If you have not yet returned the forms, please DO become a study participant by returning the completed materials by ________________.
SUCCESS OF THIS IMPORTANT PROJECT DEPENDS UPON YOUR HELP.

Call if you did not receive or have misplaced your materials and I will mail a replacement. Do call if further information is needed regarding this study.

Sincerely,

Cynthia Prestholdt, RN, MS
Phone: Days: (504) 765-2324,-2325 Evenings: (504) 766-5147
LSU School of Vocational Education/Baton Rouge, LA 70803-5477
APPENDIX X

Means of Critical Thinking Raw Scores
For Novice, Experienced and Expert Nurses
MEANS OF CRITICAL THINKING RAW SCORES FOR NOVICE, EXPERIENCED, AND EXPERT NURSE SAMPLES

The following table presents raw score means for the California Critical Thinking Test for the three professional nurse sample groups included in the study.

Means of Critical Thinking Raw Scores for Novice, Experienced, and Expert Nurse Samples

<table>
<thead>
<tr>
<th>CCTST Scale</th>
<th>Novice Mean</th>
<th>Experienced Mean</th>
<th>Expert Mean</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SD</td>
<td></td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Cognitive Skills (CT)</td>
<td>16.29</td>
<td>17.02</td>
<td>17.48</td>
<td>1.04</td>
<td>.36</td>
</tr>
<tr>
<td></td>
<td>3.42</td>
<td>4.34</td>
<td>3.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td>4.42</td>
<td>4.31</td>
<td>4.42</td>
<td>.07</td>
<td>.93</td>
</tr>
<tr>
<td></td>
<td>1.48</td>
<td>1.55</td>
<td>1.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td>5.87</td>
<td>6.69</td>
<td>6.94</td>
<td>2.82</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>1.88</td>
<td>2.26</td>
<td>2.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inference</td>
<td>6.00</td>
<td>6.02</td>
<td>6.13</td>
<td>.06</td>
<td>.94</td>
</tr>
<tr>
<td></td>
<td>1.80</td>
<td>1.96</td>
<td>1.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deductive Reasoning</td>
<td>7.32</td>
<td>7.00</td>
<td>7.29</td>
<td>.23</td>
<td>.80</td>
</tr>
<tr>
<td></td>
<td>2.27</td>
<td>2.70</td>
<td>2.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inductive Reasoning</td>
<td>7.32&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.17&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8.46&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.79</td>
<td>.03</td>
</tr>
<tr>
<td></td>
<td>1.89&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.13&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a,b</sup> Means not sharing a common superscript are significantly different at p < .05 or less (Tukey Test).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
VITA

Cynthia Ann Ofstad Prestholdt was born and reared in Minneapolis, Minnesota, and was an honor graduate of Minnehaha Academy. She completed her baccalaureate degree in nursing, with high distinction, at the University of Minnesota in 1963. She was inducted into Sigma Theta Tau, international honor society of nursing, and was the recipient of a scholarship and several other university awards. She completed the master of science degree in public health nursing at the University of Minnesota in 1967.

Her professional career includes staff nursing roles in critical care and as a public health nurse in Minneapolis. She has practiced as a certified childbirth educator in Louisiana for over twenty years, both in independent practice and in affiliation with a major hospital. She more recently worked as a nurse researcher during clinical trials related to nutritional research. She has published several times in refereed nursing journals and in one nursing text.

During the past eighteen years, she has taught baccalaureate nursing students and has served on the graduate faculty in a masters degree nursing program. Current faculty responsibilities include theory and clinical instruction of senior students, especially in community health nursing. She has undertaken numerous faculty committee responsibilities within the school of nursing and within her employing university. She has chaired the Curriculum and Faculty Affairs Committees, and now chairs the Evaluation Review Committee.

Current professional memberships include Sigma Theta Tau, American Nurses' Association, the Association of Community Health Nurse Educators, the Association of Louisiana Evaluators, and the American Society for Psychoprophylaxis in Obstetrics (ASPO/LAMAZE). She currently serves as the Louisiana Nurses' Association representative on the Governor's Task Force on Multiple Drug Resistant Tuberculosis.
She serves on several local health agency advisory boards, frequently attends professional conferences, and has presented workshop programs on a variety of subjects. She was recently recognized by the Baton Rouge District Nurses Association for her contributions to the nursing profession.

She currently resides in Baton Rouge, Louisiana with her husband of over three decades, Perry Harold. They have two adult children. She is active in university, church, and in community activities seeking to foster international understanding.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Cynthia Ann Ofstad Prestholdt

Major Field: Vocational Education

Title of Dissertation: The Influence of Expert Status and Learning Style Preference on Critical Thinking Abilities of Professional Nurses

Approved:

Michael J. Burnett
Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination: July 12, 1995