RESEARCH PRODUCTIVITY OF DOCTORALLY
PREPARED NURSES

DISSERTATION

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By

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The purpose of this study is to determine the possible relationship between post-doctoral research productivity of doctorally prepared nurses and instructional experiences of doctoral study, conditions of employment and other factors that may be related to research productivity. The design of the study is causal comparative.

Data for the study was gathered through use of a three-part questionnaire developed by the researcher. The first part of the questionnaire solicits demographic data used to describe the respondents as to age, employment and clinical specialty. The next part gathers data describing the respondents' academic experiences, and the final section explores attitudes toward research and actual research activities. The questionnaire was reviewed by a panel representative of the population prior to its use in the study and was revised for clarity.

The population for this study is registered nurses holding earned doctorates of the type Ed.D., Ph.D. and D.N.S. identified by the Directory of Nurses With Doctoral Degrees 1984, compiled by the American Nurse's Association (ANA). The directory lists 3,648 nurses, of whom 200 were selected for the study. The sample was randomly selected from five
degree categories: the Ed.D., Ed.D. in nursing, the Ph.D., the Ph.D. in nursing and the D.N.S. Forty selections were provided from each category through use of the computerized data bank from the directory of the ANA. An over-all return rate of 76% was achieved following distribution of questionnaires.

Findings of the study are as follows. The respondents closely resembled the population as to age, sex, number of years in nursing and employment. The majority of respondents are female, over age forty-five, employed full time with the most common employment setting being nursing education. Through use of chi square analysis of data a significant relationship was determined to exist between research productivity and certain instructional experiences of doctoral study: selected research support factors and the opportunity for collaboration with peers.
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CHAPTER I

INTRODUCTION

Nursing research has just recently gained national prominence and attention with the establishment of a National Center for Nursing Research at the National Institutes of Health, by the 1985 session of Congress. Nursing research, however, has always had the interest of the nursing profession. Through the years, nursing leaders have seen nursing research as the key to excellence in practice (1, 21, 9, 11) and as the most appropriate means to develop the body of knowledge called nursing science (19). The profession has encouraged and supported research efforts by its members in both formal and informal ways. The American Nurses Association (ANA), the major professional organization of nursing, has made official its strong interest in nursing research through passage of its Resolution on Priorities in Nursing Research (4) which calls for research in all areas of professional endeavor. Further, the ANA wholly supports the American Nurse Foundation Extramural Grants Program to fund nursing research (2).

Nursing has long been viewed as a valued and necessary
serious economic factor. Today, however, health care constitutes 10.5 percent of the Gross National Product and nursing is the health care industry's most populous profession (23). There is, therefore, strong and growing interest in discovering the contribution that nursing can make in solutions for health care problems. Such discoveries are expected to come through scientific nursing research. When House-Senate conferees established the nursing center, they expressed their belief that "... a significant amount of our health care dollars could be saved if research related to improved patient care, patient education and health promotion were substantially supported" (3). Clearly, the need for and importance of nursing research is receiving national attention. It is also clear that funding and support for these efforts is being addressed. The question remaining is: Who will do this important research?

Any scientific research requires a high level of knowledge in the field under investigation plus refined skills in the tools of the research process such as statistics, concept definition, research design and data analysis. Although there is great variance in curricula, all doctoral programs include instruction in the research process. Indeed, in a policy statement, the Graduate Council of Graduate Schools in the United States proclaims the purpose of the doctoral degree to be "to prepare a
student for a lifetime of inquiry that manifests itself in creative scholarship and research . . ." (6). It is certainly appropriate then to expect doctorally prepared nurses to be most naturally suited to the task of nursing research.

Because nursing draws from a variety of disciplines such as biology, behavioral and social science, education and medicine, it has been customary for nurses to seek doctoral education in these related fields as well as in nursing science. In virtually all doctoral programs students are expected to demonstrate research proficiency by concluding their studies with research that will reflect the nature and focus of the particular program. The programs come from a variety of disciplines and include several types of degrees. Because the training is intense and protracted it is reasonable to expect that experiences in a nurse's doctoral preparation will also influence future research activities of that nurse.

Research is an exacting and complex process. It requires a skilled researcher and an array of resources including, but not limited to, time, money, materials and expertise in several areas. The availability of these resources often determines to a large extent the realization of the research process. While all nurses with doctoral degrees have training in the research process, the research productivity of these nurses varies greatly. Little is known of what influences their productivity.
Statement of Problem

The concern of this study is the post doctoral research activities of nurses in the United States holding earned doctorates.

Purposes of the study are as follows:

1. To determine if instructional experiences in doctoral study and post-doctoral research productivity are related,
2. To determine if conditions of employment and research productivity are related, and
3. To discover critical factors related to research of nurses with earned doctorates.

Research Questions

In order to determine if a relationship exists between instructional experiences of doctoral study and post-doctoral research productivity, the following questions will be explored.

Does a relationship exist between

1. instruction in the research process and research tools and post-doctoral research productivity?
2. participation in faculty guided research during doctoral study and post-doctoral research productivity?
3. the subjects of the nurse's doctoral dissertation and the subject of subsequent research studies?
4. type of degree obtained and post-doctoral research productivity?
5. type of degree obtained and level of involvement in post-doctoral research productivity?
6. type of degree obtained and subject of post-doctoral research activities?
7. type of degree obtained and perceived need for assistance in research activities?

In order to discover other critical factors related to post-doctoral research activities the following questions will be explored:

Does a relationship exist between
8. conditions of employment and post-doctoral research productivity?
9. having a research mentor and post-doctoral research productivity?
10. attitude toward research and post-doctoral research productivity?
11. basic nursing preparation and post-doctoral research productivity?
12. opportunity for collaboration with peers and post-doctoral research productivity?
Definition of Terms

The following terms will have restricted meaning and consequently are defined for this study.

1. **Doctorally Prepared Nurse.** --a registered nurse, residing in the United States holding an earned doctoral degree of the type Ed.D., Ph.D., DNS., D.N.Sc., DN.

2. **Research.** --scientific study or investigation for the purpose of establishing facts and analyzing their significance.

3. **Nursing Research.** --research dealing with the nature of man and his environment having relevance to the profession of nursing.

4. **Research Productivity.** --the type, number and focus of research study as completed by any single researcher alone or in consort.

Delimitations

This study will be limited to registered nurses holding earned doctorates of the type Ed.D., Ph.D., D.N.Sc., DNS., DN., listed in the *Directory of Nurses with Doctoral Degrees, 1984* (3) published by the American Nurses Association.
Background and Significance of the Problem

The need for nursing research is no longer a controversial question within the profession of nursing or in the context of the current socio-political framework in the United States. In 1974 the American Nurse Association passed a resolution making nursing research a professional priority. Nursing leaders, beginning with Florence Nightingale and continuing to the present time, have spoken of the need for research as a means of establishing a body of nursing knowledge. They have clearly identified areas of need, and using a nationwide Delphi technique, have prioritized research problems having the greatest potential for impact on patient welfare (15).

Currently, federal spending on welfare and social services has been reduced, while at the same time a Center for Nursing Research has been established under the Department of Health and Human Services. The expressed hope in national statements is that nursing research will contribute to reducing the cost of health care.

There has been consensus among nursing leaders over time that higher education, in particular doctoral education, would equip nurses to engage in scientific inquiry and carry out needed research. There has been heated debate, however, as to the type of doctoral degree most needed by the profession. Nursing, by virtue of its nature as an applied discipline, derives its body of knowledge from
a variety of sciences and so it was natural for nurses to seek advanced knowledge in these contributory fields. In the early 1900s, nurses were simply urged to obtain graduate degrees. The first nurse to earn a doctorate pursued her advanced study in Psychology and Counseling, receiving the Ph.D. in 1927. In the years 1926-1959, 132 nurses earned doctorates in various disciplines including public health, administration, medicine, law, and, most commonly, education (17).

The idea of a doctorate in nursing, a cherished goal for nursing leaders, was realized at Teachers College, Columbia, in the late 1920s. By the 1960s there were still only six doctoral programs in nursing, hardly sufficient to satisfy the demands of an entire profession. Nurses continued to earn doctorates in related fields as well as in nursing.

In 1971, the Division of Nursing (U.S. Public Health Service) assembled a national conference of nursing and educational leaders to address "Future Directions of Doctoral Education for Nurses." Eminent nursing leaders attended the conference and articulated their views on doctoral education and on the curriculum design that could best prepare nurses to meet the professional goals.

Martha Rogers, a featured speaker at the conference, was adamant that "a degree in anything but nursing dilutes nursing--and contributes to a delay in the formation of a
body of nursing knowledge" (19). Rogers believes nurses should be prepared first and in greatest numbers with the doctor of philosophy degree in nursing science "which has long been deemed to represent completion of a theoretical oriented research program." She believes other degrees must grow out of a theory base developed by nurses with the Doctor of Philosophy in Nursing Science.

Rozella Schlotfeldt, an equally eminent nursing leader and also a featured speaker at the conference, took a broader stance. She proposed doctoral education in three forms: the clinical doctorate in nursing, DNS or Dn.Sc.; the Ph.D. or Ed.D. in nursing; and the Ph.D. or Ed.D. in related fields. Dr. Schlotfeldt believes the degrees in related fields would keep nursing abreast of knowledge that could be used for nursing (20). All conference participants, however, acknowledged that nurses with doctoral preparation were badly needed and this need would increase markedly in the future (16).

Sixteen doctoral programs in nursing were implemented in the 1970s and two more in the early 1980s. Of these new programs, thirteen confer the Ph.D. and five confer a Dn.Sc. degree. A close look at the programs does not, however, reveal substantial curricula differences between the degrees (13).

In 1972-74, Leininger surveyed new and planned doctoral programs in nursing and identified several emergent problems
and issues. Among these was the concern that federal and state funds were limited at the precise time increased numbers of nurses were interested in pursuing doctoral education. A second issue was that the value of practice-oriented versus research-oriented doctoral programs in nursing had not been examined or clearly delineated (14).

This state of affairs persists today. While the number of nurses enrolling in doctoral programs is increasing, funding for both individuals and programs becomes more tenuous. To date, twenty-four doctoral programs exist with many more in the planning stage. An interim report by the staff of the Southern Regional Education Board, for example, reveals that sixteen or seventeen schools within its region currently offering master's programs in nursing are planning, or preparing to implement, doctoral programs in the near future (21).

Only a very small number of studies have attempted to describe the employment characteristics of doctorally prepared nurses and a smaller number of studies have dealt theoretically with the involvement in research of nurses with earned doctorates (8). Very little information exists as to the type of research done by nurses with earned doctorates with respect to the type of doctoral education they obtained. Since there is clearly identified interest in the preparation of researchers in nursing, there must be an equally clear understanding of factors that contributed
successfully to that preparation.

The significance of this study will be its contribution to discovering

1. Those factors associated with research productivity of nurses with earned doctorates with particular reference to the role of doctoral instructional experiences; and

2. The type of research carried out by nurses with various types of doctoral degrees.

Methods and Procedures

To gather data relevant to the research questions, a survey questionnaire was developed by the researcher and sent to 200 registered nurses with earned doctorates. The nurses were selected from the ANA Directory of Nurses with Doctoral Degrees, 1984 (5) by computerized random sampling technique. One hundred fifty-two usable questionnaires were returned providing information about the doctoral experiences, employment conditions and post doctoral activities of those nurses. The data was analyzed using frequency distributions to describe the study participants and the chi square test of independence to compare selected behaviors and characteristics.

Organization of the Study

This study is organized and presented in the following manner. Chapter I introduces the study with a statement of the problem, purpose of the study research questions, the
background and significance of the study, definition of terms and the delimitations of the study. Chapter II presents a review of related literature addressing nursing research, doctoral curriculum and factors reported to impact research productivity as discussed in nursing and higher education literature. Chapter III includes the methods and procedures used to collect and analyze the data obtained for this study.

Chapter IV presents the statistical analysis of the data, and Chapter V, the summary, results, interpretations, conclusions and recommendations that were derived from the analysis of the data.
CHAPTER BIBLIOGRAPHY


CHAPTER II

REVIEW OF THE LITERATURE

This review of the literature is presented to provide a background for the significance of this study and to develop the focus of the instrument constructed to gather data to answer the research questions. The presentation includes a brief history of nursing research and the nurse researcher, an analysis of doctoral program types from both higher education and nursing literature and a discussion of literature containing selected factors impacting on research productivity.

History of Nursing Research

Research in nursing, as in any discipline, is the means to developing and refining a body of knowledge and a set of skills. As such it has always been a part of professional nursing, beginning with the famous Florence Nightingale, founder of scientific nursing.

Florence Nightingale recognized firsthand that improved sanitary conditions in a military hospital saved lives. At a time when the collection and analysis of social statistics were uncommon, Florence Nightingale made her argument to the military for sanitary reform compelling by the use of
meticulous statistics. She is today credited with helping to pioneer the revolutionary ideas that social phenomena could be objectively measured and subjected to mathematical analysis (18, p. 128).

Nursing leaders since Florence Nightingale's time have been at variance in their choice of research focus but have been unanimous in their call for scientific inquiry and the need to use research as a basis for practice. The efforts began in a problem solving approach but soon developed into formal research. In 1910, Mary Gardner presented "Findings on Parent Education" at a meeting of nursing school directors in Minnesota. Ms. Gardner had compared groups of parents educationally prepared for childbirth by the nurse with parents who were not formally prepared. The positive findings encouraged her to advocate at that professional meeting that nurses be trained to provide education to prospective parents (34, p. 182). In a recent history of obstetrics and gynecology, the author credits nursing with the entire concept of prenatal care and the pioneering of its design (81, p. 142).

The Committee on Public Health Nursing of the National League of Nursing Education met in 1913 to consider some contemporary problems for nursing's attention.

Katherine Tucker wrote,
We are almost past the day of the common sense nurse who meets situations simply as her inherited instincts or acquired habits teach her with only the background of her own limited experience and folklore of her people as basis for judgment. Now, intelligent care of the sick must involve some knowledge of the scientific approach to disease -- something as to the causes and prevention as well as knowledge of particular symptoms and special treatment (85, p. 113).

A review of the history of nursing research provided by Drs. Helen Nahm and Susan Gortner for *Nursing Research* reveals a wide range of problems receiving the attention of nursing between 1900 and 1950. Articles appearing in the *American Journal of Nursing* focus on patient care in scores of diseases. By 1930, case studies were appearing in that journal for the purpose of intraprofessional dialogue and the instruction of practicing nurses. In 1932 attention was given to nurse/physician cooperation and by the 1940s, articles appeared citing the nursing shortage with proposed solutions (36).

In 1942, Bixler called explicitly for nursing research in an article entitled "Research and Problems in Nursing." She outlined the research process, encouraged collaboration of nurses in service settings with trained researchers and generally made a convincing case for research saying "... a reasonable confidence that problems will yield to (scientific) study should characterize one's attitude in these times" (13, p. 676). Nursing research by that time included all areas currently designated as important to the
profession: patient care problems, the professional realm (what is nursing), and interprofessional collaboration.

Though individual nurses became excited about research possibilities and involved in research, it was not until the mid-1950s that the profession made a formal commitment to encourage and support scholarly work. In 1955 the American Nurses Foundation was established and a gift from a private foundation provided research grants through the National League for Nursing (76). The same year, the Division of Nursing of the United States Public Health Service established the Nurse Research Grants and Fellowship Program, thereby making public funds available for subsidy of nursing research and research training for nurses (87). It is noteworthy that prior to 1950, only 30 nurses held earned doctorates in the United States.

With public monies available, individual nurses interested and involved with research projects and the profession publicly committed to support, the way seemed paved for the rapid development of a body of nursing research. With increased support and attention, however, came intra-professional controversy over preparation of nurse researchers and their framework for research. Nursing leaders who had been calling for research began questioning the ability of nurses to do research, the possibility of nursing being researchable and the proper focus of any research called nursing.
Focus and Definition of Nursing Research

There have existed over the last two decades almost as many definitions of nursing research as there exist nursing leaders. Over time, a variety of criteria have been raised as essential to any study an investigator might wish to label nursing research. Some critics have been so exclusive with their criteria as to make one truly question that there is such a thing as nursing research. Others have been so broad in their definitions as to permit the qualification as nursing research of almost any inquiry concerned with man. Some examples follow.

Dorothy Johnson, noted nursing leader and educator, offered her appraisal of the state of the art of nursing research in a paper presented at a workshop on theory development sponsored by the Division of Baccalaureate and Higher Degree Programs (43) in 1977. Dr. Johnson grouped investigations relevant to the direct care of patients into three major categories. The first includes investigations conducted by nurses or other scientists that have implications for nursing practice but that fall essentially within the boundaries of other disciplines. She gives as example a study examining the potential for drug-drug interactions among residents of a nursing home. Though one of the most traditional functions of nursing is the administration of medication, Dr. Johnson does not accept this study as nursing research.
Dr. Johnson's second category includes studies that "attempt to describe patient behavior with some effort to couch these descriptions in terms meaningful to nurses but which cover the entire spectrum of behavioral science and are therefore not nursing research" (43, p.3). Dr. Johnson's third category is described as one in which the outcomes of nursing interventions are tested for efficacy. Because even these experimental studies do not proceed from a unified theoretical framework, they cannot be called nursing research according to Dr. Johnson. In reading Dr. Johnson's paper, one is forced to conclude that there may be something called nursing research but it has not yet been seen by Dr. Johnson.

At the other end of the controversy are many leaders who encourage research in a variety of disciplines valuing its applicability to nursing problems (25). At the heart of the controversy lies the issue of nursing theory. Those most conservative in their definitions of nursing research focus on the theoretical base from which the research proceeds. They require that the base be a nursing theory using Kerlinger's definition of theory: "... a set of interrelated constructs (concepts, definitions and propositions) that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining the predicting phenomena" (45, p. 9). Their view of the need for theory base is congruent with Thomas Kuhn's
thesis on scientific development, which maintains that when there is a generally accepted theory within a field, that theory serves to direct the work of researchers by organizing perceptions, defining what is of interest, and directing how to study relevant phenomena (47).

Some nursing leaders such as Martha Rogers expect and advocate the recognition of a single nursing theory. Other leaders encourage the testing of several theories of a diverse nature. Margaret Hardy, Professor, Boston University School of Nursing, points out that at this time nursing does not have a prevailing theory or paradigm but probably several preparadigm schools of thought (39). For this reason she believes that the testing of many theories is not only acceptable but necessary. This attitude is congruent with Kuhn's thesis that the development of scientific thought begins with several divergent schools of thought focused on the same range of phenomena and that science advances through revolution as opposing paradigms are tested and overthrown. Hardy reasons that if, indeed, nursing is in this preparadigm stage, research is part of an evolutionary process and that nurse scientists must persevere in developing knowledge that may solve very specific nursing problems (39, p. 77).

Also at issue in the controversy over defining nursing research is the idea of practicality. Nursing is an applied discipline and this aspect of its nature suggests to some
That nursing research must be practice oriented (23, 24, 30, 39, 43, 46, 48, 53). Others see its applied nature and eclectic field of resources as a justification for supporting theoretical and practical research in many fields, for application to nursing. Joan Rinehardt, in a scholarly article on research and theory development instructs the reader in research design using numerous clinical examples but closes with the admonition that "... we are a practice discipline but we must not be exclusively practice oriented" (71). Some theorists discuss research design but never take sides in the aspect of practice applicability. They call for rigorous methods, appropriate design and statistical treatment without dealing with utility of findings.

Fawcett describes a continuum of theory development which begins with the basic research which initially develops a theory, moves through testing of that theory, and finally culminates in use of the theory to test practical application (28, pp. 59-60). She explains that research on the first two levels is far removed from nursing practice application though it will ultimately direct clinical experimentation which will impact nursing practice problems. This view probably puts to rest some of the dissatisfactions expressed in the literature as controversy over too theoretical vs. too empirical research focus.

While the nursing profession has not resolved its
ambivalence with theory vs. practice or what is real nursing research, it is in agreement that nursing research will make significant and needed contributions to the profession. This consensus is evidenced by the "Resolution on Priorities in Nursing Research" passed by the House of Delegates of the American Nurses Association in 1974, which states:

Resolution on Priorities in Nursing Research

WHEREAS, nursing is a discipline in need of further developing and testing of its body of knowledge, and WHEREAS, the communication of nursing knowledge would be enhanced by the existence of tested concepts and constructs, and WHEREAS, nursing lacks significant influence, power, and prestige because of its inability to specify its contribution to health care; therefore, be it RESOLVED, that the American Nurses' Association make a concerned effort to build a public image of nursing research as an essential contribution to knowledge in the health care field, and be it further RESOLVED, that during the next decade the principle thrust of nursing research be a threefold one, namely, 

a. the development of systematically derived information relevant to the practice of nursing,
b. the development and testing of theories in practice,
c. the identification of criterion measures, tools, and instruments to document the outcomes and effectiveness of nursing practice(l).

Three years later, the priorities of the resolution were spelled out more specifically by the ANA's Commission on Nursing Research which identified two categories of focus: practice, (patient care) and profession-related.
Twelve practice areas for the study were:

1. Studies to reduce complications of hospitalization and surgery (sleep deprivation, anorexia, diarrhea, neurosensory disturbances, respiratory infections, circulatory problems, and others).
2. Studies to improve the outlook for high-risk parents and high-risk infants.
3. Studies to improve the health care of the elderly.
5. Studies of adaptation to chronic illness and the development of self-care systems and group-care systems.
7. Studies of nursing interventions to promote health.
8. Studies to facilitate the successful application of new knowledge to patient care.
9. Studies to define and delineate health states.
10. Studies of addictive and adherence behaviors.
11. Studies of under- and over-nutrition.
12. Studies to evaluate the outcomes and/or effectiveness to consumers and providers of different patterns of delivery of nursing services (22, p. 405)

Six areas for study were listed pertaining to the profession of nursing:

1. Studies of manpower for nursing education, practice, and research.
2. Studies of quality assurance for nursing and of criterion measures for practice and education.
5. Studies of nursing curriculum.
6. Studies of the organization of the nursing profession (22, p. 405).

These priorities seem to be broad enough to encompass most of the areas of research called for by nursing leaders and preferred by researchers themselves.
In the years since the resolution was passed, there have been various commentaries on the progress of the profession in addressing the stated priorities. Observers have looked not only at trends in the focus of research but at the research as well.

The Nurse Researcher

Florence Nightingale was the first nurse to publish her research, although she had no formal preparation in either health care or research (66, p. 8). Mary Gardner, who presented her findings related to prenatal care in 1910, was a graduate of a nurse training school which certainly did not include any aspect of research training in the general course (34).

In 1926, the first nurse to earn a doctorate graduated from Teachers College, Columbia University, receiving the Doctor of Education Degree. Slowly, the very small number of doctorally prepared nurses began to impact on practice as both teachers and researchers. By 1941 sufficient nursing investigations had been made to warrant a publication which was entitled *Investigation of Problems in Nursing Education* and published by the Bureau of Publications, Teachers' College, Columbia University (65). The small unbound publication represented the bulk of nursing research of that era.
It was clear that the small number of nurses capable of research had to be supplemented if the problems of the profession were to receive needed attention. To this end, Genevieve Bixler wrote an article in 1942 entitled "Research and Problems in Nursing" that appeared not in a journal of higher education but in the *American Journal of Nursing*, a practice journal. The article was directed to "... a group of relatively inexperienced and unsupervised workers who need to study specific problems but who cannot for various reasons receive the systematic training of research workers" (13, p. 676). She was referring to the majority of professional nurses, supervisors, teachers and administrators alike who were close to the problems of the profession but untrained in methods of inquiry. She proceeded to give her readers an overview of research methods and encouragement to join forces with trained researchers to address professional problems. This approach was a common one for many years.

Practicing nurses were primarily involved in research as data gatherers and problem spotters. Research came from practice-problems, and those with practice skills seldom had research training and vice versa. In a study of the literature entitled "Nursing's Search for Scientific Knowledge" Julia Brown and others sampled research from four major nursing journals for the years 1952, 1960, 1970, and 1983. They found that in the early years the senior authors were usually not nurses, studies were better described as
problem solving than research, and there was little theoretical orientation. By 1983 the group found that seventy-eight percent of senior authors were nurses, there was a sharp increase in collaboration, and that as early as the end of the 1960s, forty-eight percent of authors were doctorally prepared (15, p. 26).

Beck reviewed studies in the journal *Nursing Research* from January 1974 to June 1985, in order to identify the theoretical frameworks used by nurse researchers. It was found that nurses used between one and four concepts or theories for their investigations, with stress, role theory, and social learning theory by far the most prevalent theoretical bases (11, p. 37). Use of theoretical framework is usually taken as an indicator of higher level research. The increased sophistication of nursing research correlates with the increased numbers of doctorally prepared nurses doing research. It is significant to note that prior to 1950 only thirty nurses held earned doctoral degrees and of that number four were practicing physicians and two were lawyers.

During the 1960s, five hundred nurses earned doctorates in twenty various majors (76, p. 178). The number continued to increase with over 3,600 doctorally prepared nurses now listed in the *ANA Directory of Nurses with Doctoral Degrees, 1984* (2). Given the complexity of the research process itself and the extent of knowledge of subject matter necessary to generate new knowledge, doctoral study is likely to be
the minimal preparation necessary to the competent researcher.

Higher Education

The highest academic degree possible in America today is the doctorate. The degree may be earned in many fields and does vary in form and title somewhat from field to field and from institution to institution. Superficially, academicians have viewed the Ed.D. as the practice degree and the Ph.D. as the research degree although a close look at present realities blurs this distinction considerably. Schweitzer (78) sees doctorates in two categories: research and non-research degrees. Doctorates in medicine, dentistry, veterinary science, and optometry fall into the non-research category. They do not require a research project thesis and are limited almost exclusively to the healing arts. The research degrees are the Ed.D., and the Ph.D. In discussing the latter degrees an attempt is made to distinguish between the two. Schweitzer explains that some Ed.D. curricula differ from the Ph.D. in the increased amount of course work and a more practical, rather than theoretical, problem for dissertation. He says in summary, however, "... In numerous cases the distinctions between the two degrees are quite shadowy and in many instances it is impossible to identify which type of degree is involved from the requirements, the thesis topic or the character of the thesis" (78, p. 21).
In nursing, the professional doctorate is the D.N. Sc. In some schools there is a title variation but the substance of the degree is professed to be a practice orientation, much as the Ed.D. is regarded in education.

The Association of Graduate Schools describes the professional doctorate as "the highest university award given in a particular field in recognition of completion of academic preparation for professional practice" (6). They then describe the Doctor of Philosophy degree as an award recognizing "the ability to carry out meaningful research and to discover new knowledge and . . . which in addition usually implies appropriate preparation for active scholarship and research. . . . Its purpose is to prepare a student for a lifetime of inquiry that manifests itself in creative scholarship and research often leading to careers in government, business and industrial organization as well as traditional careers in university and college teaching. . . . A central purpose of the doctoral program is the extension of knowledge." (37)

Dale Anderson, Chair of the Department of Education at Washington State University, undertook a study designed to distinguish between the two degrees in regard to admission, residency requirements, program requirements and employment patterns of graduates (3). The study included 167 institutions and identified no significant differences between the programs in any of the variables with three
exceptions. Language requirements were much more frequent in Ph.D. programs, though choice of tool subjects were equal in both. Employment patterns did differ significantly with college and university work being the most cited work setting, with K-12 public school employment second. Ed.D. holders cited the exact opposite order in employment settings. There was a substantial difference between the two degrees on the acceptance for a practical problem or survey as a substitute for a basic research study with Ed.D. programs accepting such activities much more frequently than did the Ph.D. programs. Anderson concludes that the degrees will continue to serve different philosophical goals while remaining very similar in the major aspects (3).

Howard Smith's recent study of the question made similar findings. Smith concluded that "the most significant observation to be made is that the similarities between the two degrees are more impressive than the differences." (79) It is apparent from these and other studies (4, 5, 24, 68, 72, 91) that very little can be deduced about a doctoral program from knowing only type, Ed.D. or Ph.D. Both profess to offer similar training and rigor as evidenced by scrutiny of degree requirements. If differences in the programs exist, they may be more evident in the behavior of their graduates.
Doctoral Education Impact on the Researcher

Florence Downs, in an exhaustive review of doctoral programs, concludes that doctoral education is preparation for scholarship and that demonstration of scholarship is accomplished through continued contributions to the state of the art. She views doctoral education as "the primary process through which scholarly skills and knowledge will be increased" (26, p. 58).

Schotfeldt points out that research in all fields is intimately related to the experience of potential researchers (76, p. 178). Interest in and commitment to research is profoundly affected by associations with leaders in a field, especially teachers. Most often in the basic sciences the research focus made in doctoral study becomes the life work of that scientist. Though that is less often true in the applied sciences, experiences in doctoral study certainly profoundly influence future professional work. The Graduate Council policy statement on the Ph.D. speaks to this point directly when it refers to the doctoral program as preparing a student for a lifetime of inquiry (37).

Unlike other professions, nurses have traditionally sought doctoral preparation in many fields outside their own discipline. The earliest doctoral program in nursing was begun at Teachers College, Columbia University in the early 1920s. It remained the only nursing doctorate in the country until the 1960s. Because nursing is a discipline
which applies knowledge from many sciences, it was natural for nurses to seek education in those contributory disciplines.

Doctoral education for nurses proceeded over time in three distinct phases (59). The first phase 1926-1959, saw nurses prepared primarily as teachers and administrators with only 132 nurses earning doctoral degrees. The second phase, the 1960s, has been referred to as the nurse-scientist era. New York University initiated its Ph.D. program in nursing science, a few other nursing doctorates were developed and 450 nurses earned advanced degrees, primarily in other disciplines. The 1970s saw the first major professional effort to determine what goal the profession was to have for doctoral education. Sixteen doctoral programs in nursing were developed of which twelve confer the Ph.D. and four confer the D.N. Sc. degree (59, p. 645). During this latest period, controversy over the best choice of degree consumed a great deal of the profession's energy.

At a conference entitled "Future Directions for the Doctoral Education for Nursing," leaders of the profession argued the merits of various program choices (52). Martha Rogers was adamant that any degree but the Ph.D. in nursing would fail to serve the advancement of nursing knowledge (73). Schlotfeldt, at the same conference spoke of the need for nurse scholars to be prepared in all of the fields
contributory to nursing in order to bring fresh knowledge to nursing for its special application (75). During the conference, participants also touched on the felt confusion over degree types. The one concensus achieved was that the title of a degree probably had more to do with the way a school was organized than with what a program actually offered (52, p. 28).

Today there are twenty-four schools offering a doctorate in nursing (61) with many more in the planning stages (80). The doctorate in nursing is becoming steadily more common among the population of doctorally prepared nurses but still is not unanimously favored as the preferred educational path for nurses.

There are those who question the validity of a Ph.D. in a discipline with as allegedly a small body of knowledge as nursing. There are even those who question if nursing has any knowledge unique to itself.

Some leaders in the 1960s called for doctoral programs for nurses in the basic sciences so that once they were prepared in research they could develop new nursing knowledge justifying a nursing degree (67). Others called then and now for preparation in basic disciplines for the potential contributions to nursing these nurses could make (74, p. 83).

The question becomes more than philosophical when nursing leaders make funding recommendations for program
development and individual study grants. As early as the late 1950s, the Division of Nursing, U.S. Public Health Service was supporting two related programs—the Faculty Research Development Grant (FaReDeG) and the Nursing Theory Conferences. Grant money was used primarily to "stimulate research capabilities among faculty in graduate nursing programs typically through graduate education leading to a doctorate" (59, p. 648). Until quite recently, the majority of government funding for nursing education has been devoted to developing nursing doctoral programs in various institutions. Very little, if any, support has been available for the nurse who wished to pursue doctoral education in other than a nursing program, degrees Downs calls "inferior degrees" (26, p. 57). And yet, there remain those who question the validity of the degree and the degree curriculum now in place.

Leininger surveyed new and proposed doctoral programs in 1972-74 and identified four main concerns: limited fundings, neglect of program components to prepare administrators and clinicians, lack of identification of a core curriculum, and the explication of practice vs. research relative merits (50). Cleland, too, addressed the same issues and their impact on the quality of a program with an added concern for adequately prepared faculty (17).

General concern for quality programs has led to a great deal of writing and exhorting by nursing leaders. Norris
gives salient and commendable guidelines for doctoral faculty selection and promotion of a research climate in the program (64). Others discuss degree types and curriculum merits (26, 50, 59, 77).

And yet in 1981, when an investigative team surveyed twenty doctoral programs in nursing for ideal essential vs. actual essential content, a great disparity existed. Only eleven schools submitted information that described program requirements and the nature of the degree. Five schools were not using a current nursing model as a conceptual framework (the primary argument for a nursing doctorate) and one school had no identified core courses (10, p. 314).

Lancaster undertook to compare curricula of all existing doctoral programs in nursing, expecting to find clear differentiation between the Ph.D. in nursing and the D.N.Sc.

His conclusions are:

1. The differences in the existing Ph.D. and D.N.Sc. programs are vague.

2. The differences in the dissertation research for the Ph.D. and D.N.Sc. are not well defined (49).

In a pro-con literary face-off in Nursing Outlook two nurses argue the necessity of a doctorate for nurses. Reasons given for obtaining the doctorate include validating skills, expanding performance abilities and increasing career options (70). Criticisms of the doctorate cited were: the probable stagnation of the nurse in one area,
narrow job opportunities and loss of access to research populations (84). Both authors are doctorally prepared.

In view of the fact that the primary expectation of the doctorally prepared nurse has been research productivity, the realities of performance have been disappointing. In two major studies of nurse-doctorates only a small portion of those nurses report their primary professional involvement as research activities. In a study of the 1973 population, only 43 percent indicated that they were currently engaged in research, 36.3 percent had been engaged in research in the past five years, and 20.8 percent had no research involvement. Of the 1,020 subjects, only 3.5 percent listed research as their primary position (69).

In a similar survey of the 1981 population, preference for the Ph.D. had increased while preference for the Ed.D. decreased. In this population 5.5 percent listed research as a primary responsibility. Brimmer, the investigator, points out that "despite the change toward a stronger research emphasis in doctoral study the extent of involvement of doctorally prepared nurses in research activities has not shown a comparable increase" (14).

Both the 1975 and the 1983 studies looked at employment characteristics of the nurse-doctorate population as well as degree preference and time spent on research. Neither study attempted to measure research productivity nor compare research activities among the various degree types. Since
the profession is vitally interested in generating researchers it would seem reasonable to try to discover which of the many doctoral programs completed by nurses has been associated with productive researchers.

Stimulating interest and skills in research is a concern of all applied disciplines and a vital part of their doctoral programs. A review of the literature in some of the those disciplines reveals several commonalities in recommended learning experiences that are expected to promote research skills in the student. The Association of Counselor Education and Supervision Guidelines for Doctoral Preparation speak emphatically to the need for doctoral students to acquire research skills. They make several explicit recommendations.

- Doctoral students must demonstrate proficiency in statistics and research design.
- Faculty should serve as models and be involved in ongoing research.
- Doctoral students should have the opportunity to participate in faculty research (5).

These three themes plus the notion of faculty monitoring appear again and again in Higher Education literature. Ralph Tyler, an eminent scholar/researcher writes, "Certain features are likely to characterize any superior program of training for research . . . association
with a student group dedicated to research careers
... participation in research at a steadily advancing
level ... thorough grounding in the discipline and its
technical skills" (86, p. 112). Tyler goes on to advocate
exposure to theoretically based research calling empiricism
the simple recording of facts.

Wilson et al., in College Professors and Their Impact
on Students, maintains that frequent personal interaction
with faculty is how students develop their interest in and
commitment to intellectual pursuits, especially research
(90). This faculty student relationship and its sometimes
mystical benefits is treated at length by Ross Mooney who
strongly advocates the involvement of doctoral students in
faculty research. While courses in statistics and design
are essential, involvement in the actual research with a
seasoned researcher truly enables the student. Mooney
illustrates his thesis beautifully by saying, "Knowing how
to make a map is NOT the same as knowing how to make a
journey" (54, p. 177).

The advisor as mentor is discussed by Bargar and Duncan
who give a full prescription for the proper mentoring of a
student. The mentor should be a role model, worthy of the
student's trust, and a capable and seasoned researcher. The
thrust of the relationship is enhancement of the student's
understanding when needed, and thoughtful criticism and
protection of the student from irrelevant and abusive
criticism (7). The National Association of State Universities and Land Grant Colleges defines research goals of its members as "to enhance student education on both the undergraduate and graduate level" (56, p. 170). It is perhaps this strong influence of doctoral faculty on their students that prompt one of nursing's concerns about doctoral education for nurses outside nursing. There is a stated fear that the nurse will be "lost" to the other discipline, no longer contributing to nursing. In at least one study this fear was found to be groundless as the only shift in research by these nurses was from the alternative discipline, back to nursing (69).

All of the higher education literature speaks to the need for a thorough grounding in statistics and design (5, 6, 8,) and the nursing school programs add concept development as ideal essential content in any doctoral program (10). Most programs offer computer courses as an option for the language requirement or tool subject. No study has been done to date which surveys active researchers' opinions on the impact of these learning experiences on their own research productivity.
Selected Factors Impacting the Researcher and Research Productivity

While the generation of new knowledge is the stated objective of doctoral preparation, the doing of research seems to be, for many professionals, an ever out-of-reach ideal. Professional journals are dependably full of exhortations to overcome perceived barriers and to carry out needed research (7, 8, 9, 11, 12, 13, 15, 16, 19, 20, 29, 30, 32, 44, 51, 53, 54, 76, 82, 86, 88). Typically such articles contain a persuasive case for the need for research and some suggestions for overcoming obstacles to performing investigations. Indeed, in most professions, there are obstacles.

Measuring research performance is one of the first difficulties encountered in attempting to understand research performance. Not only does a universally accepted definition of research not exist, but within many professions the definition of research in that profession remains controversial. In nursing, for example, opinion is very diverse as to the definition of nursing research as was outlined earlier in this chapter. This uncertainty exists in counseling (88), social sciences (31), education and many other disciplines (19).
In a 1984 report on faculty work load by ASHE-ERIC, the term research covered ten items which included painting, creating dramatic or musical compositions, writing articles or books, rehearsing one's music or drama or dance, practicing athletics (for physical education faculty), reading journals, viewing art and discussing research (92, p. 45).

Most of the literature discussing research productivity seems to regard, primarily, the university scholar and the traditional aspects of that way of life. In very recent years industry has become a major employer of scientists of the natural sciences but very little is written about those settings. This may relate to the usual methods of measuring research productivity through publication or citation counts. Probably the research efforts of industry-employed scientists (engineering, pharmacy and aeronautics,) are better measured through product development.

John Creswell presents a profile of productive researchers taken from correlate studies over a forty year period.

He tells us that a productive researcher

is employed in a major university that rewards research and assigns ample time for faculty to conduct research;
holds senior professional rank, though performance may peak 10 years after the doctorate and again later toward the end of a career;

spends at least one-third of time on research activities;

began publishing early in career and received positive feedback from peers for research efforts; and

maintains regular and close contact (e.g., telephone calls) with colleagues on and off campus who conduct research on similar topics (20).

A study by Walton (88) of research activity of counselor educators developed a similar profile. He found the following factors positively correlated with high research productivity: longer tenure in the profession, higher academic rank, affiliation with larger colleges and universities, increased number of journal articles submitted, increased professional activity other than research and a greater amount of time devoted to research on a weekly basis. There was no significant difference found between high and low research producers in regard to their degree type, number of years between achievement of the baccalaureate and doctoral degrees, academic tenure, number of professional memberships, and primary area of specialization or age (88). To date there are no published studies of doctorally prepared nurses correlating employment or preparation with research productivity. Two studies exist which describe these nurses' involvement in research giving no parameters for the involvement. The 1975 study reveals 31.5 percent of the population functioning in some research
capacity (69, p. 348). The 1983 study addressed the topic somewhat differently but concluded that "little change has occurred in the average amount of time allocated for research activities" (14, p. 165).

Nieswiadomy carried out an investigation of 500 nurse educators exploring their involvement in research in 1980. She found only 25 percent of the sample involved in research activities (past and present) and was able to describe several correlates to research activity. Those engaging in research activities were, for the most part, doctorally prepared and affiliated with larger colleges and universities, especially with institutions offering graduate degrees. Her sample reported that their institutions provided minimal to no support for research, and fifty percent of the institutions did not consider research in faculty evaluation for promotion or tenure.

Reasons given by study subjects for non-involvement in research (in order of reported priority) were:

1. lack of time
2. lack of skills
3. lack of interest
4. lack of support from employer
5. lack of funds
6. lack of facilities
7. lack of a research population (63, p. 55).
These factors appear over and over again in the literature as barriers to research productivity. Fuller, addressing the question of how a doctorally prepared nurse develops into a productive researcher found that the number of nurses with doctorates who continue to publish five years after obtaining the degree is extremely small. Reviewing job descriptions of doctorally prepared nurses, she found very few which included research as an integral part of the nurse's job. Citing lack of time and conflict of duties as the most significant impediments, Fuller also points out that lack of access to clinical facilities, lack of a conducive climate of peer support and lack of research skills on the part of the nurse, were all common problems (32).

Lack of research skills is a lament seen in the literature frequently and attributed to a variety of causes. Taira-Fauces (84) and Reed (70) in separate articles discuss the expected vs. the real capabilities of doctorally prepared nurses and remind us that there are many reasons for pursuing the doctoral degree, research being only one. Fuller points out that most other disciplines provide post-doctoral training for research and that nurses trained in a cognate discipline may find it difficult to transfer methods and skills of the cognate to nursing (32, p. 111). Conversely, Donaldson and Crowley state clearly that "all research that is important to the profession of nursing is
not derived from the discipline of nursing" (25, p. 113). Chenitz and Swanson see post doctoral training as essential and describe the role of the post-doctoral research fellow in nursing as lonely but necessary if legitimate research skills are to be developed (16, p. 418).

Funding is a problem discussed in the literature of all helping professions. An entire 1984 issue of Change was devoted to the concern over diminishing funding for educational research, teaching and curriculum. Entitled "Graduate Education: Trouble Ahead," the journal devoted article after article to pointing out the deficiencies of funding for libraries, research fellowships and what they called deplorable laboratories (38). Morton discusses the impact on nursing of the financial distress of higher education, pointing out that increased teaching loads necessarily limit the amount of time and energy college professors can devote to research (58). Keller points out that perhaps two-thirds of all higher education research is unfunded (44, p. 9).

Though admittedly sparse, funding for nursing research has been obtainable for many years beginning with the U.S. Public Health Service which established Nursing Research Grants and Fellowship Programs and the American Nurses Foundation. Both were initiated in 1955 (62, 76). Many public and private funding foundations have offered support for nursing research, some specifically available only to
The doctorally prepared nurse. Recently a center for nursing research was established within the National Institutes of Health, United States Public Health Service which is expected to provide increased funding especially for clinical investigations. All federal funding becomes questionable, however, in light of the Gramm-Ruddman Budget Act of 1985.

The complexity of the research process has been challenged lately by the tactic of collaboration of researchers with similar interests. Often researchers with divergent skills but like concerns can collaborate on research projects achieving a product far exceeding the skills of any one of the team. Barbara Bishop makes an almost impassioned plea to expert clinicians and skilled researchers to join their separate but essential skills to collaborate in researching the problems of the profession (12). In making a case for collaboration she points out some of the perceived barriers to research such as lack of research skills, lack of clinical competence, lack of access to a research population. Typically the clinician lacks familiarity with research techniques (statistics, design) while the researcher may lack knowledge of new field problems and access to a research population. This schism is not unique to nursing.

Stockton and Hulse address the same issue for counselors. They point out that counseling is an applied
discipline with an emphasis on practice but that "if the profession does not assume responsibility for intellectual inquiry...concerning effective practice the field cannot advance" (82, p. 303). Citing many perceived reasons for a paucity of research in their discipline they offer the suggestion of collaboration as an effective remedy. They especially advocate the collaboration of the practitioner, the academic researcher and graduate students, thereby combining and sharing skills at many levels (82).

The Western Interstate Conference of Higher Education sponsored a major project to promote collaborative efforts among researchers and clinicians, specifically using a problem-solving approach addressing patient care solutions (51). A study undertaken by the Michigan Nurses Association, funded by the Division of Nursing, U.S. Department of Health and Human Services (CURW 1975-1980), explored ways of promoting research and disseminating findings and concluded that collaboration would contribute to meeting both goals (51). Collaborative efforts can take many forms, from work-setting groups addressing a common problem to long-distance collaboration, such as occurred between Felton and McLaughlin working on opposite coasts of the United States. They saw their liaison to be particularly beneficial as one of the researchers carried sufficient prestige to influence the obtaining of funding while the other had access to the research population (29).
Collaboration as a strategy to improve research is discussed by Iwasiw and Olson, who identify many benefits to the strategy such as mutual motivation, shared skills, firmer deadlining and having a knowledgeable sounding board. Having access to potential collaborators may figure significantly in stimulating research (42).

Mentoring is another form of collegial affiliation that can serve some of the same needs as collaboration. Mentoring as a concept has been treated in depth by almost every discipline (33, 35, 60) and certainly applies to the nurse researcher. Darling advocates the cultivating of "minor mentors" for various aspects of one's professional career, so as to bring several kinds of expertise to a network of relationships. Such mentoring for research often begins in graduate school between professor and student and can greatly enhance the learning which takes place.

Fagen and Fagen studied the results of mentoring relationships among nurses and offered the following information. Mentoring positively impacts socialization and inspiration; very few subjects picked up negative traits from a mentor, both mentors and protégé were likely to be more satisfied with their jobs and less burnout occurred among mentors and protégé. Defined as an "experienced adult who befriends and guides a less experienced adult," the mentor could be a significant figure in the development of a researcher (27).
Carol Barta, on assuming the position of Chief of Nursing Service and Education at the University of Virginia Medical Center, set out as her primary ambition to increase the number of nursing research projects at the medical center. A survey of her faculty and staff revealed the missing ingredients of research support to be peer approval and encouragement, lack of familiarity with the research process, and perceived lack of time to undertake literature reviews. Barta instituted research classes, held topical conferences to bring potential collaborators together and made an innovative attempt to bring library resources to the workplace. The university library was involved in a joint venture with nursing service which amounted to a mini-search. As a client was admitted for care, a data base search was made and the most recent research article pertaining to the client's condition was attached to the chart (9).

Literature searches are, of course, an integral part of the research process and can be a heavy part of the work involved. With the advent of bibliographic utilities, searches can, today, be more thorough and considerably less painful than in the days of manual searching.

Computer assistance was introduced into libraries to assist in cataloguing, that is, recording, describing and indexing items in a collection. Computers are significant in this process because they enable sharing of catalogue
records and nearly instant retrieval. The oldest and largest of the bibliographic utilities is Online Computer Library but there are several others including Research Libraries Group which serves specific needs of large research libraries. Most areas of the country also have regional network resources and commercial databases available (57).

There are many clear advantages to the researcher who has access to these services, such as the example cited by Henry and others in their book On Line Searching (40). In a search for information on the use of computers to control lasers in printing, there were 78,000 items on computing, 22,000 items on lasers and 13,000 in printing. There were, however, only six references containing all three items which the computer selected in seconds. Speed is an obvious advantage of the systems which in a matter of minutes can compile information it would take days to retrieve manually. Another advantage most attractive to a nurse researcher is the fact that online searches produce significantly more current information as they are updated, in many instances, on a daily basis. When dealing with medical/scientific concepts this can be crucial.

Such services come at great cost and consequently are not available at every library. Membership fees for the various utilities are considerable. The Academic Affairs Library at the University of North Carolina at Chapel Hill
estimates its total institutional cost for membership at $135,000 for fiscal year 1983-84. Other costs include conversion of pre-existing cataloguing systems, training of personnel and actual hardware required for implementation of the system (57).

Little is known of how the availability of such services impacts on the individual researcher. It would seem obvious that such support services would lighten the load and encourage research activity. Hoover writes that faculty members are conservative and slow to approach new information services but that "... after receiving the results of one good online search, many faculty are hooked..." (47, p. 16). In 1982, however, Williams found that the major users of online services were legal institutions, followed by industry, government and lastly, academic institutions (89, p. 1).

Is the availability of automated searching considered essential by the researcher? Would the inaccessibility of this support service be a deterrent to the otherwise potential researcher?

Summary

A review of the literature confirms that there is a growing need for nursing research and that both the profession of nursing in particular and society in general have an interest in seeing increased research productivity
on the part of nurses. The profession appropriately looks to the doctorally prepared nurse to fill the role of researcher, but there are many avenues to the doctorate available to nurses and little is known of the impact on research productivity of any one of those avenues. Nor is it clear what experiences in a doctoral program are associated with research productivity.

Other professions share the concern of preparing productive researchers for their disciplines and the problem of providing support to those members who would engage in research. Factors such as conditions of employment, access to automated library resources, funding of research projects, support of colleagues, available time and access to a research population are all reported to influence research productivity but to date no studies have assessed the impact of these factors on doctorally prepared nurses.
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CHAPTER 3

RESEARCH METHODS AND PROCEDURES

Introduction

This study was designed (1) to determine if instructional experiences in doctoral study and post-doctoral research productivity of doctorally prepared nurses are related, (2) to determine if conditions of employment and post-doctoral research productivity of doctorally prepared nurses are related, and (3) to discover critical factors related to research productivity of doctorally prepared nurses. The purpose of this chapter is to present the methods and procedures used to conduct this study.

Research Design

The nature of this investigation is causal-comparative. According to Borg and Gall, "the causal-comparative method is aimed at the discovery of possible causes for a behavior pattern by comparing subjects in whom this pattern is present with similar subjects where it is absent or present to a lesser degree" (4, p. 445). This study is designed to determine the possible relationships between post-doctoral research productivity of doctorally prepared nurses and learning experiences of doctoral study, conditions of
employment, and other factors that may be related to research productivity. It is ex post facto research, because doctoral training, employment conditions and other factors will have exerted their influence on research productivity before the study takes place. There is no attempt to show causality, only association. The data was gathered by use of a mailed questionnaire developed by the researcher.

Instrument

The questionnaire used in this study was developed by the researcher and is divided into three sections (Appendix A). The first section solicits demographic data which is used to describe the participants in the survey as to age, employment, education, and clinical nursing specialty. The next section gathers data which describes the participant's academic experiences during doctoral courses and the dissertation process. These items reflect traditional aspects of doctoral instructional experiences such as coursework, associations with faculty and dissertation activity. The remainder of the questionnaire is devoted to exploring attitudes toward research, actual research activities and the participants' opinions on the contribution of their doctoral program to their post-doctoral research abilities. Directions for completion are given in the body of the questionnaire providing such guidelines as whether one or
more choices in response to a given question is appropriate. The questionnaire was accompanied by a cover letter (Appendix B) which introduced the study and the researcher and solicited the participation of the subject. The importance of the subject's participation was emphasized and gratitude expressed for her compliance. Summary data following completion of the study was offered to participants on their request.

Prior to use in the study the questionnaire was submitted to a panel of five doctorally prepared registered nurses, representative of the study population (Appendix C). The nurses were asked to review the instrument for clarity and validity and the cover letter for clarity and effectiveness.

The nature of the study was explained to the panel and each member of the panel asked to (1) complete the questionnaire as directed, (2) indicate the amount of time necessary to complete it, (3) evaluate the questionnaire for clarity and validity, and (4) react critically to both letter and questionnaire.

The questionnaires were returned to the researcher and the panel was then interviewed for comment and criticism of the instrument. The panel made suggestions to improve clarity of the instrument which were incorporated into a revised form. These were minor rewordings of some items and
the general directions. No item was judged by the panel to be irrelevant and no new items were suggested for inclusion.

Population

The population for this study is registered nurses in the United States holding earned doctorates of the type Ed.D., Ph.D., and D.N.S./DN.Sc./D.S.N., identified by the Directory of Nurses With Doctoral Degrees, 1984. This directory is compiled periodically by the American Nurses Association (ANA) and represents the most comprehensive listing of doctorally prepared nurses available today (1).

The directory of 1984 lists 3,648 doctorally prepared nurses identified through a national search. Licensure as a registered nurse and holding of an earned doctorate are the only requirements for inclusion in the directory. Membership in the American Nurses Association is not a requirement and there is no fee involved. Means used by the ANA to seek out doctorally prepared nurses for inclusion in the directory include: direct mailing to nurses listed in previous issues of the directory; search letters to state nurses' associations, schools of nursing and various nursing organizations; and published notices in journals of professional nursing and the journals of allied professions such as sociology, psychology, education and public health.

Eligible nurses provide the ANA information for inclusion in the directory. Requested information includes
academic biography, type of employment, nursing specialty and research interest. For the 1984 directory approximately 4,500 questionnaires were sent to eligible candidates, and 3,648 completed questionnaires were returned and used in the directory (1, p. iii). Of this number 6.3 percent or 230 nurses held doctorates in the disciplines of law, medicine, veterinary science, pharmacy, osteopathy and public health. Nurses holding these degrees were not considered for this study due to the special practice focus of their education.

Sample

The sample for this study was taken from the population described above. In order to insure equal representation of the five degree categories that are concerns of this study, computerized random selections of forty nurses were made from within each of the five categories yielding a target population of 200 nurses. These categories are (1) the Ph.D. in nursing, (2) the Ph.D. in a field other than nursing, (3) the Ed.D. in nursing, (4) the Ed.D. in a field other than nursing, and (5) the professional nursing doctorate designated DN.S., D.N.Sc. or D.S.N. The sample was provided by the ANA from the computerized data bank for the Directory of Nurses with Doctoral Degrees, 1984. Nurses holding doctoral degrees in the described categories were identified by code and selections were made within each category using computerized random sampling techniques.
Eighty selections were actually made in each category to permit replacement of subjects found to be unreachable by mail.

The decision to include forty subjects in each category was made in anticipation of a return rate for questionnaires of at least sixty percent which would result in a minimum of twenty-four subjects in each category. Achieving this minimal number of subjects in each category was an important preparation for use of the chi square statistic (4, p. 466). Ary and Jacobs caution that "when there are multiple categories, larger samples are needed. If N is small and consequently the expected frequency in any cell is small, the sample statistic may not approximate the chi square distribution very closely" (3, p. 409).

Procedure for Data Collection

Each randomly selected nurse was sent a survey questionnaire, stamped return envelope and a cover letter describing the study, identifying the researcher and soliciting the nurse's participation in the study. Fourteen questionnaires were returned undeliverable (moved, deceased) and were sent to a randomly selected replacement subject in the same degree category. In all, one hundred and fifty-two usable questionnaires were returned. The overall return rate of 76 percent was achieved on a single mailing with no follow-up reminders required. The range of return in all categories was 67.5 to
90 percent with greatest returns for nurses holding the Ph.D. degree.

Analysis of Data

Demographic data describing the population as to age, sex, clinical specialty and basic nursing preparation is displayed in frequency tables. Data used to respond to the research questions were treated with the chi square test of independence to determine the existence of relationships. Chi square was selected because the data were nominal in nature and the expectation was that the data would not be normally distributed.

Summary

This chapter described the methods and procedures used to carry out this study of the post-doctoral research productivity of registered nurses holding the Ph.D., Ed.D., and D.S.N., D.N.S./D.N. Sc. degrees. The data were gathered from one hundred fifty-two such nurses who responded to a mailed questionnaire providing information to determine if a relationship exists between instructional experiences of doctoral preparation and post-doctoral research productivity, conditions of employment and post-doctoral research productivity and to discover factors critical to post-doctoral research productivity. The demographic data collected were analyzed using descriptive statistics such as frequency and measures of central tendency. Data used to respond to the research questions were analyzed with the chi square test of independence.
CHAPTER BIBLIOGRAPHY


CHAPTER IV
ANALYSIS OF DATA

Introduction
This chapter reports the analysis of data concerning the post-doctoral research activities of doctorally prepared nurses in the United States. The data was obtained from one hundred fifty two nurses holding doctoral degrees who responded to the research questionnaire developed for this study. The chapter begins with a description of the respondents: their age, sex, education, professional specialties, and employment status. The data gathered to respond to the research questions proposed in Chapter One are then presented and analyzed.

Characteristics of the Respondents
The study sample of 200 was derived from the population of 3,648 nurses with earned doctorates listed in the Directory of Nurses with Doctoral Degrees, 1984. The respondents are 152 nurses who returned the mailed questionnaire. Table I shows the number of questionnaires sent, return rate, and the distribution of respondents according to degrees.
### Table I

**QUESTIONNAIRE RETURN RATE AND DISTRIBUTION OF RESPONDENTS AS TO DEGREE TYPE**

<table>
<thead>
<tr>
<th>Degree type</th>
<th>N Sent</th>
<th>N Returned</th>
<th>% Returned</th>
<th>% of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed.D., Nsg.</td>
<td>40</td>
<td>30</td>
<td>75</td>
<td>19.7</td>
</tr>
<tr>
<td>Ed.D.</td>
<td>40</td>
<td>28</td>
<td>70</td>
<td>18.4</td>
</tr>
<tr>
<td>Ph.D., Nsg.</td>
<td>40</td>
<td>27</td>
<td>67.5</td>
<td>17.8</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>40</td>
<td>36</td>
<td>90</td>
<td>23.7</td>
</tr>
<tr>
<td>DSN/DNS/DNSc</td>
<td>40</td>
<td>31</td>
<td>77.5</td>
<td>20.4</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>200</strong></td>
<td><strong>152</strong></td>
<td><strong>76</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

An overall return rate of 76 percent was achieved with a range of 67.5 percent to 90 percent based on degrees held. This represents an almost even distribution of respondents among the degree types. The highest return rate, 90 percent, was from the nurses with the Ph.D. and the lowest return was from nurses with the Ph.D. in Nursing.

A demographic description follows. The age, sex, number of years experience in nursing and basic nursing preparation of respondents is displayed in Table II by frequency and percent.
TABLE II

AGE, SEX, YEARS OF EXPERIENCE IN NURSING AND DOCTORAL MAJORS OF RESPONDENTS*

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-35</td>
<td>8</td>
<td>3.9</td>
</tr>
<tr>
<td>36-44</td>
<td>38</td>
<td>25.0</td>
</tr>
<tr>
<td>&gt; 45</td>
<td>108</td>
<td>71.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>149</td>
<td>98</td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years in Nursing</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>11-20</td>
<td>31</td>
<td>20.4</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>118</td>
<td>77.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Basic Nursing Preparation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate Degree</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>Diploma</td>
<td>84</td>
<td>55.2</td>
</tr>
<tr>
<td>Baccalaureate</td>
<td>64</td>
<td>42.2</td>
</tr>
</tbody>
</table>

*Total number of respondents in each category 152

None of the respondents is under twenty five years of age and the large majority is over age forty-five. The respondents were overwhelmingly female which is generally
representative of the profession of nursing as well as doctorally prepared nurses.

The majority of respondents have been nurses twenty-one years or longer with only three nurses having ten years or less in the profession, clearly experienced professionals. All of this information generally agrees with the studies done by the American Nurses Association utilizing direct data gathering techniques with the entire population of doctorally prepared nurses (1).

Basic nursing preparation of respondents was almost exclusively diploma and baccalaureate with only four respondents reporting initial preparation through associate degree programs.

Because a variety of doctoral majors are traditional for nurses, the respondents were asked to indicate their major. Table III displays the majors as reported by respondents.

TABLE III
DOCTORAL MAJORS OF RESPONDENTS

<table>
<thead>
<tr>
<th>Major</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Science</td>
<td>65</td>
<td>42.8</td>
</tr>
<tr>
<td>Behavioral Science</td>
<td>14</td>
<td>9.2</td>
</tr>
<tr>
<td>Education</td>
<td>60</td>
<td>39.5</td>
</tr>
<tr>
<td>Biological Science</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Public Health</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>Social Science</td>
<td>7</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>152</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Clearly the most common major of the respondents outside of nursing is education. The data correspond with past studies of this population (1). Behavioral science is the next most common major, a choice which generally includes psychology, child development and other disciplines germane to nursing. None of the respondents indicated a double major.

The respondents were also asked to indicate the number of years since their doctorate was obtained in order to determine if any particular era in doctoral education was over represented in the sample. Table IV gives the distribution of the respondents based on the number of years since the doctorate was obtained.

**TABLE IV**

**NUMBER OF YEARS SINCE DOCTORATE OBTAINED**

<table>
<thead>
<tr>
<th>Years Since Doctorate</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 or less</td>
<td>46</td>
<td>30.2</td>
</tr>
<tr>
<td>6-10</td>
<td>53</td>
<td>34.9</td>
</tr>
<tr>
<td>11 or more</td>
<td>53</td>
<td>34.9</td>
</tr>
<tr>
<td>Totals</td>
<td>152</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The respondents are almost evenly distributed as to number of years since the doctorate was obtained. This distribution makes the group more representative of the population but is somewhat a surprising as over sixty
per cent of nurses with doctorates have obtained them in the last ten years (1). It should be noted that the respondents, therefore, do not represent any particular era in doctoral education for nurses.

Employment characteristics is an important concern of this study in regard to research productivity. The employment status, type of employment and the clinical specialties of the respondents are displayed in Table V.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not employed</td>
<td>15</td>
<td>9.9</td>
</tr>
<tr>
<td>Self employed full-time</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>Self employed part-time</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>Employed full-time by other</td>
<td>123</td>
<td>80.9</td>
</tr>
<tr>
<td>Employed part-time by other</td>
<td>7</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Type of Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not employed</td>
<td>15</td>
<td>9.9</td>
</tr>
<tr>
<td>Nursing practice</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>Nursing management</td>
<td>14</td>
<td>9.2</td>
</tr>
<tr>
<td>Nursing education diploma</td>
<td>1</td>
<td>.7</td>
</tr>
<tr>
<td>Nursing education AD</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>Nursing education BSN</td>
<td>34</td>
<td>22.3</td>
</tr>
<tr>
<td>Nursing education grad</td>
<td>58</td>
<td>38.2</td>
</tr>
<tr>
<td>Independent nursing practice</td>
<td>1</td>
<td>.7</td>
</tr>
<tr>
<td>Consulting</td>
<td>11</td>
<td>7.2</td>
</tr>
<tr>
<td>Outside nursing</td>
<td>11</td>
<td>7.2</td>
</tr>
</tbody>
</table>

**Clinical Specialty**

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Number</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal/child</td>
<td>32</td>
<td>21.2</td>
</tr>
<tr>
<td>Medical/Surgical</td>
<td>63</td>
<td>41.4</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>35</td>
<td>23.0</td>
</tr>
<tr>
<td>Community</td>
<td>18</td>
<td>11.8</td>
</tr>
<tr>
<td>Family Practice</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>152</td>
<td>100.0</td>
</tr>
</tbody>
</table>

*Totals in all categories = 152*
The majority of the respondents are employed full-time in some type of nursing education (63.2%) with more than half of those in graduate nursing education. Slightly less than 10 percent of the respondents are in management, and less than one percent are in independent practice. A wide range of clinical specialties is represented with the largest number being employed in medical surgical nursing. Family practice is the specialty of only 2.6 percent of the respondents.

Profile

Overall, the respondents seem to be representative of the total population of nurses with doctorates (1). A profile of the average respondent might be as follows: she is a doctorally prepared nurse having a traditional clinical specialty, over forty-five years old and employed full-time in nursing education. She has held her doctorate for at least six years, and her initial nursing education was either baccalaureate or diploma.

The remainder of the chapter presents the data gathered from these respondents concerning their instructional experiences in doctoral study, conditions of employment and other selected factors which may impact their research productivity. The information is organized according to the purposes of the study.
Instructional Experiences in Doctoral Study
and Post Doctoral Research Productivity

Choice of Doctoral Program

Subjects were asked to indicate which factors critically influenced their choice of a particular doctoral program by checking any factors that applied to their decision. Table VI displays the frequencies of those choices and the percentage of the respondents making each choice.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Number*</th>
<th>Percent*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment aspirations</td>
<td>56</td>
<td>36.8</td>
</tr>
<tr>
<td>Specific learning goals</td>
<td>89</td>
<td>58.6</td>
</tr>
<tr>
<td>Geographic available programs</td>
<td>90</td>
<td>59.2</td>
</tr>
<tr>
<td>Economic considerations</td>
<td>45</td>
<td>29.6</td>
</tr>
<tr>
<td>Part-time study opportunities</td>
<td>33</td>
<td>21.7</td>
</tr>
<tr>
<td>Entrance criteria</td>
<td>25</td>
<td>16.4</td>
</tr>
<tr>
<td>University prestige</td>
<td>61</td>
<td>40.1</td>
</tr>
</tbody>
</table>

*Multiple choices possible

Geographic availability of a program and specific learning goals of the learner were indicated as critical factors influencing a clear majority of the respondents. University prestige and employment aspirations were the next two most influential factors. Entrance criteria was
selected by very few of the respondents. A 1983 study by the American Nurses Association indicates that sixty percent of these respondents changed positions after receiving the doctorate, but four-fifths continued in the same type of position (5, p. 158).

Relationship Between Instruction in Research and Research Productivity

Research question one deals with the relationship between instruction in the research process and the amount of post-doctoral research productivity. The data relating to courses in statistics, research process and computer literacy are grouped into three categories: no courses, one to three courses and four or more courses. The data relating to concept development—grant writing, strong faculty guidance and writing for publication—are grouped into two categories, no experience and some experience.

Data describing research productivity are grouped into three categories: nurses who did no research (N46), nurses who completed one to three research projects (N59), and nurses who completed four or more research projects (N47). Table VII presents the findings related to instruction and research activity.
### TABLE VII

**RELATIONSHIP OF RESEARCH PRODUCTIVITY TO INSTRUCTIONAL EXPERIENCES DURING DOCTORAL STUDY**

<table>
<thead>
<tr>
<th>Type of Instructional Experience</th>
<th>Research Productivity</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0(N46)</td>
<td>1-3(N59)</td>
</tr>
<tr>
<td>Statistics</td>
<td>43</td>
<td>54</td>
</tr>
<tr>
<td>Research</td>
<td>43</td>
<td>57</td>
</tr>
<tr>
<td>Computer</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>Concept Analysis</td>
<td>26</td>
<td>45</td>
</tr>
<tr>
<td>Writing for Publication</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Grant Writing</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Strong Guidance (dissertation)</td>
<td>30</td>
<td>39</td>
</tr>
<tr>
<td>Participation in Faculty Research</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

*Significant at .05 level  
**Significant at .01 level
One hundred six respondents reported completing research projects since obtaining their doctorates. Productivity ranged from seventeen persons who completed one project to twelve people who completed nine or more. The courses identified in this study taken during the doctoral program are traditionally a part of most doctoral curricula (5). The majority of respondents reported having courses in research, statistics, computer, and concept development. They also believed they had strong faculty guidance during the dissertation process. Very few respondents reported instruction in grant writing or writing for publication. The Chi square test of independence applied to the data as shown in Table IX indicates that at the .05 level of significance the number of courses in statistics, research process, concept development and instruction in grant writing and writing for publication are not significantly related to research productivity. Strong faculty guidance during dissertation preparation was also found to have no significant relationship to research productivity. The number of formal courses in computer literacy, however, was found to be significantly related (p .03) to research productivity with 45.2 percent of the productive researchers having one to three courses in computer literacy. The majority of nurses with no research productivity reported no computer courses.
Participation in Faculty Research

Research question two deals with the relationship between participation in faculty guided research during doctoral study and post-doctoral research productivity. The chi square test of independence applied to data on participation in faculty research and post-doctoral research productivity showed the two factors to be significantly related (p .0002). Eighty-nine percent of the nurses with no research productivity reported no involvement in faculty research during doctoral study while twenty-nine percent of productive researchers reported having that experience. Table VII includes data for this finding.

Relationship of Dissertation Research to Post-Doctoral Research

Research question three asks: Is there a relationship between the subject of a nurse's doctoral dissertation and the subject of post-doctoral studies? Data were originally collected to respond to this question according to a nursing dissertation subject category with five subtopics and a non-nursing category with seven sub-topics all to be compared to matching post-doctoral categories and sub-categories. Frequencies were so disproportionate that no meaningful comparisons could be made. The data was therefore reclassified simply into nursing and non-nursing categories for dissertation and eleven post-doctoral research
categories. The frequencies remained disproportionate but did permit chi square analysis. Table VIII displays this data.

**TABLE VIII**

CROSSTABULATION OF DISSERTATION TOPIC AND POST-DOCTORAL RESEARCH TOPIC

<table>
<thead>
<tr>
<th>Post Doctoral Research Topics</th>
<th>Dissertation Research Topic</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nursing</td>
<td>Chi²</td>
<td>df</td>
<td>p</td>
<td>Non-Nursing</td>
<td>Chi²</td>
<td>df</td>
</tr>
<tr>
<td></td>
<td>Nursing Care</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
<td>.29</td>
<td>1</td>
<td>.58</td>
</tr>
<tr>
<td></td>
<td>Nursing Education</td>
<td>2.27</td>
<td>1</td>
<td>.13</td>
<td>3.26</td>
<td>1</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>Nursing Management</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
<td>.21</td>
<td>1</td>
<td>.64</td>
</tr>
<tr>
<td></td>
<td>Nursing Profession</td>
<td>1.1</td>
<td>1</td>
<td>.29</td>
<td>1.36</td>
<td>1</td>
<td>.24</td>
</tr>
<tr>
<td></td>
<td>Behavioral Science</td>
<td>4.2</td>
<td>1</td>
<td>.4</td>
<td>1.95</td>
<td>1</td>
<td>.16</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Biological Science</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Public Health</td>
<td>1.95</td>
<td>1</td>
<td>.16</td>
<td>.98</td>
<td>1</td>
<td>.32</td>
</tr>
<tr>
<td></td>
<td>Health Education</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
<td>.003</td>
<td>1</td>
<td>.95</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>0.0</td>
<td>1</td>
<td>1.0</td>
<td>.04</td>
<td>1</td>
<td>.83</td>
</tr>
</tbody>
</table>

There is no relationship demonstrated between dissertation research topics and any of the post-doctoral research topics. The most common areas of post-doctoral research for respondents were nursing care and behavioral science. None of the respondents reported research in business.
Relationship of Degree Type to Research Productivity

Research question four deals with the relationship between type of degree obtained and post-doctoral research productivity. Table IX displays the number of research projects completed by nurses with the five selected types of doctorates.

**TABLE IX**

**RESEARCH PRODUCTIVITY ACCORDING TO DEGREE TYPE**

<table>
<thead>
<tr>
<th>Degree Type</th>
<th>N</th>
<th>Number of Research Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>D.N.S./D.S.N./D.N.Sc.</td>
<td>31</td>
<td>4</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>36</td>
<td>9</td>
</tr>
<tr>
<td>Ph.D., Nursing</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>Ed.D.</td>
<td>28</td>
<td>12</td>
</tr>
<tr>
<td>ED.D., Nursing</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>Totals</td>
<td>152</td>
<td>46</td>
</tr>
</tbody>
</table>

*Chi Square 20.99, df 8 (p=.0072)*

A Chi square analysis of the data in Table IX confirms a significant relationship (p .007) between the variables of degree type and research productivity for this data. Nurses having the D.N.S., Ph.D. and Ph.D. in Nursing were more productive of research than those with the Ed.D. and Ed.D. in Nursing.
**Type of Degree and Level of Involvement in Research**

Research question five asks: is there a relationship between type of degree obtained and level of involvement in post-doctoral research? Data on level of involvement were indicated by the respondent's choice of any of the five roles they had implemented in their research activities. The role choices available were: solo researcher, primary investigator, assistant investigator, collaborator and mentor/consultant. Multiple choices of roles were possible as any individual could have filled several roles over time.

Table X presents data on the relationship of degree type to research role implementation.

**TABLE X**

RELATIONSHIP OF DEGREE TYPE TO RESEARCH ROLE IMPLEMENTATION

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo researcher</td>
<td>8</td>
<td>13</td>
<td>13</td>
<td>16</td>
<td>18</td>
<td>6</td>
<td>4</td>
<td>.17</td>
</tr>
<tr>
<td>Primary investigator</td>
<td>8</td>
<td>7</td>
<td>13</td>
<td>16</td>
<td>18</td>
<td>10*</td>
<td>4</td>
<td>.04*</td>
</tr>
<tr>
<td>Assistant investigator</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>3.1</td>
<td>4</td>
<td>.53</td>
</tr>
<tr>
<td>Collaborator</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>12</td>
<td>2.4</td>
<td>4</td>
<td>.66</td>
</tr>
<tr>
<td>Mentor/consultant</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>17</td>
<td>15</td>
<td>11.9*</td>
<td>4</td>
<td>.01**</td>
</tr>
</tbody>
</table>

*Significant at $p < .05$

**Significant at .01 level
Very few (N19) nurses reported ever having filled the role of assistant researcher. The most frequently reported role was that of solo researcher (N68), followed by that of primary investigator (N62). Nurses with the DN.S. filled the greatest variety of research roles.

Through chi square analysis of the data, a relationship was determined to exist between degree type and the researcher roles of mentor/consultant (p .01) and primary investigator (p .04). Among nurses who reported filling the role of research mentor/consultant over 45.5 percent held the DNS or the Ph.D. degrees. Among those nurses who reported filling the role of primary investigator, over 75 percent held the Ph.D., Ph.D. in Nursing or the DN.S degrees.

**Relationship Between Type of Degree and Subject of Post-Doctoral Research**

Research question six asks: is there a relationship between type of degree obtained and subject of post-doctoral research projects? The degree type variable was tested for possible relationship to eleven different research subjects. Table XI shows the relationship of degree type to research topics.
TABLE XI
CROSSTABULATION OF DOCTORAL DEGREE TYPE
TO POST-DOCTORAL RESEARCH TOPICS

<table>
<thead>
<tr>
<th>Research Topics</th>
<th>Chi$^2$</th>
<th>df</th>
<th>Level of Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Care</td>
<td>12.6</td>
<td>4</td>
<td>.01**</td>
</tr>
<tr>
<td>Education</td>
<td>2.4</td>
<td>4</td>
<td>.65</td>
</tr>
<tr>
<td>Management</td>
<td>8.7</td>
<td>4</td>
<td>.06</td>
</tr>
<tr>
<td>Profession</td>
<td>3.9</td>
<td>4</td>
<td>.4</td>
</tr>
<tr>
<td>Behavioral science</td>
<td>8.4</td>
<td>4</td>
<td>.08</td>
</tr>
<tr>
<td>Education</td>
<td>4.0</td>
<td>4</td>
<td>.39</td>
</tr>
<tr>
<td>Business</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Science</td>
<td>6.05</td>
<td>4</td>
<td>.19</td>
</tr>
<tr>
<td>Public Health</td>
<td>4.59</td>
<td>4</td>
<td>.33</td>
</tr>
<tr>
<td>Health Education</td>
<td>2.31</td>
<td>4</td>
<td>.67</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Data insufficient for computation
**Significant at .01 level

The only significant relationship discovered between degree type and the eleven selected subject categories was between type of degree and the subject category of nursing care interventions (p .01). Nurses holding the D.N.S. comprised over thirty percent of the respondents who reported doing research in the area of nursing care interventions, while other degree types represented from nine to twenty-two percent of researchers in that category of research. Frequencies among the eleven categories were very disproportionate ranging from sixty-two in the category of nursing interventions to zero in the category of business research.
Perceived Need for Assistance in Performance of Research

Respondents were asked if they had sought assistance in the performance of their research and, if so, what kind of assistance was obtained. Table XII displays the frequencies of choices made by respondents indicating assistance they had actually obtained in completing their research.

**TABLE XII**
CROSSTABULATION OF TYPES OF RESEARCH ASSISTANCE UTILIZED BY RESPONDENTS ACCORDING TO DEGREE TYPE

<table>
<thead>
<tr>
<th>Types of Assistance</th>
<th>Frequency</th>
<th>Percent*</th>
<th>Chi</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design of the study</td>
<td>32</td>
<td>21.0</td>
<td>.4</td>
<td>4</td>
<td>.97</td>
</tr>
<tr>
<td>Statistical treatment of data</td>
<td>72</td>
<td>47.0</td>
<td>10.7</td>
<td>4</td>
<td>.03**</td>
</tr>
<tr>
<td>Review of the literature</td>
<td>6</td>
<td>3.9</td>
<td>4.19</td>
<td>4</td>
<td>.38</td>
</tr>
<tr>
<td>Choice of question</td>
<td>11</td>
<td>7.2</td>
<td>.10</td>
<td>4</td>
<td>.99</td>
</tr>
<tr>
<td>Analysis of data</td>
<td>46</td>
<td>30.0</td>
<td>1.9</td>
<td>4</td>
<td>.75</td>
</tr>
<tr>
<td>Grant writing</td>
<td>17</td>
<td>11.2</td>
<td>2.47</td>
<td>4</td>
<td>.64</td>
</tr>
<tr>
<td>Writing for publication</td>
<td>13</td>
<td>8.6</td>
<td>4.37</td>
<td>4</td>
<td>.35</td>
</tr>
<tr>
<td>Data gathering</td>
<td>4</td>
<td>2.6</td>
<td>8.3</td>
<td>4</td>
<td>.08</td>
</tr>
<tr>
<td>Construction of tools</td>
<td>36</td>
<td>23.7</td>
<td>2.7</td>
<td>4</td>
<td>.60</td>
</tr>
</tbody>
</table>

*Multiple choices possible

**Significant at .05 level

As is demonstrated in Table XII, seventy-two researchers or forty-seven percent of the respondents sought expert assistance for statistical treatment of data. Very few researchers sought assistance in data gathering,
choice of question or review of the literature. It is noteworthy that 87.5 percent of the sample reported seeking expert assistance of some kind in the execution of their research.

Research question seven deals with the relationship between type of degree and the use of assistance with one's research. The nine types of assistance were compared to degree type (Table XII). The only significant relationship identified by chi square analysis of the data is between degree type and the use of expert assistance for statistical treatment of data, (Chi square 10, df 4, p .03). Nurses holding the professional nursing doctorate, the Ph.D. and the Ph.D. in nursing represented seventy-five percent of those who reported seeking expert assistance with statistical treatment of data. These degrees are also associated with the most research productivity in this study.

Additional data was gathered by asking respondents to indicate the extent to which they believed their doctoral program prepared them to do research. Table XIII displays the choices made in response to this question.
TABLE XIII
RESPONDENTS PERCEPTIONS OF THEIR RESEARCH COMPETENCY

<table>
<thead>
<tr>
<th>Perception</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully prepared to conduct research</td>
<td>65</td>
<td>42.8</td>
</tr>
<tr>
<td>Knowledgeable of the process and able to select appropriate assistance</td>
<td>81</td>
<td>53.3</td>
</tr>
<tr>
<td>Appreciative consumer of research</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>Totally unprepared to conduct research</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Totals</td>
<td>152</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The great majority of respondents (96.1 percent) indicated that they believe themselves to be competent researchers able to select and seek appropriate assistance if necessary. Only 2.6 percent believed they were only helped to be knowledgeable consumers and 1.3 percent believed they were totally unprepared to conduct research. There were no significant relationships identified between degree types and the expressions of research competence.

Discussion

Data presented thus far address the relationship of instructional experiences in doctoral study and postdoctoral research productivity for the respondents. A relationship was discovered between courses in computer literacy and research productivity (p .02). This relationship may
suggest either that once prepared with computer skills a nurse is likely to engage in research or that those intending to conduct research have had the foresight to prepare themselves this skill. There is a relationship in this study \((p=.0002)\) between active participation in faculty research and subsequent research productivity. This finding supports the recommendations from many disciplines \((1, 2, 7, 10)\) that doctoral faculty be involved in ongoing research and appropriately involve their students. Subjects of respondents' post-doctoral studies and subjects of their dissertation studies were not found to be meaningfully related. Among the nursing dissertation topics, eighty percent are either patient care or nursing education topics. Among the non-nursing subjects fifty-seven percent are education topics. Among the post-doctoral studies seventy-three percent are identified as nursing research which is noteworthy in view of the fact that only fifty-eight percent of the sample hold nursing degrees.

Nursing has traditionally been concerned about nurses who achieve doctorates in other fields being "lost" to nursing \((8)\). These data indicate that nurses do research in a variety of areas irrespective of their degree type. Behavioral science was the most frequently reported area of non-nursing research for nurses with nursing and non-nursing doctorates alike. No cross-over was demonstrated from nursing to non-nursing topics in either direction. Type of
degree obtained is significantly related in this study to research productivity (p .007). Respondents with the Ph.D., Ph.D. in Nursing or D.N.S. demonstrated greater research productivity than did respondents holding the Ed.D. or Ed.D. in Nursing. The research productivity of the respondents with the Ph.D. degrees would be expected in view of the general acceptance of the Ph.D. as the research degree. The D.N.S, however, is a practice degree oriented toward development of advanced clinical skill and application of research, not generation of new knowledge.

In this study, the type of degree is also significantly related to level of involvement in research with respondents having the Ph.D., Ph.D. in Nursing and D.N.S. serving most often as mentor/consultants to other researchers and as primary investigators in team research efforts. Respondents with these degrees are also the most productive of research in this study. The finding that only 23.5 percent of respondents had ever filled the role of assistant investigator is interesting from more than one point of view. Apparently it is not a role being utilized to build research skills by beginning nurse researchers. Also, with sixty-two respondents reporting that they have acted as primary investigators it might be expected that more than the reported nineteen would have served as assistants. The preponderance of solo research roles (N68) indicates that research for many of the respondents is a solitary pursuit.
The only significant relationship found between type of degree and various subjects of post-doctoral research topics of respondents is with the subject of nursing care interventions. Thirty percent of reported nursing care intervention research had been done by respondents with the DNS degree, while the other four degree types accounted for nine to twenty percent of that research. This is certainly congruent with the clinical focus of the DNS degree, which is nursing care, and theory application.

The vast majority of researchers in the study (87.5 percent) sought some kind of expert assistance in completing the research process. A significant relationship was identified in this study between degree type and assistance sought in statistical treatment of data. Respondents with the Ph.D., Ph.D. in Nursing and the DNS sought assistance more frequently than did those with the other degrees. These degrees were also the most research productive and the relationship may be due to the larger amount of research done by these groups as compared to the other two degree types. It is noteworthy that over ninety-six percent of respondents perceived themselves to be competent researchers able to implement the research process.
Conditions of Employment and Research Productivity

Several factors traditionally associated with employment were analyzed for their possible association with research productivity.

Respondents were given a list of research support factors associated with employment and asked to indicate which factors they found essential to enable their research efforts. Table XIV displays the choices made by respondents.

**TABLE XIV**

RESEARCH SUPPORTS REPORTED ESSENTIAL AND AVAILABLE TO RESPONDENTS

<table>
<thead>
<tr>
<th>Research Supports</th>
<th>Believed Essential</th>
<th>Actually available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number* Choosing</td>
<td>% of Respondents</td>
</tr>
<tr>
<td>Employee support</td>
<td>125</td>
<td>82.2</td>
</tr>
<tr>
<td>Release time</td>
<td>106</td>
<td>69.7</td>
</tr>
<tr>
<td>Financial support</td>
<td>96</td>
<td>63.2</td>
</tr>
<tr>
<td>Clerical support</td>
<td>114</td>
<td>75.0</td>
</tr>
<tr>
<td>Research aids</td>
<td>40</td>
<td>26.3</td>
</tr>
<tr>
<td>Research consultant service</td>
<td>70</td>
<td>46.1</td>
</tr>
<tr>
<td>Mentor support</td>
<td>42</td>
<td>27.6</td>
</tr>
<tr>
<td>Collaboration with peers</td>
<td>79</td>
<td>52.0</td>
</tr>
<tr>
<td>Computer services</td>
<td>122</td>
<td>80.3</td>
</tr>
<tr>
<td>Library resources</td>
<td>127</td>
<td>83.6</td>
</tr>
<tr>
<td>On-line data base searching</td>
<td>69</td>
<td>45.4</td>
</tr>
<tr>
<td>Access to research population</td>
<td>123</td>
<td>80.9</td>
</tr>
</tbody>
</table>

*Multiple choices possible
Library resources, employer support, access to research population, and computer services were picked most frequently by respondents as essential. Research assistants and mentor support were chosen least frequently.

Only fifty-seven percent of the respondents had employer support for their research and only 23.7 percent were given released time. Only twenty-five percent had financial support for their research and less than half had clerical support.

Few respondents reported having access to either a mentor (18.4 percent) or research assistant (18.4 percent). Released time and financial support deemed essential by over sixty percent of respondents was actually only available to slightly more than twenty percent of respondents.

**Conditions of Employment and Research Productivity**

Research question eight deals with the relationship between conditions of employment and research productivity. The research support factors related to employment listed in Table XIV were compared to research productivity. Table XV shows the number of members of the group non-productive of research (group I) and the groups productive of research (group II, those completing one to three research projects and group III, those completing four or more research projects) who have access to the research support factors. The significance level for each relationship is also given.
### TABLE XV

**RELATIONSHIP OF RESEARCH SUPPORT FACTORS TO RESEARCH PRODUCTIVITY**

<table>
<thead>
<tr>
<th>Nurses' Research Productivity</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X²</td>
</tr>
<tr>
<td><strong>GrI</strong></td>
<td><strong>GrII</strong></td>
</tr>
<tr>
<td>Employer support</td>
<td>17</td>
</tr>
<tr>
<td>Release time</td>
<td>3</td>
</tr>
<tr>
<td>Financial support</td>
<td>4</td>
</tr>
<tr>
<td>Clerical support</td>
<td>10</td>
</tr>
<tr>
<td>Research aids</td>
<td>3</td>
</tr>
<tr>
<td>Research consultant service</td>
<td>8</td>
</tr>
<tr>
<td>Mentor support</td>
<td>4</td>
</tr>
<tr>
<td>Collaboration with peers</td>
<td>16</td>
</tr>
<tr>
<td>Computer services</td>
<td>20</td>
</tr>
<tr>
<td>Library resources</td>
<td>26</td>
</tr>
<tr>
<td>On-line data base searching</td>
<td>13</td>
</tr>
<tr>
<td>Access to research population</td>
<td>15</td>
</tr>
</tbody>
</table>

*Group I, N46 (0 projects), Group II, N59 (1-3 projects), Group III, N47 (>3 projects)

**Significant at or below .05 level
The percentage of productive researchers having access to the various research supports was consistently higher than that of the group non-productive of research in every instance. Very large differences in the groups were in the areas of employer, financial and clerical support, release time for research, and access to research population. Three times as many productive researchers had access to these supports than did the respondents who did no research. A significant relationship was found between the respondent's research productivity and her access to each of the twelve of the conditions of employment measured as displayed in Table XV.

The impact of primary position on research productivity could not be assessed as the frequencies in the nine employment categories were so disproportionate as to make comparisons statistically inappropriate. Table V gives those frequencies. There was no way to group data and achieve meaningful designations. Consequently, no relationship was discovered between areas of employment and research productivity.

Discussion

Twelve research support factors were identified as being conditions of employment and were measured to determine a possible relationship with research productivity. In
every instance the productive researchers in this study had access to more support factors than did the respondents non-productive of research. This could be interpreted to mean that having access to such support factors encourages capable persons to do research. It could also mean that nurses intending to do research seek employment where such supports are available.

In an overview of the conditions of employment it is noteworthy that among all respondents less than forty percent had released time or financial support for research. Little more than half reported opportunity for collaboration with peers or access to on-line data base searching, though over sixty-two percent are employed in higher education. All of the research support factors studied are identified in the literature as consistently available to the most productive researchers (6, p. 2).

Areas of employment are those traditional for the population of doctorally prepared nurses. Nursing education so dominated the area of employment that no meaningful comparisons could be made across fields of employment as to possible impact on research productivity. Only one respondent reported working in a diploma nursing program. Diploma programs are non-degree granting and usually do not employ doctorally prepared faculty. Such programs have been phased out of nursing education for the last ten to fifteen years, with very few remaining in existence nation-wide.
Only one respondent reported being in independent nursing practice which is surprising given the number of professional nursing doctorates represented in the sample (20.4 percent). In all, only twenty-six percent of respondents were employed outside nursing education. Nine percent were retired or unemployed.

Critical Factors Impacting Research Productivity

Several selected factors were studied in terms of their possible relationship to research productivity. These factors are, having a research mentor, attitude toward research, basic nursing preparation and opportunity for collaboration with peers.

Research Mentors

Research question nine asks, is there a relationship between having a research mentor and post-doctoral research productivity? Ninety-one percent of respondents non-productive of research did not have a mentor, while 22.6 percent of productive researchers reported having a mentor. In a finer breakdown among productive researchers thirty percent of nurses completing four or more pieces of research reported having mentors. When chi square test of independence was applied to these data a significant relationship (p=.02) was discovered to exist between research productivity and having a research mentor. These data are displayed in Table XV.
Attitude Towards Research

Research question ten deals with attitude toward research and research productivity. Respondents were asked to indicate their attitude toward research by selecting any of the six attitude descriptors in the questionnaire. Table XVI displays attitude descriptors chosen by respondents grouped according to their research productivity, respondents non-productive of research (Group I), respondents who have completed one to three research projects, (Group II) and respondents who have completed four or more research projects (Group III). Level of significance is given for each relationship for which the chi square could be computed.

TABLE XVI
RELATIONSHIP OF RESPONDENTS' ATTITUDE TOWARD RESEARCH AND RESEARCH PRODUCTIVITY

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Gr I</th>
<th>Gr II 1-3</th>
<th>Gr III &gt;4</th>
<th>X²</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Of great personal interest</td>
<td>16</td>
<td>48</td>
<td>41</td>
<td>36.7</td>
<td>2</td>
<td>.0000*</td>
</tr>
<tr>
<td>Important to the profession</td>
<td>37</td>
<td>52</td>
<td>42</td>
<td>1.8</td>
<td>2</td>
<td>.39</td>
</tr>
<tr>
<td>Relevant to my goals</td>
<td>18</td>
<td>45</td>
<td>40</td>
<td>25.6</td>
<td>2</td>
<td>.0000*</td>
</tr>
<tr>
<td>Beyond my skill</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Of no personal interest</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The responsibility of all doctorally prepared nurses</td>
<td>23</td>
<td>34</td>
<td>35</td>
<td>6.1</td>
<td>2</td>
<td>.045*</td>
</tr>
</tbody>
</table>

Multiple choices possible
+Chi square not computed 3 of 6 cells <5
*Significant at or below .05
Significant relationships were discovered for three of the six attitudes. Over eighty percent of productive researchers reported great personal interest in research, that it is important to the profession and relevant to their goals. These relationships are statistically significant as indicated in Table XVI. Only one respondent reported believing research to be beyond her level of skill and only five reported having no interest in research.

Respondents who had done no research at the time of the study were asked if they planned to do research in the future and only forty-five percent replied in the affirmative. They were also asked to indicate reasons for non-involvement in research that applied to their situation. Given eleven selections from which to choose, subjects made the choices displayed in Table XVII.

**TABLE XVII**

**REASONS GIVEN FOR NON-INVolVEMENT IN RESEARCH**

<table>
<thead>
<tr>
<th>Reasons Given</th>
<th>N*</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No interest</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>Insufficient skill</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>No employer support</td>
<td>16</td>
<td>10.5</td>
</tr>
<tr>
<td>No time</td>
<td>41</td>
<td>27.0</td>
</tr>
<tr>
<td>Lack of computer resources</td>
<td>10</td>
<td>6.6</td>
</tr>
<tr>
<td>No reward</td>
<td>12</td>
<td>7.9</td>
</tr>
<tr>
<td>No funding</td>
<td>19</td>
<td>12.5</td>
</tr>
<tr>
<td>Lack of peer support</td>
<td>9</td>
<td>5.9</td>
</tr>
<tr>
<td>No access to research population</td>
<td>6</td>
<td>3.9</td>
</tr>
<tr>
<td>Lack of library resources</td>
<td>7</td>
<td>4.6</td>
</tr>
</tbody>
</table>

*Multiple choices possible*
Clearly, lack of time to engage in research is the most common reason given for non-involvement. No other factor received comparable attention. Of written comments added to the questionnaire by respondents, time is the most frequently mentioned problem of both the productive and the non-productive researcher.

**Basic Nursing Preparation**

Research question eleven asks: is there a relationship between basic nursing preparation and post-doctoral research productivity? The respondents' basic nursing preparation was identified in the demographic section of the questionnaire. Four respondents began their nursing education with the Associate Degree, eighty-three with the diploma in nursing, and sixty-three with the baccalaureate degree. The four A.D. prepared nurses were deleted for this specific analysis as the disparity in frequencies made statistical treatment meaningless and they could not be appropriately added to another category. The B.S.N and diploma nurses were compared as to research productivity by chi square analysis and no significant relationship was determined (Chi square 3.49, df 2, p .17).
Collaboration with Peers

Research question twelve deals with the possible relationship between opportunity for collaboration with peers and post-doctoral research productivity. Through chi-square analysis of data, a significant relationship was determined to exist between opportunity for collaboration with peers and research productivity, \( p < 0.003 \). These data are displayed in Table XV. Sixty-eight percent of the most productive researchers (four or more projects) reported having opportunity for collaboration, while only thirty-five percent of respondents non-productive of research reported having any such opportunity. Further, when productive researchers were asked what kind of expert assistance, if any, they had sought in completing their research, forty-two percent reported seeking collaboration with peers as their means of obtaining assistance.

Discussion

A relationship between having a mentor and being a productive researcher was determined in this study. Only nine percent of respondents non-productive of research had mentors while twenty-two percent of respondents of productive research reported having mentors. The direction of this relationship, however, is not determined. It could well be that having a mentor is an empowering experience
that would lead to increased productivity as the literature suggests (3, 7). It could also mean that a nurse motivated to do research will seek out a skilled researcher and form a mentor/protégé relationship.

Relationship of attitude toward research and research productivity was determined in this study. Productive researchers understandably held positive attitudes towards research but so, too, did a majority of respondents non-productive of research. Only five respondents reported having no interest in doing research which suggests that lack of interest is not a significant deterrent to performance of research. When asked what factors related to their non-involvement in research, lack of time was chosen most frequently. Insufficient skill was mentioned by only four respondents. Clearly, respondents perceive themselves capable of and interested in doing research but believe it to be a prohibitively time consuming process.

The basic nursing education program of the respondent and its possible relationship to her research productivity was examined. Because the baccalaureate program is the only basic nursing program that introduces research to the student it was hypothesized that nurses so prepared might be more likely to have a research orientation. No relationship, however, was discovered in this study. One curious piece of data is that only four of the one hundred fifty-two respondents had AD nursing as a basic preparation. In the
last fifteen years, large numbers of AD nurses have been graduated making the small number in this study disproportionate.

The opportunity for collaboration with peers is clearly related to research productivity among the respondents. This is supportive of literature review (4, 6, 9), and reasonable in view of its apparent benefits. Collaboration permits a mix of experts and 87.5 percent of productive researchers reported seeking expert assistance of some kind in completing their research. Collaboration also permits the sharing and dividing of a complex and time consuming task reducing the demands on any one researcher. Since lack of time was identified as the most common impediment to would be researchers, collaboration could be a useful remedy.

Findings

The following is a summary of major findings as presented in this chapter. Demographics of the study sample are as follows.

1. There are 152 respondents of whom 150 are female and two male, with the majority over forty-five years of age.

2. Four respondents obtained their basic nursing education in an associate degree program, eighty-four in a diploma program and sixty-four in a baccalaureate program.
3. Five types of doctoral degrees are represented: Ed.D., Ed.D. in Nursing, Ph.D., Ph.D. in Nursing and D.N.S./D.S.N./D.N.Sc. with nursing and education the most common majors.

4. The majority of respondents are employed full time and the most common type of employment is nursing education. Five clinical specialties are represented.

Major findings in this study in response to research questions are as follows:

1. A relationship was determined to exist between post-doctoral research productivity and courses in computer literacy ($p < 0.03$). No other relationship between selected doctoral courses and post-doctoral research productivity was determined.

2. A relationship between participation in faculty guided research during doctoral study and post-doctoral research productivity was determined ($p < 0.0002$).

3. No relationship was determined to exist between the respondent's dissertation subject and her subsequent post-doctoral research topics.

4. A relationship was determined to exist between type of doctoral degree and post-doctoral research productivity ($p < 0.0007$).
5. A relationship between conditions of employment as identified in the study and post-doctoral research productivity was determined. Each of twelve conditions of employment was found to be related at or below the .05 level of significance to post-doctoral research productivity.

6. A relationship was determined between having a research mentor and post-doctoral research productivity (p.02).

7. The majority of respondents are interested in research (97 percent) and believe themselves to be competent to perform research. The major impediment to research was identified as time constraints.

8. No relationship was determined between a nurse's basic nursing education and subsequent post-doctoral research productivity.

9. A relationship between opportunity for collaboration with peers and post-doctoral research productivity was determined (p.003).
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CHAPTER V

SUMMARY, DISCUSSION OF DATA FINDINGS CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This chapter presents a summary of the study, its problem, purposes, research questions, survey method, statistical analysis and data findings. The data findings are discussed and conclusions based on the data findings are presented. Implications of the findings are also presented, and recommendations are made for further study.

Summary

The problem with which this study is concerned is the research productivity of doctorally prepared nurses in the United States. The purposes of the study are (a) to determine if instructional experiences in doctoral study and post-doctoral research productivity of doctorally prepared nurses are related; (b) to determine if conditions of employment and research productivity of doctorally prepared nurses are related; and, (c) to discover critical factors related to research productivity of nurses with earned doctorates. To fulfill the purposes of this study answers to the following research questions were sought. Does a relationship exist between:
1. instruction in the research process and research tools and post-doctoral research productivity?

2. participation in faculty guided research during doctoral study and post-doctoral research productivity?

3. the subjects of the nurse's doctoral dissertation and the subject of subsequent research studies?

4. type of degree obtained and post-doctoral research productivity?

5. type of degree obtained and level of involvement in post-doctoral research productivity?

6. type of degree obtained and subject of post-doctoral research activities?

7. type of degree obtained and perceived need for assistance in research activities?

8. conditions of employment and post-doctoral research productivity?

9. having a research mentor and post-doctoral research productivity?

10. attitude toward research and post-doctoral research productivity?

11. basic nursing preparation and post-doctoral research productivity?

12. opportunity for collaboration with peers and post-doctoral research productivity?

The population for this study consists of 3,648 doctorally prepared nurses listed in the Directory of Nurses.
With Doctoral Degrees, 1984 published by the American Nurses Association. The study sample consists of two hundred nurses from the described population representing five degree types; Ed.D. in nursing, Ed.D., Ph.D. in Nursing, Ph.D. and the D.N.S./D.N.Sc./D.S.N. degree. The study sample was randomly selected within each degree category and respondents represent seventy-six percent of the nurses solicited for participation in this study. Data for this study was collected by mailed questionnaires developed by the researcher specifically for this study. The questionnaire consisted of three parts, the first of which gathered demographic data about the subjects. The second part of the questionnaire gathered data relating to the subject's doctoral study experiences and the final part focused on the subject's research activities. The questionnaire was field tested on a panel of five nurses representative of the study population.

Demographic data were organized into frequency tables for display of information. All data used to respond to research questions were analyzed by applying the chi square test of independence to determine the existence of a relationship, using p < .05 as the level of significance.

The following are the major findings of the study.

1. A relationship was determined to exist between post-doctoral research productivity and courses in computer literacy (p.03). No other relationship between doctoral
courses and post-doctoral research productivity was determined.

2. A relationship between participation in faculty guided research and post-doctoral research productivity was determined (p.0002).

3. No relationship was determined between dissertation topics and the subsequent post-doctoral research topics chosen by respondents.

4. A relationship was determined to exist between type of doctoral degree and post-doctoral research productivity (p.0007).

5. A relationship between conditions of employment as identified in the study and post-doctoral research productivity was determined. Each of twelve selected conditions of employment was found to be related at < p.05 to post-doctoral research productivity.

6. A relationship was determined between having a research mentor and post-doctoral research productivity (p.02).

7. The majority of respondents are interested in research (97%) and believe themselves to be competent to perform research. The major impediment to research was identified as time constraints.

8. No relationship was determined between a nurse's basic nursing education and subsequent post-doctoral research productivity.
9. A relationship between opportunity for collaboration with peers and post-doctoral research productivity was determined (p.003).

Discussion of Data Findings

Demographic data for the sample such as age, sex, number of years in nursing, and basic nursing preparation are congruent with previous studies of the population (1). The most common major is nursing science which is explainable by the fact that three of the five degree types selected for the study are nursing degrees. The next most common major is education which in previous studies of the population was the most common major (6).

Over eighty percent of the respondents are employed by someone or some organization with the most common setting being nursing education (63 percent). This is congruent with previous studies as is the distribution among clinical specialties of respondents (1).

Choice of a doctoral program by respondents was influenced most often by specific learning goals (58.6 percent) and geographic availability of a program (59.2 percent). Much of the existing literature (7, 17) speaks to the consideration that the vast majority of nurses are women and thus likely not to have the freedom to relocate to attend graduate school. This study bears out that concern. Surprisingly, only 21.7 percent reported the opportunity for
part-time study as being a significant factor in their choice. It may be that among married women the choice of family location is dictated by the spouse's employment opportunities and is of more consequence than financial support during graduate study.

Various aspects of doctoral instruction were tested for possible relationship to research productivity. Courses in computer literacy, participation in faculty research and type of degree were found to be related to research productivity.

For this study, courses in research, statistics, grant writing, writing for publications and strong faculty guidance during dissertation preparation showed no relationship to post-doctoral research productivity.

Courses in computer literacy are a relatively recent addition to doctoral study. The relationship with post-doctoral research productivity may be attributable to the exposure to data analysis that occurs during computer training or to the fact that nurses who intend to do research may be foresighted enough to prepare themselves with computer skills.

The relationship in this study between post-doctoral research productivity and participation in faculty research supports similar findings reported in the literature (3, 9, 15, 22, 23). Many disciplines advocate the involvement of
students in faculty research and call for faculty to maintain involvement in ongoing research.

Degree type is related to both research productivity and level of involvement in research for this study. Respondents holding the professional nursing doctorate (D.N.S/D.S.N./D.N.SC.) were frequently involved in research on a higher level, that is, as primary investigator. This would not be an expected finding based on the description of the degree, which is a clinical or practice oriented rather than a research degree. Studies of the various degrees, however, have concluded that the focus of a degree cannot be readily surmised from its title. Beare, in a study of twenty doctoral nursing programs could find no clear pattern in core curriculum in the various types of degrees (5). Lancaster in a study of all doctoral programs in nursing concluded that differences in Ph.D. and D.N.Sc. programs are vague and differences in dissertation research between the two programs are not well defined (14).

Schweitzer (20), Anderson (2), and Smith (21) all conclude in reviewing differences between doctoral degree types that there are more similarities than differences among the various programs.

Respondents holding the Ph.D. degree most frequently served as mentor/consultants to other researchers. This is congruent with the degree dedication to research but it is noteworthy that they were not the most productive
researchers in this study. Respondents having the Ed.D. and the Ed.D. in nursing were the least productive of research which would be expected as these are not research degrees.

No meaningful relationships were identified in this study between the subject of the dissertation and subjects of post-doctoral research. There has been a concern in the nursing profession for many years that nurses getting degrees in disciplines other than nursing would be "lost" to nursing by being socialized into the other discipline during work on the dissertation research (7). In a 1975 study, a slight shift was detected from a non-nursing dissertation back to a nursing focus in subsequent research (10). This present study indicates that nurses are indeed not lost to nursing but are doing research in both nursing and non-nursing areas.

The disagreement within the profession over what is and what is not nursing research may make it impossible to come to any real conclusions about this concern. This debate is presented in Chapter Two.

A relationship was discovered between the research area of nursing interventions and degree type. Nursing care was the most commonly reported area of research for this study and though representatives of all five degrees reported some activity in this area the two Ph.D. and the DNS degrees were the most productive. This activity is congruent with the research orientation of the Ph.D. degrees and the clinical
focus of the DNS, though the DNS is a practice degree. With over sixty respondents reporting education as their major it might be expected that a relationship exists with degree type and educational research. No other relationships were identified, however, between the five degree types and any of the written other subject categories.

Eighty-seven percent of the respondents who had implemented a research project had sought expert assistance for some aspect of the task. Researchers most frequently sought help in statistical treatment of the data and analysis of the data. The degrees most productive of research, the professional nursing doctorate and both Ph.D. degrees, were significantly related to the use of expert assistance in statistical treatment of data and analysis of the data. This could be related to the fact that those respondents produced a greater volume of research or that they were using more sophisticated techniques which required expert attention.

Forty-three percent of the respondents believed themselves to be fully prepared by their doctoral program to conduct research. This finding differs significantly from a study done by Nieswadomy who studied nurse educators in 1983.

Nieswadomy's subjects reported their reasons for lack of involvement in research as lack of time, skill and interest (18).
Though Nieswadomy's subjects were nurse educators they were not all doctorally prepared. In the present study, only 3.9 percent of the subjects believed they lack necessary skills to perform research.

Productive researchers in the study identified employer support, release time, clerical support, computer access to a research population, computer services and library resources as being most critical to their ability to carry out research. All of the research support resources identified in the study were found to be significantly related to research productivity. All twelve resources were more available to the productive researchers in this study than to the respondents who did no research. While it is likely that nurses intending to do research will seek employment which offers such resources it is also possible that access to resources that will facilitate research encourage interested nurses to do research. Cresswell's profile of the productive researcher taken from correlate studies over the past forty years includes several of these resources. He found particularly that the productive researcher has released time for research activities, employer support and access to collaboration with peers. Cresswell believes such studies can inform those interested in encouraging research about strategies for developing researchers (8).
Several additional selected factors were studied as to their possible relationship to research productivity. These factors were: having a research mentor; attitude towards research; and basic nursing preparation and opportunity for collaboration with peers. All were found to be related to research productivity in this study with the exception of basic nursing preparation.

There are many differences among the three types of basic nursing preparation, any one of which could influence future research productivity. Because the baccalaureate preparation is the only one of the three programs which introduces research to the basic student it could be expected to influence future involvement in research. No relationship, however, was found to exist.

Respondents productive of research reported having access to a research mentor significantly more often than did respondents non-productive of research. The mentor relationship is discussed in many disciplines (4, 7, 11, 15, 22, 23). Studied by Fagan and Fagan among nurses, mentoring is said to positively impact socialization and inspiration. This study does show that more respondents productive of research than those non-productive of research reported having research mentors.

In this study productive researchers reported a positive attitude toward research. Over eighty percent of productive researchers reported "great personal interest in
research;" that "it is important to the profession;" and that "it is relevant to my goals." Over sixty percent of respondents non-productive of research, however, felt the same way.

Fifty percent of respondents productive of research reported believing research to be "the responsibility of all doctorally prepared nurses" and sixty-five percent of the respondents non-productive of research agreed. Though statistical significance was determined in three of the four positive attitudes selected more frequently by the productive researchers, the actual percentages were quite close. It must also be noted that the number of productive researchers in the study was more than twice the number of nurses non-productive of research.

Respondents in the study had two distinct opportunities on the questionnaire to indicate lack of interest in performing research. No more than three percent of the respondents reported lack of interest on either item. Eighty-nine percent of respondents who had not done research reported lack of time as the reason for non-involvement. Lack of funding, lack of employer support, and no reward were also frequently mentioned by respondents of the present study and other studies of similar populations (6, 18, 19). Extemporaneous comments added to the questionnaire also addressed these facts. One respondent reported that she routinely had over sixty contact hours per week at her job
and that research would have to be conducted outside that
time frame. Several respondents reported that as faculty
they were consulting to so many students doing research,
there was no time to undertake their own projects. No other
factor or factors combined received as much attention from
respondents as did the issue of time.

In this study, opportunity for collaboration with peers
was found to be significantly related to research pro-
ductivity. Sixty-eight percent of the most productive
researchers reported having such opportunities, while
sixty-five percent of respondents non-productive of research
reported having no such opportunities. Other findings in
the study can be associated with this finding. Forty-two
percent of productive researchers reported using peers to
provide expert assistance in completion of research. With
time mentioned most frequently as an impediment to research,
collaboration with peers permits the dividing of tasks among
those involved reducing the time commitment of any one
person. And finally, the most productive researchers
reported their role in research as most often being that of
primary investigator, which implies collaboration with other
members of the investigating team.

Collaboration with peers as a research tactic has been
presented repeatedly in the literature in the reporting of
successful projects (10, 12, 13) and by those who would
encourage and invite research efforts (4, 13, 15). This
study supports the literature and provides evidence that collaboration is a tactic utilized frequently by productive researchers.

Conclusions

Based on the data findings, the following conclusions appear to be warranted.

1. The instructional experiences in doctoral study of nurses with doctorates significantly influence their post-doctoral research productivity. Nurses who experience participation in faculty guided research and instruction in computer literacy perform more research than nurses who do not have those experiences.

2. Doctorally prepared nurses who have access to research support factors such as: released time for research, clerical and computer services, financial support, library services and research populations perform more research than do doctorally prepared nurses lacking those supports.

3. Doctorally prepared nurses who have research mentors and opportunity for collaboration with peers perform more research than do doctorally prepared nurses who do not have those advantages.
Implications

Following are implications of the study findings that relate to curriculum planners in doctoral programs and to employers who wish to encourage research.

Curriculum planners who wish to prepare competent researchers:
1. should provide doctoral students with opportunities to participate in faculty research;
2. should provide doctoral students with opportunities to become computer literate;
3. should ensure that strategies for collaborative research are taught and introduce doctoral students to research networks; and,
4. should encourage doctoral faculty to act as mentors.

Employers who wish to stimulate research productivity:
1. should provide clerical support, computer and library services and released time for research activity.
2. should assist the nurse researchers in obtaining reasonable access to a research population and funding for projects;
3. should encourage and facilitate research collaboration within and outside its own organization; and
4. should foster mentoring by experienced researchers.
Recommendations for Further Study

Following are recommendations for further study.

1. This study should be replicated using a larger sample from the population.

2. The population of productive nurse researchers should be surveyed to determine what factors stimulated their desire to perform research.

3. Investigation of mentoring relationships between nurse researchers should be performed to discover how the relationship is developed and the perceived benefits to involved parties.

4. An investigation should be performed to determine possible reasons for the association between academic instruction in computer literacy and increased research productivity.

5. Further investigation should be made of the tendency of nurse researchers to pursue various areas of research interest as opposed to continuing inquiry in the area of dissertation research.

6. The research technique of collaboration should be studied so that strategies to facilitate its use could be developed for interested researchers.

7. The long-term effect, if any, of the introduction of research to the basic nursing student should be investigated.
8. A comparative study should be made of research productivity of the doctorally prepared nurse and doctorally prepared members of other practice disciplines such as education, social work and counseling.
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APPENDIX A

QUESTIONNAIRE
QUESTIONNAIRE

1. Please check your age group:
   1( ) under 25
   2( ) 25-35 years
   3( ) 36-45 years
   4( ) over 45

2. Sex:
   1( ) female
   2( ) male

3. Number of years in nursing:
   1( ) 10 years or less
   2( ) 11-20 years
   3( ) 21 years or more

4. What was your initial nursing preparation?
   1( ) Associate Degree
   2( ) Diploma Program
   3( ) Baccalaureate Degree

5. What is your doctoral degree?
   1( ) Ed.D. in nursing
   2( ) Ed.D. in a field other than nursing
   3( ) Ph.D. in nursing
   4( ) Ph.D. in a field other than nursing
   5( ) DNS/DN/D.N.Sc.

6. What was your doctoral major? Please check the one category most descriptive of your major.
   1( ) nursing science
   2( ) behavioral science
   3( ) education
   4( ) business
   5( ) biological science
   6( ) public health
   7( ) social science

7. Number of years since doctorate was obtained:
   1( ) 5 years or less
   2( ) 6-10 years
   3( ) 11 or more
8. What was your primary employment role before you obtained your doctorate? (Check only one).
1( ) nursing practice
2( ) nursing management
3( ) nursing education—diploma
4( ) nursing education—AD
5( ) nursing education—BSN
6( ) nursing education—graduate
7( ) independent nursing practice
8( ) consulting, nursing management
9( ) employment outside nursing—please describe:

9. Please indicate your current employment situation:
1( ) not employed
2( ) self-employed and working full-time
3( ) self-employed and working part-time
4( ) employed full-time by some person or organization
5( ) employed part-time by some person or organization

10. What is your current primary position? (Please check only one)
0( ) not employed
1( ) nursing practice
2( ) nursing management
3( ) nursing education—diploma
4( ) nursing education—AD
5( ) nursing education—BSN
6( ) nursing education—graduate
7( ) independent nursing practice
8( ) consulting
9( ) employment outside nursing—please describe:

11. What do you consider your basic clinical specialty to be?
1( ) MCH
2( ) med/surg
3( ) psych
4( ) community
5( ) family practice
6( ) other—please describe:
<table>
<thead>
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<th>No.</th>
<th>Category</th>
<th>1</th>
<th>2</th>
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</thead>
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<tr>
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<td>Nursing management</td>
<td>1-3 projects</td>
<td>&gt; 3 projects</td>
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<td>Nursing profession related/professional issues</td>
<td>1-3 projects</td>
<td>&gt; 3 projects</td>
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<td>1-3 projects</td>
<td>&gt; 3 projects</td>
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<tr>
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<tr>
<td>41</td>
<td>Other</td>
<td>1-3 projects</td>
<td>&gt; 3 projects</td>
</tr>
</tbody>
</table>

Please describe or name __________

42. Please give the total number of post doctoral research projects you have completed

______ projects
23. Your doctoral dissertation design is best described as:
   (Check only one)
   1( ) experimental/quasi-experimental
   2( ) historical
   3( ) descriptive
   4( ) causal/comparative
   5( ) correlational

Please indicate whether your dissertation addresses a nursing topic or non-nursing topic by checking either item 24 or 25.

24. Nursing topic with focus on: (Check only one)
   1( ) practice/patient care interventions
   2( ) nursing education
   3( ) nursing management
   4( ) profession related
   5( ) other, please describe

25. Non-nursing topic in field of: (Check only one)
   1( ) behavioral science
   2( ) education
   3( ) business
   4( ) biological science
   5( ) public health
   6( ) health education
   7( ) other, please describe:

The next questions address your concerns and experiences as a researcher or potential researcher.

26. Please review the following factors and check all that you personally find essential to enabling your post doctoral research activities.

   ( ) employer support/expectation
   ( ) release time for research
   ( ) financial support
   ( ) clerical support
   ( ) research aids
   ( ) research consultant service
   ( ) mentor support
   ( ) collaboration with peers
   ( ) computer services
   ( ) library resources
   ( ) on-line data base searching
   ( ) access to research population
APPENDIX B

LETTER TO RESEARCH SAMPLE
Dean Colleague:

You have been randomly selected from the ANA Directory of Nurses with Doctoral Degrees to participate in a study of nurses with earned doctorates.

This study is specifically concerned with the research productivity of nurses with earned doctorates in relation to their instructional experiences in their doctoral program. The results of the study are expected to discover if associations exist between certain academic experiences and research productivity. The study will also gather data about what tools and supports you, the doctorally prepared nurse, see as necessary to permit you to undertake research activities.

Your response is especially important because it will be a direct and personal evaluation by the very nurses to whom the profession and society look for new knowledge and scientific practice.

The enclosed instrument is a survey questionnaire which has been tested with a small sample of nurses with earned doctorates. It is designed to obtain all necessary information for the study and to require a minimum amount of your time. The average time for completion of the questionnaire during the pilot trial was 15 minutes. Please complete and return the questionnaire in the provided envelope by March, 1986, if possible.

This study has the approval and interest of the College of Higher Education, North Texas State University and is being conducted in partial fulfillment of the Doctor of Philosophy degree in College Teaching. We are most grateful for your time and attention and will be happy to send you summary data following completion of the study if you so desire. I am confident that having been through the dissertation process yourself, you realize how very much I appreciate your assistance.

Sincerely,

Elizabeth Farren, R.N., M.S.
Assistant Professor, Baylor University School of Nursing

Dr. Dwane Kingery, Ed.D
Professor, Matthews Chair for Higher Education
North Texas State University
APPENDIX C

Panel of Experts

Dr. Cheryl Anderson, Ph.D.
Baylor University School of Nursing

Dr. Lorraine Gentner, Ph.D.
Baylor University School of Nursing

Dr. Martha Sanford
Baylor University School of Nursing

Dr. Marjorie Sczekan, Ph.D.
University of Southern Colorado

Dr. Carol Stevenson, Ed.D.
Texas Christian University
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