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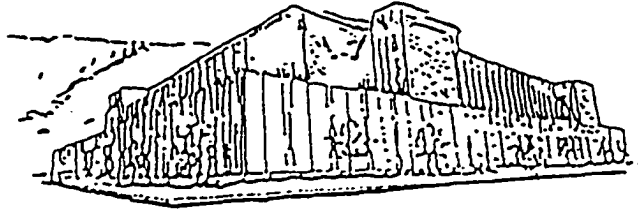
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ATTITUDES OF RURAL NURSES TOWARD COMPUTERS:
IMPLICATIONS FOR CONTINUING EDUCATION

by

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presented in partial fulfillment of the requirements

for the degree of

Doctor of Education

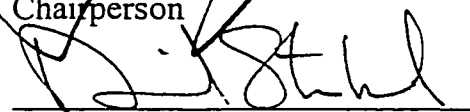
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Geographic isolation and limited continuing education opportunities are ongoing challenges facing rural nurses. The expansion of computer technology into rural health care facilities has the potential to provide networking opportunities for health care providers and allow for access to educational programming. According to the Theory of Reasoned Action, attitudes of rural nurses toward computers must be determined prior to implementation of computer technology as a viable method for addressing challenges facing rural nurses. Nurses' attitudes toward computers have been studied, however no research has been completed that examined rural nurses' attitudes exclusively.

This exploratory survey was conducted to determine rural nurses' attitudes toward computers and to identify variables influencing those attitudes. Two-hundred fifty-four nurses from randomly selected rural hospitals in six states completed a questionnaire measuring attitudes toward computers. Participants were also asked to comment on personal experiences with computers and with continuing education.

Scores on the questionnaire indicated the respondents had positive attitudes toward computers ($M=108$, $SD=17.69$). T-tests and analysis of variance revealed significant differences in attitudes in relation to gender, age, level of educational preparation, specialty certification and experience with computers ($p < .05$). Stepwise regression and path analysis were used to identify predictors of attitude toward computers. Analysis of respondents' comments resulted in the identification of four categories for discussion: 1) lack of recognition of the value of computers for nurses, 2) lack of resources for equipment and training, 3) issues of access to continuing education, and 4) use of computers for continuing education. Respondents strongly voiced their commitment to maintaining quality nursing practice through continuing education but were faced with decreasing resources, limitations due to distance, and inadequate staffing to cover their absence. Use of computer technology was identified by respondents as a possible means to help alleviate difficulties related to access to continuing education facing rural nurses. Results of this study suggest that with appropriate resources and adequate computer training, the implementation of computer technology could be effective for delivering continuing education to rural nurses.

Acknowledgments

I would like to thank those who have guided and supported me through the completion of this research study.

To:

....My Dissertation Chair, Dr. John Lundt, for his time, expertise, and patience both during the completion of this study and over the past years as I completed coursework.

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Table of Contents

	Page
I. Chapter 1: Introduction	1
A. Purpose of the Study	1
B. Problem Statement	1
C. Background of the Study	2
D. Significance of the Study	4
E. Research Question	7
F. Research Hypotheses	7
G. Definition of Terms	8
II. Chapter 2: Review of Related Literature	10
A. Introduction	10
B. Theoretical Framework	10
1. Theory of Reasoned Action	10
2. Attitudes	13
3. Use of Theory of Reasoned Action in Research	14
4. Measurement of Attitudes	17
C. Attitudes of Nurses Toward Computers	18
1. Stronge-Brodth Instrument	20
2. Thomas' Opinionnaire	27
D. Rural Nursing	29
1. Defining Rural	29
2. Challenges for Rural Nurses	32
3. Continuing Education for Rural Nurses	39
4. Computers for Rural Health Care	39
E. Summary of the Literature	42
III. Chapter 3: Methodology	43
A. Research Design	43
B. Population and Sample	45
C. Instruments	47
D. Item Development	50
E. Data Analysis	50

IV.	Chapter 4: Analysis of Findings	52
A.	Characteristics of the Sample	52
1.	Gender	52
2.	Age	52
3.	Educational Preparation	52
4.	Length of Practice	53
5.	Practice Area	54
6.	Certification	56
7.	Licensure	56
8.	Distance Traveled to Continuing Education	58
9.	Computer Usage	58
B.	Hypothesis Testing	59
1.	Hypothesis 1	60
2.	Hypothesis 2	64
3.	Hypothesis 3	68
4.	Hypothesis 4	71
5.	Hypothesis 5	72
6.	Hypothesis 6	73
C.	Efficiency of Computers	76
D.	Confidentiality	79
E.	Attitudes Toward Computers	81
1.	Multiple Regression	83
2.	Path Analysis	85
3.	Qualitative Analysis	90
4.	Lack of Recognition of the Value of Computers	91
5.	Lack of Resources Regarding Computers	92
6.	Access to Continuing Education	94
7.	Continuing Education by Computer	97
V.	Chapter 5: Summary, Implications, Conclusions	102
A.	Summary	102
B.	Implications for Rural Hospitals	104

C.	Implications for Nursing Education	108
1.	Continuing Education	109
D.	Implications for Research	112
E.	Conclusions	114
VI.	Appendix A: Letter of Directors of Nursing	118
VII.	Appendix B: Questionnaire	120
VIII.	Appendix C: Permission for Use of the Questionnaire	127
IX.	Appendix D: Research Rationale for Questionnaire	129
X.	References	140

List of Tables

	Page
Table 1: Age of Respondents	53
Table 2: Educational Level of Respondents	53
Table 3: Length of Practice of Respondents	54
Table 4: Major Practice Areas	55
Table 5: Certification Types	57
Table 6: Distance Traveled to Continuing Education	58
Table 7: Years of Nursing Practice	66
Table 8: Regression Analysis: Relationship Between Attitude Toward Computers and Computer Usage	7+
Table 9: Mean Scores by Computer Usage	74
Table 10: Zero-order Correlations	83
Table 11: Stepwise Multiple Regression Results Predicting Attitudes Toward Computers	84

List of Figures

	Page
Figure 1: Attitude Toward Computers by Gender	61
Figure 2: Attitude Toward Computers by Age	65
Figure 3: Attitude Toward Computers by Education	70
Figure 4: Attitude Scores	82
Figure 5: Path Analysis Diagram	86

Chapter 1

Introduction

Purpose of the Study

The purpose of this study was to examine the attitudes of rural nurses toward the use of computers and identify variables that may influence their attitudes. Variables examined in this study included certification, licensure requirements, gender, educational preparation, and computer usage. Previous research that examined nurses' attitudes toward computers have sampled nurses working in urban settings. No previous studies have examined rural nurses' attitudes toward computers.

Problem Statement

Health care organizations, particularly those in rural areas, have recently experienced financial challenges. In response to demands for cost effective health care, hospitals have gone through significant changes with respect to financial management and allocation of resources. Decreased funds for educational programming have resulted in the elimination of nurse educators and the loss of funding for continuing education. Nurses practicing in rural areas must begin to explore alternative methods for obtaining the continuing education credit necessary for maintaining clinical competence.

Background of the Study

The importance of continuing education for nurses is well documented in the literature. Nurses participate in educational programming because of a desire for professional growth, to maintain clinical competence, and to acquire new knowledge or skills. In addition, external expectations regarding continuing education mandates are important motivating factors for attending continuing education offerings.

Several states now mandate continuing education as a requirement for licensure of professional nurses. The first states to require continuing education credit for licensure were California and Kansas in 1978 (Thurston, 1992). Since then, 24 states have enacted legislation requiring documentation of some form of continuing education as a requirement for license renewal (Yoder-Wise, 1998).

Professional nursing roles have continued to evolve since these mandates were initiated. Nurses have expanded their roles to include education, research and health care administration. More recently the demand for primary health care providers, particularly in underserved areas, has been instrumental in the rise of independent practice roles for nurses with advanced degrees or training, and those who are maintaining certification in areas of specialization. Because of the diversity and professional expansion within nursing, continuous evaluation of educational programming and competency is essential (Davee & McHugh, 1995).

Health care organizations recently have faced difficult times with respect to appropriation of financial resources. In order to respond to the public concerns related to health care, rapid changes are taking place in an effort to reduce costs while improving the health care delivery system. The associated changes have often meant restructuring of nursing care delivery systems and reduced funding for education within the organization. In practical terms this has meant the loss of positions dedicated to organizing and providing continuing education for nursing staff, the elimination of financial support for continuing education tuition and the inability of institutions to provide days off with pay to attend such offerings. Currently, in many hospitals, nurses must use their days off or vacation time to attend continuing education functions and can no longer count on any financial support for the incurred costs (Hedman & Lazure, 1990).

The impact of health care changes in rural areas has been even greater. The shortage of physicians and nurses in rural areas has been an ongoing challenge for administrators responsible for recruitment of qualified personnel. The shortage of nurses in rural areas has persisted despite the fact that urban centers have enacted hiring freezes and layoffs of staff. Stratton & Briggs Lausch (1992) state that the smallest hospitals are currently experiencing the most severe shortages. They further add that the impact is heightened due to the added burden the vacancies create for the fewer remaining nurses. Administrators must also deal with the

financial burden of supporting a continuous cycle of recruitment efforts (Stratton & Briggs Lausch, 1992).

While several reasons for the shortage of health care workers have been documented, one important factor is the lack of continuing education available in these areas. Health care institutions can no longer afford to provide continuing education or to send nurses to programs. Additional factors that are deterrents to obtaining continuing education include the distance to providers of education, seasonally inclement weather and the unavailability of additional staff to cover the nurse's absence while attending the program (Hedman & Lazure, 1990).

Despite the difficulties in obtaining continuing education, nurses in rural areas remain committed to keeping their practice current and competent. Many of these nurses are licensed in states that require continuing education credit for relicensure or are certified in specialized areas that require continuing education for renewal of the certification. Other rural nurses simply believe that the nursing profession is enhanced by nurses who remain current through continuing education.

Significance of the Study

As a result of the difficulties in obtaining continuing education in rural areas, several approaches regarding the use of distance learning have been employed. Common methods include audio or video teleconferencing, interactive

television, and computer assisted instruction. In many rural areas, the expense involved in the adoption of these technologies precludes widespread usage.

However, the relatively low cost of computer assisted instruction either through pre-programmed software or through the use of the Internet has recently caught the attention of nurses in rural areas as a possible solution to issues related to accessing continuing education.

Several advantages to learning via computers have been addressed with regard to usage in the rural environment. Computer assisted instruction is less costly than sending nurses to distant sites for continuing education due to travel time and time away from work. Additionally, nurses can complete the continuing education on their own time and avoid using vacation benefits or time off without pay to pursue educational opportunities. The use of computer assisted instruction is also advantageous financially to the institution in that one program can be used for many nurses. More recently, the Internet provides continuing education in the form of interactive patient care scenarios that enhance critical thinking in nurses.

Several problems are prevalent in nursing related to computer usage. In nursing school, few students have sufficient exposure to the use of computers to become comfortable using them in their practice or for continuing their education beyond graduation. Consequently, for many nurses currently practicing, computer literacy was not included in their educational program and they are not familiar

with the language surrounding the use of computers (Reynolds & Ferrell, 1989). Many nurses are simply resistant to change and unwilling to take the time or make the effort to learn how computers could actually ease some of the frustrating aspects of practicing nursing in a rural setting (Perry & Mornhinweg, 1992).

Because of the rapid increase in use of computer technology in all aspects of health care and life in general, it is important that nurses become skilled with the computer. Resistance to using the computer seems to result from either inadequate experience, lack of exposure, or poor attitudes about changing to a new technology (Thomas, 1990).

Developing remedies for inadequate experience or lack of exposure to computers is possible even in rural areas. Expertise in computer technology is prevalent in even the most remote areas and courses or tutorials for the beginning computer user are reasonably accessible. However, according to the Theory of Reasoned Action (detailed in Chapter 2), if nurses' attitudes about computers are negative, the use of computers to enhance continuing education will be ineffective (Ajzen & Fishbein, 1980).

Studies by Allen (1986), Brodt & Stronge (1986), Scarpa, Smeltzer, & Jasion (1992), Simpson (1997), Stronge & Brodt (1985), Sultana (1990), and Thomas (1990) that examined nurses' attitudes toward computers are reviewed in Chapter 2. None of these studies focus on the attitudes of rural nurses. It is clear

that if computers are to be introduced and accepted as a viable means for delivering continuing education to rural nurses, the attitudes of these nurses needed to be determined.

Research Question

The questionnaire developed for this study contained sections soliciting both quantitative and qualitative information. The portion of the questionnaire designed for qualitative data collection was not guided by a hypothesis, but by a research question. LoBiondo-Wood & Haber (1998) state that studies in which a particular phenomenon is being explored may often be guided only by research questions. This is especially common when “there is a dearth of literature in a particular area of interest to the researcher” (LoBiondo-Wood & Haber, 1998, p.83). Talbot (1995) also states that research questions rather than hypotheses are appropriate when the aim of the study is to describe, explore or explain. The research question that was designed to help guide the exploratory nature of the study was:

What are rural nurses’ attitudes toward computers?

Research Hypotheses

Six research hypotheses were also developed to guide this study.

H₁ There is a difference in attitudes toward computers between male and female rural nurses.

- H₂ There is a relationship between the age of rural nurses and their attitudes toward computers.
- H₃ There is a difference in attitudes toward computers among rural nurses with different levels of educational preparation.
- H₄ There is a difference in attitudes toward computers among rural nurses who hold certification and those who do not hold certification.
- H₅ There is a difference in attitudes toward computers among rural nurses who are required to obtain continuing education credit for relicensure and those who are not required to obtain continuing education credit for relicensure.
- H₆ There a relationship between rural nurses' attitudes toward computers and computer usage.

Definitions of Terms

Nurse: Nurse is defined as any person licensed to practice as a registered nurse or licensed practical nurse in their state of employment (Montana State Board of Nursing, 1996).

Rural: Rural is defined for the purposes of this study by county, examining three parameters. The first is a population density of less than 100 people per square mile. The second is a hospital size of 25-100 beds or less. The third is a

driving time of 30 or more minutes or severe geographic and climatic conditions (Elison, 1986).

Certification: As defined by the American Nurses' Association (1979), certification is the process by which a nongovernmental agency or association certifies that an individual licensed to practice a profession has met certain predetermined standards specified by that profession for specialty practice.

Continuing Education: Continuing education is defined by the American Nurse's Association (1975) as a "planned, organized learning experience designed to augment the knowledge, skill, and attitudes of nurses for the enhancement of nursing practice, education, administration, and research to the end of improving health care to the public." This definition is used by all the states who require continuing education credit for relicensure in the United States (Davee & McHugh, 1995).

Attitude: Attitude is defined as a "learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (Fishbein & Ajzen, 1975, p.6).

Computer Usage: Computer usage was self-defined by the participant by indicating on the questionnaire the amount of time they spend using computers. Respondents indicated they use a computer less than once a week, more than once a week, but not daily or every day.

Chapter 2

Review of Related Literature

Introduction

The literature related to this study involves several areas. The concept of attitude will be addressed within the framework provided by the Theory of Reasoned Action (Fishbein & Ajzen, 1975). Additionally, research exploring nurses' attitudes toward computers and factors affecting continuing education for rural nurses will be discussed.

The implementation of continuing education programs for rural nurses via computer is being addressed in the literature (Pickard, 1990; Fulmer, Hazzard, Jones, & Keene, 1992; Crandall & Coggan, 1994). If the attitude of rural nurses toward computers can be measured, the results can be used to help explain or predict behavior related to successful use of the computer for attaining continuing education credit. Based on the Theory of Reasoned Action, it is imperative that understanding rural nurses' attitudes toward computers be a precursor to development of any continuing education program requiring computer usage. An extensive review of the literature indicated that there are no studies published that explore rural nurses' attitudes toward computers.

Theoretical Framework

Theory of reasoned action. One of the most widely used theoretical

frameworks related to attitude research is the Theory of Reasoned Action (Fishbein & Ajzen, 1975). This expectancy value model developed by Fishbein & Ajzen (1975) has demonstrated that it is possible to predict intentions by measuring attitudes toward performing a behavior and the person's perceptions of the social pressures present, otherwise termed subjective norms. The Theory of Reasoned Action will be used to study how the attitudes of rural nurses' toward computers may influence their decision to use computers for obtaining continuing education credit.

Conceptually defined, an attitude is a feeling about a specific subject and according to the Theory of Reasoned Action, attitudes are a function of beliefs (Fishbein & Ajzen, 1975). For example, when a person believes that performing a given behavior will lead to a positive outcome, the behavior will be looked upon with a favorable attitude. Conversely, if a person believes that performing a given behavior will produce a negative outcome, the behavior will be regarded with an unfavorable attitude. Each person holds certain beliefs that determine attitudes toward performing behaviors. Behavioral change is produced by changing the person's beliefs about the consequences of performing or not performing the behavior.

Subjective norms are also a function of beliefs but in a different way. These are conceptually defined as the person's beliefs that specific groups or

individuals think they should or should not perform a behavior. These beliefs are responsible for exerting pressure on a person's motivation to comply. In other words, the subjective norm may provide pressure on an individual to perform or not perform a given behavior, independent of the person's own attitude toward the behavior (Ajzen & Fishbein, 1980). Adolescent peer pressure is an example of this phenomenon.

The Theory of Reasoned Action is expressed algebraically by the following equation:

$$B \sim BI = (Ab) = (SN)$$

where B = overt behavior which is considered to be mediated (~) by BI, behavioral intention. Ab represents the attitude toward the behavior and SN represents the subjective norms that may influence the behavior (Strader, Katz, & Stanton, 1987).

The Theory of Reasoned Action suggests, therefore, that if a nurse believes that using computers will have a positive outcome, then he/she will develop a positive attitude about computers. If a nurse believes that using computers will have a negative outcome, then he/she will develop a negative attitude about computers. This leads to the hypothesis that nurses who have a positive attitude about computers will be more likely to choose computers as a means of obtaining continuing education credit.

Whatever the attitude the person has, subjective norms may also exert

pressure on the nurse and influence the nurse's choice. Colleagues or family members may influence the nurse's attitude toward computers. In addition, continuing education requirements mandated by state boards of nursing or certifying bodies may also influence a nurse's choice to pursue the computer option as a means for obtaining continuing education.

Behavioral change, according to the Theory of Reasoned Action, results from a change in a person's beliefs about whether or not to perform a behavior. In order to bring about a change in a person's attitude, communication must contain information that ties the target behavior to various positive or negative attributes (Ajzen & Fishbein, 1980). Communication that stimulates a shift in the underlying beliefs will influence the attitudes, causing intentions and behaviors to change (Fishbein & Ajzen, 1975).

Attitudes. Many studies have been published examining the link between attitudes and behavior. Fishbein (1967) states that researchers have concentrated on an effort to define "attitude" rather than on research directed at the relationship between attitudes and behavior. Nevertheless, there have been several attempts made by researchers to explain this relationship. The major works will be presented chronologically.

As early as the 1940's, Doob (1947) reported that attitudes are responses to external stimuli and that these responses act as cues to arouse behavioral

responses. Behavioral responses are then a function of an individual's reinforcement history, and the individual develops a response hierarchy based on past reinforcement. This past reinforcement coupled with an arousal of attitude will cause the individual to act, given an appropriate behavioral alternative. Conversely, if an individual is faced with a behavioral alternative that is perceived negatively or is not related to the attitude, the individual will not act (Doob, 1947).

Attitude-behavior consistency has been demonstrated in other studies of relevant social behavior. Fishbein, Ajzen, & McArdle (1980) showed support for a link between attitude and behavior in a study attempting to encourage 160 hospitalized alcoholics to sign up for treatment. By using persuasive messages aimed at changing the patients' attitudes, 30 per cent of the patients changed their behavior regarding treatment.

Use of theory of reasoned action in research. The Theory of Reasoned Action has been applied to a wide variety of socially relevant behaviors among many types of research settings. It has been used in attempting to understand voting practices, drug use, treatment for alcoholics and others (Strader, et. al., 1987). In addition, numerous studies (Allen, 1986; Brodt & Stronge, 1986; Hendrickx, 1989; Hendrickx & Finke, 1994; Stronge & Brodt, 1985; & Thomas, 1990) related to nurses' attitudes have been published using the Theory of Reasoned Action as a framework. These studies will be discussed further in this

chapter.

Oliver & Berger (1979) demonstrated support for the attitude-behavior relationship in explaining variance in intention to receive flu inoculations; Fishbein, Bowman, & Thomas (1980) in predicting and understanding voting behavior; McCarty (1981) in changing contraceptive usage intentions; and Poindexter (1980) in predicting newspaper reading behavior. More recently Evers & Karnilowicz (1996) used the behavior-attitude relationship to explain patient functioning related to attitudes toward multiple sclerosis; Janke (1994) to explain breast feeding attrition rates; and Apodaca, et al. (1997) to explain community health program participation. These researchers have historically provided a confirmation between attitude and behavior as presented by the Theory of Reasoned Action.

In nursing, the Theory of Reasoned Action has been used in a variety of studies. Hendrickx (1989) used the Theory of Reasoned Action in examining high school juniors' attitudes toward nursing as a career and as a framework for a study examining high school guidance counselors' attitudes toward nursing as a career (Hendrickx & Finke, 1994). Five hundred-seventeen guidance counselors responded to the survey in which they reported positive attitudes about nursing as a career. Positive attitudes toward nursing were highly correlated with whether or not they recommend nursing to high school students ($r=.94$, $p<.05$). The Theory of

Reasoned Action was supported in that positive attitudes were a prediction of behavior.

Strader (1988) studied 90 randomly selected male and female college students who had not yet decided on a major. The Theory of Reasoned Action was used as a framework for the study. The components of the Theory of Reasoned Action were used to construct a preliminary belief scale related to attitudes about a nursing career. The two treatment groups were pre-tested, exposed to a videotaped persuasive message about nursing and then post-tested and requested to fill out a sign-up sheet for a career as a registered nurse. The control group was not exposed to the message. Data analysis revealed that the group exposed to the persuasive communication demonstrated a significantly higher ($p < .05$) sign-up rate for nursing than the control group. Results showed that the experimental group, after exposure to the message, showed more positive belief and attitude scores than the control group.

Several widely accepted questionnaires regarding nurses' attitudes toward computers were also based on the Theory of Reasoned Action. Thomas (1990) used the Theory of Reasoned Action in the development of two "Computing in Nursing Opinionnaires." These instruments were parallel measures designed to assess changes in nurses' and nursing students' attitudes toward computing in nursing. Thomas (1992) found a significant improvement in mean attitude scores

from pre-test to post-test ($t=3.61$, $p<.001$), and an increase in computer use by students ($\chi^2=6.86$, $p<.05$). She concluded that a positive attitude toward computers resulted in more frequent computer use by students, congruent with the Theory of Reasoned Action.

The theoretical basis for the development of a widely used instrument by Stronge & Brodt (1985) included Fishbein & Ajzen's work (1975). This instrument was designed for assessment of nurses' attitudes toward computers and has been used in replication studies which also have been based on the Theory of Reasoned Action (Scarpa, Smeltzer, & Jasion, 1992). These studies are detailed further in the chapter.

Each of the aforementioned nursing studies (Hendrickx & Finke, 1994; Scarpa, Smeltzer, & Jasion, 1992; Strader, 1988; Stronge & Brodt, 1985; & Thomas, 1990) are evidence that the Theory of Reasoned Action (Ajzen & Fishbein, 1975) has been deemed suitable as a foundation for nursing research involving attitudes. Based upon this evidence, the Theory of Reasoned Action be employed as a framework for this study.

Measurement of attitudes. While a review of the literature demonstrated that no universally accepted definition of attitude exists, certain characteristics of attitudes were evident. One characteristic is that attitudes are learned through interaction in situations (Fishbein & Ajzen, 1975). Shaw & Wright (1967)

described attitudes as an antecedent of behavior, and it is this relationship between behavior and attitude that has served as the focal point for measurement of attitudes. Skinner & Kreuter (1997) describe the relationship between behavior and attitude in the theoretical application of behavioral science theories to enhance attainment of objectives by various groups.

Whatever the definition of attitude used, the most common measure of attitude is a questionnaire (Ajzen & Fishbein, 1975). Self-report techniques to measure attitude appear to be the most common for several reasons. Fink (1995) and LoBiondo-Wood & Haber (1998) state that the survey is appropriate for collecting information that describes, compares or explains knowledge, attitudes or behavior. In addition, anonymity is ensured and there is no opportunity for the investigator to either purposefully or inadvertently, alter the respondents' attitudes (Stronge & Brodt, 1985). The "Attitudes Toward Computers" questionnaire, a self-report survey that was developed for this study, will be discussed further in Chapter 3.

Attitudes of Nurses Toward Computers

With the rapid increase in information technology that has occurred over the past two decades, the nursing profession has been faced with changes in the way health care information is managed. In many areas, computers have become routine parts of daily operations. Hospitals have specialized equipment in many

patient care areas and nurses are being exposed to increasingly technical ways of caring for patients. Computers now determine staffing needs on nursing units, deliver diagnostic test results more quickly, provide access to library resources more efficiently and are being used in many hospitals for documentation of patient care. However, despite the wide use in many settings, nurses are often reluctant or uncomfortable to work with computers.

As computers began to be more widely used in health care, major concerns surfaced. Worthley (1982) identified sources of reluctance to computer usage as: the nurses' reluctance to return to the role of the learner, fear of failure, fear of changing relationships on the job, fear of losing the social benefits of interaction with co-workers and patients, and intimidation from the common belief that adolescents are proficient with computers.

Reynolds & Ferrell (1989) conducted continuing education for nurses that offered basic computer workshops. Attendees identified the most common reasons for attending as personal interest, professional interest, interest based on their childrens' use of computers in school, and the personal desire for academic success. The authors stated that for nurses currently practicing, computer literacy and usage skills must be addressed since many of these nurses had no exposure to computers in their original nursing programs (Reynolds & Ferrel, 1989).

With regard to documentation of patient information on computers, several

other issues have been identified. Ethics, patient privacy and confidentiality were identified as important concerns with regard to nurses' attitudes about computer usage for patient data (Barhyte, 1987; Romano, 1987).

Perry & Mornhinweg (1992) identified several obstacles that prevent nurses from accepting computers in their practice. A major problem they identified was that nurses' educational preparation with regard to computer usage did not keep up with the expectations of those who make healthcare policy. In a survey of 152 practicing nurses, 75% had either no exposure or exposure of less than once a week during their formal nursing education. Over half of those surveyed reported they had never used a computer or had used one for less than one year (Perry & Mornhinweg, 1992). The study also indicated that while some nurses were comfortable turning on a computer and had some word processing skills, there was a knowledge deficit related to computer systems operations as well as overall anxiety about computer usage. Results from this study led to computer training courses for the particular group of nurses surveyed.

Since the mid-1980's, there have been assessment tools developed that were designed to measure nurses' attitudes toward computers. Two instruments have been widely used in the nursing literature (Stronge & Brodt, 1985; Thomas, 1990).

Stronge-Brodt instrument. The instrument that has been used to measure nurses' attitudes most often was developed by Stronge and Brodt (1985). The

purpose of their initial research was to develop an instrument that could be used to measure nurses' attitudes toward computers. The instrument employed a Likert-type scale designed to reflect the major issues related to computers in nursing that had been identified through a review of the literature. Six areas were developed that served as the basis for instrument construction: 1) job security, 2) legal ramifications, 3) quality of patient care, 4) capabilities of computers, 5) employee willingness to use computers, and 6) benefits to the institution (Stronge & Brodt, 1985).

The Stronge & Brodt (1985) instrument was piloted first with 48 nursing students and faculty at an Iowa college. Each of the items on the questionnaire was analyzed and an index of discrimination was calculated. Nineteen of the statements had an index of discrimination above .50 and were considered to be acceptable for inclusion in the questionnaire. Content validity was established and internal consistency was determined using the Spearman-Brown prophecy formula. The instrument was then published for use as an effective measurement of attitudes of nurses toward computers.

Brodt & Stronge (1986) used the questionnaire in a survey of 185 nurses practicing in a community hospital. Results indicated nurses had a somewhat favorable attitude toward computers based on mean scale scores. Registered nurses had a more favorable attitude than licensed practical nurses ($p < .001$) and

nurses with 21 or more years of experience demonstrated a more positive attitude than nurses with less than 10 years of experience ($p < .01$). Age, length of employment in the current position and the presence of a computer terminal on the nursing unit had no significant effect on attitudes toward computers (Brodt & Stronge, 1986).

Many of the early studies related to nurses' attitudes toward computers utilized the Stronge-Brodt questionnaire. Schwirian, Malone, Stone, Nunley, & Francisco (1989) used the Stronge-Brodt questionnaire in a study comparing the attitudes of nurses and nursing students toward computers. The sample included 353 sophomore nursing students and 358 staff nurses in a midwestern metropolitan area. Results showed that the nursing students had more positive attitudes toward computers than the practicing nurses ($t = 4.206$, $p < .001$). In addition, it was found that the students who worked with computers in their work settings or had used computers in educational courses had more positive attitudes than those students who had not (Schwirian et al., 1989).

Burkes (1991) used the Stronge-Brodt scale in a correlational study to identify relationships between satisfaction with computerized charting, beliefs about computer use in nursing, and motivation to use computerized nursing programs. The sample consisted of 133 full and part-time nurses in a large, tertiary hospital in Salt Lake City. Pearson correlation coefficients were used to

test the relationships between the study variables. The authors reported positive correlations between computer-use satisfaction and computer-use beliefs, computer-use satisfaction and computer-use motivation and between computer-use beliefs and computer-use motivation ($p < .05$). There was no significant correlation between age, educational level or years of nursing experience and computer-use satisfaction, which is in contrast to Brodt & Stronge's (1986) findings where education and years of nursing experience were positively correlated ($p < .01$).

An interesting negative correlation was found between computer experience and computer-use satisfaction in Burkes' (1991) study. Nurses who had more experience with computers were less satisfied with computerized charting than were nurses who had less computer experience. Earlier studies had noted positive correlations between computer experience and positive attitudes (Chang, 1984; Melhorn, Legler, & Clark, 1979). While Burkes (1991) does not offer any discussion regarding the negative correlation between computer experience and computer-use satisfaction, one could speculate that nurses were not adequately prepared for computer charting or were unaware of the advantages of their systems. The nature of these findings indicate a need for further study.

Bongartz (1988) compared attitudes about computers among nurses who had computer experience and those who did not. The Stronge-Boldt questionnaire was again used as the instrument. Results showed that nurses who worked in

hospitals with computers on the nursing units were less positive ($M=70.05$, $SD=13.13$) about computers than nurses who worked in areas without computers ($M=72.22$, $SD=12.8$, $p<.05$) (Bongartz, 1988).

A replication study by Scarpa, Smeltzer, and Jasion (1992) was conducted using the Stronge-Brodt questionnaire with 136 nurses in a 500-bed hospital. Results showed that nurses with previous computer use had more positive attitudes than nurses without previous experience ($t=4.71$, $p<.001$). Variables such as educational level, job title, age and years in nursing practice showed no significant difference in attitudes (Scarpa et al., 1992).

Sultana (1990), in another replication of Stronge-Brodt's work, surveyed 58 nurses in a general hospital. It was concluded that age, nursing experience, computer experience, length of stay at that hospital, nurses' qualifications and unit worked on accounted for no significant difference in attitude toward computers ($p>0.05$).

The most recent study using Stronge and Brodt's questionnaire sampled 208 nurses in a large general hospital (Simpson & Kenrick, 1997). In the Simpson and Kenrick (1997) study, 54.3% of the nurses displayed positive attitudes toward computers. In contrast with the original Brodt and Stronge (1986) study, these researchers demonstrated that age was a significant factor in determining attitudes toward computers (Mann-Whitney=2186.5, $p=0.017$). The younger nurses had

more positive attitudes toward computers. Attitudes were also inversely related to number of years worked as a nurse. Those nurses who worked greater than 21 years showed the most negative attitudes toward computers ($p=0.0017$). For the Simpson and Kenrick (1997) study, no significant differences in attitudes were found based on gender, previous experience with computers or level of education.

While the Stronge-Brodthorn questionnaire has been widely used in the literature, several concerns have been addressed with regard to the instrument. Scarpa et al. (1992) reported that results of factor analysis using the Stronge-Brodthorn questionnaire suggested response bias and that validity of the defined categories could be confirmed only through additional factor analysis with larger samples.

In response to concerns about the instrument, Stockton and Verhey (1995) conducted a psychometric examination of the Stronge-Brodthorn questionnaire by administering the tool to over 600 nurses and carried out factor analysis. In two separate samples, the internal consistency reliability for the factors was high ($\alpha = .93$ and $.92$). Stockton and Verhey (1995) supported the reliability of the instrument using larger sample sizes.

More recently a study using the Stronge-Brodthorn instrument was conducted by McBride and Nagle (1996) and resulted in inconsistent findings from previous studies. In the McBride and Nagle (1996) study, a convenience sample of 394 registered nurses in a large, metropolitan hospital and 299 baccalaureate student

nurses was surveyed to examine factors that influenced attitudes toward computers. There were no significant differences in mean scores on the instrument ($t=-1.69$, $p>.05$). In addition, concerns were once again raised about the questionnaire. McBride and Nagle (1996) stated that “The factor patterns that emerged in this study do not support Stronge and Brodt’s conceptualization of the six attitude issues. Furthermore, in both samples, approximately 50% of the variance was explained by the identified factors” (McBride & Nagle, 1996, p. 168). Results indicated a lack of support for construct validity of the instrument and the authors stated that further development is recommended (McBride & Nagle, 1996).

Other studies related to attitudes toward computers have been published without using the Stronge-Brodt scale. Anderson, Donnelly and Hess (1992), in a random survey of 404 diabetes educators, examined attitudes toward computers. The respondents were positive in their attitudes about computers ($p<.001$). They believed that computers were useful in writing reports and papers, keeping patient records but less useful for saving time, improving efficiency or in helping people learn (Anderson et al., 1992).

While many of the studies reviewed indicated unfavorable attitudes toward computers, Ngin, Simms, and Erbin-Roesemann (1993) found that computer usage added to work satisfaction among nurses. In an exploratory study of 268 nurses,

those who characterized themselves as having expert computer skills had significantly higher levels of satisfaction with their work than nurses who classified themselves as novice ($F=5.937, p<.05$). Additionally, nurses who classified themselves as having intermediate skills also reported higher levels of work satisfaction than novices or non-users ($F=5.289, p<.05$). Computer users were found to be less negative about their work and responded that the computer made their work easier (Ngin, Simms, & Erbin-Roesmann, 1993).

Thomas' Opinionnaire. Thomas (1990) developed an instrument designed to measure attitudes toward computing in nursing. This work was important because much of the prior work in this area had relied on the Strong and Boldt questionnaire which Thomas described as "... useful for hospital settings, this instrument lacks elements to measure attitudes toward computing in educational settings adequately" (Thomas, 1990, p. 194). Thomas' instrument, termed an "opinionnaire", was constructed to focus on the three dimensions of attitudes from Fishbein & Ajzen's (1975) work: feelings, beliefs and intentions to act. Thomas' instrument was published with the intent of stimulating research about nurses' attitudes toward computing in relation to educational settings.

The Thomas Opinionnaire has been used in further research. Thomas, Delaney, and Weiler (1992) used the instrument in an examination of 48 nursing students' attitudes toward computing, the relationship between their attitudes, their

computer knowledge base, and their technical computer skills. Using a pre-test, post-test design, Thomas et al. (1992) found, as expected, that students' attitudes were significantly more positive after coursework involving computers than before the coursework ($t=3.61$, $p<.001$). In addition, age and student-status were significant factors related to attitude. Older students were more positive in attitude ($\chi^2=10.69$, $p<.01$) and registered nurse students returning for their baccalaureate degrees had more positive attitudes than generic students ($\chi^2=8.03$, $p<.02$). The authors recognized the limitations of the small sample size and encouraged further use of this instrument with larger groups and with practicing nurses.

Birx, Castleberry, and Perry (1996) used the Thomas Opinionnaire in a study to determine the effects of laptop computer use on baccalaureate nursing students' attitudes toward computers, computer knowledge and computer skills. Senior nursing students ($n=38$) participated in the study. Birx et al. (1996) found that computer skills scores were significantly improved at the .05 level. There was not a statistically significant difference in attitude scores between the two groups ($t=1.13$, $p>.05$). Once again, this was a small sample with one particular group of students and needs to be replicated with larger and more diverse groups.

All of the studies examining attitudes toward computers that are discussed in this review of the literature have sampled nurses working in urban settings. Therefore, results of the previously discussed studies cannot be generalized to

nurses working in rural areas. Practicing nursing in rural health care facilities presents unique challenges that are not present in urban areas. It is important to discuss what constitutes “rural” and provide some background into the difficulties facing rural health care personnel.

Rural Nursing

Defining rural. The term “rural” has been defined in numerous ways. There are federal government definitions, and other official and non-governmental definitions. This section will discuss the various definitions of “rural” and present challenges facing nurses working in what are classified as rural areas.

According to the U.S. Bureau of the Census persons living in places of 2,500 or more inhabitants are designated as urban while population areas not considered urban are considered rural (Lee, 1991). Using this definition, there are fifteen states that have a rural population of more than 50%. The United States Bureau of the Census (1980) have defined urbanized areas as those consisting of a central core such as a city or central city, and the contiguous, closely settled area outside the city’s boundaries that have a total population of at least 50,000 combined. Additionally, the area generally has a population density of at least 1,000 persons per square mile. The rural population is differentiated between farm and non-farm populations. The farm population definition includes people in rural areas on properties of one acre or more of land, where at least \$1000 of

agricultural products were sold the previous year and non-farm populations are the areas in between the farm and urban designations (U.S. Office of Technology, 1989).

Lee (1991) discusses other definitions of rural that have been used in relation to health care. The Rural Highway Public Transportation Administration considers communities of 5,000 or less as rural while the Farmer's Home Administration defined rural as communities with 20,000 or fewer residents. The Office of Management and Budget has designated a metropolitan statistical area as a large urban area that has a high degree of economic and social integration with the surrounding area. This definition expands on the U.S. Census Bureau definition which is based entirely on where people reside. Official standards now used prior to each census, state that a metropolitan statistical area must have a city with at least 50,000 residents or an urbanized area of at least 50,000 that is part of a county having at least 100,000 people (U.S. Office of Technology, 1989).

Several other federal agencies define rural as anything outside metropolitan statistical areas. These include the Department of Housing and Urban Development, the Social and Rehabilitation Service, and the Department of Agriculture (Lee, 1991). Hinshaw, Atwood, Gerber, and Erickson (1986), for the purposes of a study contrasting job satisfaction and anticipated turnover among urban and rural nurses, have defined rural as communities with a population of

100,000 or less.

With the wide discrepancies noted in defining “rural”, it has been difficult to conduct health care planning related to rural issues. Out of this difficulty rose the emergence of research done by Elison (1986) which has produced a more widely accepted definition of rural in relation to health care. The category of “frontier” was developed in addition to rural as a way to more accurately identify areas for development of service delivery standards for health care in more sparsely populated areas.

The Frontier Task Force of the National Rural Health Association is now encouraging all federal agencies to designate areas as rural and frontier by these expanded definitions (Miller, 1990). This re-definition is extremely important for hospitals in rural or frontier areas due to the purpose of the Health Care Financing Administration. Based on population parameters, this organization is responsible for planning and implementing programs and services through financial resource allocation to rural hospital candidates (Lee, 1991).

Elison (1986) delineates urban, rural and frontier by three parameters: population density, hospital size, and driving time required to access health care. Those areas characterized as urban have more than 100 people per square mile, have a large hospital with usually 100 or more beds and a driving time of less than 30 minutes. The rural area has more than 6 but fewer than 100 people per square

mile, a small (25-100 beds) hospital and a driving time of 30 minutes. The frontier designation is reserved for those areas with less than 6 people per square mile, a hospital of 25 beds or less or no hospital at all, and a driving time of 60 minutes or having severe geographic and climatic conditions (Elison, 1986).

Challenges for rural nurses. Elison's (1986) definition is most appropriate in classification of rural and frontier areas when examining the research related to difficulties rural nurses face with regard to obtaining continuing education. Rural nursing has just recently been recognized as a critical entity in the current health care market (Bigbee, 1993). Weinert et al., (1996) delineated four general characteristics that have been used to describe rural nurses in the literature. These include:

- 1) nurses having close community ties
- 2) considerable demand to "be all things to all people"
- 3) greater cohesiveness and camaraderie among rural/frontier nurses
- 4) positive community visibility (Weinert et al., 1996).

Despite some of these positive characteristics, many difficulties face nurses working in rural areas. The American Nurses' Association (Weinert et al., 1996), in a landmark publication related to nursing in underserved rural areas, identify several challenges for the rural/frontier nurse:

- 1) an inadequate supply of primary health care providers
 - 2) lack of preparation for rural practice
 - 3) few opportunities for advancement
 - 4) reduced access to advanced and continuing education
 - 5) longer work hours (including more evening and weekend coverage)
 - 6) greater potential for professional isolation
 - 7) less professional backup and
 - 8) limited opportunities for consultation with other health care providers
- (Weinert et al., 1996, p. 16).

These concerns have been documented in various studies related to nursing in rural areas and are consistent with the literature addressing problems for rural physicians. Blumenthal (1994) compared geographic imbalances of physician manpower and described programs being used to attract and retain physicians in underserved, rural areas. For physicians, financial incentives such as medical school scholarship programs, loan-forgiveness plans and medical school programs financed specifically to attract students who will practice in rural areas upon graduation, are some of the tactics used to attract physicians to rural areas.

Teevans (1995) stated that federal programs have failed to enact meaningful legislation that would support developing rural networks for health care workers. The lack of professional networking has been a deterrent to retaining rural health

care providers and states have now begun to develop their own plans to improve networking. States are dedicating funds and staff to assist rural health care providers in developing and operating networks aimed at providing a communication link between rural agencies and personnel in an attempt to prevent the isolation expressed by rural health care professionals (Teevans, 1995).

Hemman, McClendon & Lightfoot (1995) detailed a cooperative effort in an underserved area (Alaska) to provide a continuing education program on trauma care to meet the needs of the health care community in this area. A geographic area of 250,000 square miles with temperatures as low as -50 degrees F and travel limited to air or river service in many areas were factors leading to the identification of the need to provide a cooperative program. This interdisciplinary, collaborative approach is an innovative method for providing continuing education in sparsely populated areas and needs further exploration.

In a review of the literature examining continuing nursing education needs, Kristjanson & Scanian (1989) identified four general variables to consider when planning continuing education activities:

- 1) clientele analysis of demographic characteristics predictive of participation in continuing education,
- 2) the impact on participation of perceived relevance of the educational topic and format by the learner target group,

- 3) motivational factors influencing participation in continuing education,
- 4) deterrents to participation (Kristjanson & Scanian, 1989, p. 119).

Of particular importance to rural nurses is the analysis of demographic characteristics and deterrents to participation. Several deterrents were identified by Hedman & Lazure (1990). In a response to educational needs of rural Midwest nurses, several cooperative efforts at delivering continuing education were made. The authors cited distance as a major factor. Not only was the number of miles a problem, most often there was no form of transportation available other than car. Additionally, educators were reluctant to travel to the sites for the same reasons. Because of the nursing shortage in rural areas, nurses were not allowed time off, not paid to attend continuing education offerings, and had to cover their own expenses to attend (Hedman & Lazure, 1990). The same concerns related to access to continuing education in rural areas were documented by others, as well (Lockyer, Parboosingh, & McDowell, 1987; Office of Rural Health Policy, 1993; Busack, 1994).

A shortage of rural health care providers has been documented in the literature. Wakefield (1991) states that over 9% of rural hospital beds were closed in the late 1980's as a direct result of a shortage of registered nurses. Additionally, it has been reported that 14% of nurses living in rural areas are commuting to work in urban facilities (Secretary's Commission on Nursing, 1988). Wakefield (1991)

also reported significant shortages of rural physicians, psychologists, physical therapists, and social workers. In order to address these shortages and provide quality health care to people in rural areas, it is imperative that reasons for the inability to attract health care worker be examined.

The literature suggests that the work environment in rural health care is an important reason that shortages exist. Wiens (1990) stated that models for increasing individual nurse autonomy in rural hospitals have not surfaced. The author stated that several factors impact job satisfaction in rural hospitals: lack of medical staff, more limited human resources, and lower nurse-to-ancillary staff ratio (Wiens, 1990).

Bushy & Banik (1991) examined work satisfaction of nurses ($n=100$) in rural hospitals. Three predominant themes emerged from the qualitative analysis. First, professional relationships, including communication, with administration, physicians and governing boards needed improvement. Second, the respondents wanted more input about improving patient care in their facilities and advocated hiring more professional nurses (RNs). Third, improvement in low salaries needed to be made in order for nurses to remain in the rural setting (Bushy & Banik, 1991).

Another study explored the retention of registered nurses ($n=2,488$) in rural community hospitals (Muus, Stratton, Dunkin, & Juhl, 1993). Over half of the

nurses who were designated as short term (planning to leave their positions within one year) reported dissatisfaction with several factors including extent of importance the agency placed on education and advanced training. The long-term rural nurses were most dissatisfied with opportunities for education and advancement and adequacy of benefits (Muus et al., 1993). Muus et al. (1993) also stated that other factors such as limited technology pertain to dissatisfaction among rural nurses.

Thompson & Chambers (1993) stated that geographic isolation and limited resources impede rural critical care nurses in their efforts to provide cost-effective, high-quality care. In many rural areas, critical care nurses have become frustrated with barriers in rural hospitals to the point that they leave to work in urban areas. Several issues related to education for rural nurses were addressed by Thompson & Chambers (1993). The issues of geographic isolation, limited continuing education opportunities, and limited technical support were also identified by Pickard (1990) and Hanson, Jenkins & Ryan (1990).

Rural hospitals lack the support staff or equipment to handle difficult patient care situations. Rural nurses often have to cover multiple departments and hold expertise in a variety of specialized areas and handle emergencies when the nurse may be the only person in the hospital available. Critical care nurses in rural areas have identified three priority concerns related to education: 1) maintenance

of critical care nursing skills in a low volume/low acuity environment, 2) nursing education with content appropriate to rural needs, and 3) motivation of critical care nurses in rural and small hospitals (Thompson & Chambers, 1993).

Another challenge facing rural hospitals is the lack of financial support for technology. Rural hospitals often are unable to purchase or maintain computer equipment or provide training for nurses who use them. A major issue related to continuing education identified by Wichowski & Kubsch (1995) was the need to keep current with rapidly changing technology. The major way nurses in this study coped with the uncertainty surrounding technology was to attend continuing education programs, read professional journals, or through peer networking. This is of great concern to rural nurses as accessibility of continuing education programming, lack of journal resources and fewer opportunities for networking are prevalent (Weinert et al., 1996).

Stratton, Dunkin, & Juhl (1995) in a study related to the rural nursing shortage, state that 55.3% of nurse shortage counties lie in "less urbanized" areas while only 0.2% lie in large metropolitan areas. This shortage is predicted to continue as long the need for increasing skill levels continues (Dunkin, Kindig, Ludtke, & Movassaghi, 1990).

Each of the studies presented in this section address a variety of factors that are related to challenges facing rural health care providers. For rural nurses, the

issue of access to continuing education has been identified as an area of discontent that has been related to nurses' intentions to leave their jobs (Muus et. al., 1993). The issue of access to continuing education for rural nurses warrants further discussion.

Continuing education for rural nurses. The needs for a variety of skills and unique demands placed on rural nurses are a concern related to continuing education. Rather than being able to specialize in one particular area, rural nurses must be expert generalists because of the wide range of skills and knowledge expected (Bigbee, 1993). As one author described rural nursing, “. . .nurse might help with the delivery in OB or a cardiac arrest in ER, . . .interpret an arrhythmia in CCU,...console a family,...or spread salt on an icy sidewalk” (Stuart-Burchardt, 1982). According to Gordon, Meister, & Hughes (1992) geographically isolated rural settings often result in professional and social isolation as a result of “frustratingly distant” limited opportunities for continuing education.

Due to the diverse educational demands for rural nurses, there are a variety of issues facing health care professionals. St. Clair & Brillhart (1990) state that on-site nursing continuing education programs are cut as a result of hospital cost-containment policies, and attendance at other sites is restricted because of distance, time, lack of staff coverage, and cost. As a precursor to developing self-directed learning programs as an alternative way to meet continuing education needs of

rural nurses, a study ($n=21$) was conducted to assess motivation. St. Clair & Brillhart (1990) found that rural nurses who considered themselves self-directed learners were more internally motivated ($p<.04$). The study resulted in several recommendations for the development of self-directed learning programs for rural nurses: provide liberal time tables for completion, encourage peer support and sharing of learning resources, and promote frequent communication and encouragement to participants.

Several factors were identified as barriers to continuing education for rural nurses by Hedman & Lazure (1990). Financial support for attendance at educational offerings is limited or nonexistent, nurses can attend only if they use vacation days or scheduled days off and there are few extra nurses to cover for a nurse's absence.

Computers for rural health care. Computer technology and telecommunications hold promise for the development of both networking and educational opportunities for health care providers in rural areas. Weinert et al., (1996) state that such technologies can:

- 1) promote new means of delivering health services to clients,
- 2) reduce the isolation of rural/frontier nurses,
- 3) enable nurses to remain current in their profession by providing access to the latest nursing, biomedical and social sciences information,

- 4) promote collaborative research across geographical distances, and
 - 5) provide a means to provide nursing education to rural/frontier residents
- (Weinert et al., 1996, p. 21).

The use of computer technology and telecommunications is widely supported in the literature as a means for alleviating the problems related to continuing education in rural areas. Lockyer, Parboosingh & McDowell (1987) conducted a study to determine user perception of telecommunications for physicians and nurses in rural communities. Physicians and nurses ($n=138$) ranked inservice education and local conferences as the most useful forms of continuing education, however Lockyer et. al. (1987) stated that collegial discussions were limited due to the remoteness of the location.

Crandall & Coggan (1994) state that for rural physicians, problems of geographic barriers, costs associated, lack of communication and lack of articulation of services with distant physicians are what distinguish them from their urban counterparts. However, the emergence of new technologies “offers great potential to ameliorate some of these sources of personal and professional isolation by providing access to information needed for clinical training, continuing education, professional growth and consultation” (Crandall & Coggan, 1994, p. 209).

Summary of the Literature

Nurses in rural areas have often been disadvantaged by the inability to obtain continuing education due to distance, lack of financial resources, and scarcity of staff to cover absences. In an effort to meet the continuing education needs of nurses in rural areas, delivery of content via computers is being developed. However, according to the Theory of Reasoned Action, nurses will not use this technology unless they have a positive attitude about computers and believe that using a computer for continuing education will have a favorable result. While many studies exploring nurses' attitudes toward computers have been discussed in this chapter, all of the studies were carried out in urban settings. To date, none have examined rural nurses' attitudes toward computers.

Nursing and in particular, nurse educators in rural areas have a responsibility to foster growth and understanding of the use of computer technology as a viable source for continuing education. The first step in the development and implementation of this type of resource is a comprehensive study of the attitudes of rural nurses toward computers.

Chapter 3

Methodology

The delivery of continuing education to rural nurses via computer technology is beginning to be explored. To date, no research has been conducted that examines rural nurses' attitudes toward computer usage. It is imperative that before computers are introduced as a viable option for delivering continuing education, the attitudes of rural nurses toward computers be determined.

Research Design

This study was a nonexperimental, exploratory survey. This format was used to identify information regarding rural nurses' attitudes toward computers. Several demographic variables were included to determine the relationship of these variables to the rural nurses' attitudes toward computers. These variables included age, gender, level of nursing education, years in nursing practice, employment status in nursing, nursing practice area and type of position. Additionally, questions were asked to determine whether or not the nurses hold certification in a specialty area and whether or not they are required to obtain continuing education credit for relicensure. Nurses were also asked to answer questions about distance traveled to obtain continuing education credit and their current computer usage.

To elicit qualitative data, the nurses were asked to comment on their

feelings about computers in general and give feedback about their views on continuing education. A section was included for nurses to add any comments regarding the study and the respondents had the opportunity to rate themselves as to their computer skill.

Following Human Subjects Approval, a written questionnaire was used to collect the data. Questionnaires were mailed to Directors of Nursing in randomly chosen rural hospitals selected from counties in six midwestern states with populations less than 100 people per square mile. An advantage to mailing the surveys is the ability to obtain a large amount of information from a large population in a fairly economical manner. LoBiondo-Wood and Haber (1998) state that with a survey, “a relatively small number of subjects can provide an accurate picture of the population” (p.198).

The Directors of Nursing were asked to distribute the questionnaires to nurses employed at that institution and to have the nurses return the questionnaires directly to the researcher. Envelopes were supplied to the respondents. This method of data collection is accepted in the research literature as appropriate for obtaining access to nurses working in rural areas (Blakely, Hausauer, Kern & Haack, 1996; Hanson, Jenkins, & Ryan, 1990; & Muus, Stratton, Dunkin, & Juhl, 1993). Follow-up telephone contact was made with each of the Directors of Nursing as a reminder to distribute the questionnaires if they had not done so.

The letter to the Directors of Nursing (Appendix A) included instructions to assure anonymity and confidentiality. Respondents were asked not to put their name anywhere on the questionnaire. Return of the questionnaire signified implied consent on the part of the respondent.

Population and Sample

The population for this study was nurses from rural hospitals. The six states chosen for this study included Montana, North Dakota, South Dakota, Kentucky, Iowa and Nebraska. These states were randomly chosen from all states with significant numbers of rural counties that are served by hospitals and fit the population criteria in Elison's (1986) definition of rural service areas. States were then separated into those that require continuing education and those that do not require continuing education and three states were randomly chosen from each group. Montana, North Dakota and South Dakota do not require continuing education credits for relicensure whereas Iowa, Kentucky and Nebraska do.

A list of hospitals from each of the six states was obtained from the respective state hospital association. In keeping with the rural definition, hospitals which are less than 100 beds, are located in counties with populations less than 100 people/square mile, and have a driving time of 30 minutes or more for access to an urban health care facility were included on a master list. Population data was verified using United States Bureau of Census statistics.

From the master list, four hospitals in each state were randomly chosen for inclusion in this study. Twenty-five questionnaires were sent to each of the Directors of Nursing. Follow-up phone calls to each of the Directors of Nursing confirmed that 520 questionnaires were actually distributed to nurses. Two hundred sixty questionnaires were returned for a 50% response rate. Of those returned, 6 were incomplete and not included in the statistical data analysis, although comments from the 6 were included in the qualitative analysis of respondents' comments.

The research literature differs on what constitutes an acceptable response rate. Bourque & Fielder (1995) stated that the "most studied disadvantage to mail questionnaires is their low response rate. When a single mailing that incorporates no incentives is made to a sample of the general community, the surveyor can probably expect no better than a 20% response rate" (p.15). Babbie (1990) states that a response rate of 50% is adequate for analysis and reporting of results, Polit & Hungler (1994) state that 60% is adequate for analysis but that lower response rates are common and Fowler (1993) stated "There is no agreed-upon standard for a minimum acceptable response rate" (p. 40). Based on a review of the above research texts, it was determined that the 50% response rate attained in this dissertation was acceptable and valid for statistical analyses.

Instruments

The questionnaire (Appendix B) used for data collection in this study of rural nurses' attitudes toward computers was adapted from an instrument used previously to measure opinions of nurses' about computers (Thomas, 1990). Written permission from the author was obtained for the use of the Thomas questionnaire (Appendix C). The general purpose for the development of Thomas' (1990) instrument was to measure attitudes toward computing in nursing and assess nurses' willingness to develop and use computer skills.

For the purpose of this dissertation the qualitative section was added to the original questionnaire. The responses on the Thomas questionnaire were also modified for use in this dissertation in order to clarify terminology. The resulting questionnaire for use in determining rural nurses' attitudes toward computers (Appendix B) is more closely aligned with the literature and eliminates ambiguity.

The portion of the Thomas questionnaire used in this dissertation included 30 statements modified from the original instrument. The resulting questionnaire for this study of rural nurses' attitudes toward computers included 30 statements arranged in Likert-type format. Possible responses were strongly disagree, disagree, neither disagree nor agree (neutral), agree or strongly agree. Scoring was done by assignment of 1, 2, 3, 4 or 5 to the positive items and 5, 4, 3, 2, and 1 for the reversed items. A total score for each questionnaire in the study of rural

nurses' attitudes toward computers was determined for each respondent. Possible scores ranged from 30-150. A higher score indicated a more positive attitude toward computers. The originator of the instrument (Thomas, 1990) included written scoring information with her permission for use with this research study.

Based on a review of the literature, Thomas (1990) developed mutually exclusive and comprehensive categories that formed the guide for developing the items on the Thomas Opinionnaire. A pool of 80 items was developed, based on the categories. Questions for the Thomas instrument were selected through the use of a panel of experts. Panel members were asked to rate each item as: 3 (good), 2 (fair), 1 (poor), and 0 (impossible). Additionally, panel members were asked to assess each item for relevance, clarity, accuracy, simplicity and for suggestions for improvement. Items were refined or eliminated based on the panel's recommendations. The Thomas instrument was pilot-tested with 109 nursing students.

Face and content validity of the Thomas instrument were determined by three factors. These included: "(1) the items were formulated from actual statements nurses and nursing students have made about computing; (2) the items were based on concepts gleaned from the literature; and (3) the table of specifications and scales' items were reviewed by six experts." (Thomas, 1990, p. 197).

Reliability for the Thomas questionnaire was established two ways. Split half reliability was determined as a measure of internal consistency. Cronbach's alpha was .92. Additionally, the pilot group of students took the test twice, two weeks apart. Test-retest reliability was .88 (Thomas, 1990).

The questionnaire used in this dissertation (Appendix B) was pilot tested with a group of nurses from a rural hospital in Minnesota. Thirty nurses completed the pilot questionnaire. The hospital chosen for the pilot study met the same criteria for inclusion as those in the main research population however, since Minnesota was not included in data collection, these nurses were not asked to participate in the actual study. The purpose of the pilot study was to identify difficulties with wording in the questionnaire and to establish a time-frame for completion of the questionnaire. Subsequent to the pilot study, several items on the questionnaire were reworded for clarification. The time for completion of the questionnaire with the pilot group ranged from 15-20 minutes.

Since several items on the questionnaire were modified from the Thomas instrument, measures to ensure internal consistency with the subsequent questionnaire were taken. Test-retest reliability was determined to be .92 with the pilot group of rural nurses from Minnesota. Cronbach's alpha was determined to be .89.

Item Development

As previously stated, the Thomas questionnaire was modified for the purposes of this dissertation. Items were based on a comprehensive review of the literature and the original instrument. Numerous studies have identified both positive and negative aspects involved in working with computers in health care. The final questionnaire developed for the study of rural nurses' attitudes toward computers included both positively and negatively worded items.

For the study of rural nurses' attitudes toward computers, questions were developed based on findings from numerous studies. Appendix D details the specific research studies examined in development of the questionnaire.

Data Analysis

Questionnaires were returned directly to the researcher who completed coding and data analysis. Total attitude scores were determined for each respondent. The mean and standard deviation for each demographic variable were determined to describe the sample. Frequency distributions for each demographic variable were also determined.

Inferential statistics were used as a means to make conclusions regarding the research hypotheses. Two-tailed t-tests and analysis of variance were used to test the significance of differences of the mean scores between groups. These parametric measures are justified for interval and ratio data answering questions

about whether or not two groups are different (Devore & Peck, 1986; Lobiondo-Wood & Huber, 1998).

Multiple regression was used to understand the significance of relationships between variables. A correlation matrix was determined for the variables under study. Stepwise multiple regression was used to determine the predictive power of each variable under consideration. Path analysis was employed as a method for determining direct and indirect effects on the rural nurses' attitudes toward computers. A 0.05 level of significance was used for all data analysis in this study.

For the qualitative data collected, the constant comparative method of analysis was used. Significant statements were extracted from the responses and information was compared. With progression of analysis, four themes emerged:

- 1) lack of recognition of the value of computers for nurses,
- 2) lack of resources pertinent to computer use,
- 3) issue of access to continuing education, and
- 4) use of the computer for continuing education.

A thorough discussion of both the statistical and qualitative results is detailed in Chapter 4.

Chapter 4

Analysis of Findings

Characteristics of the Sample

Gender. Two-hundred fifty-four respondents returned completed questionnaires and were included in the statistical analysis. Of the respondents, 15 (5.9%) were male and 239 (94.1%) were female. This is consistent with the national norms for gender representation in nursing. According to the National League for Nursing (1997), 5.4% of working registered nurses are men.

Age. Respondents' ages were distributed throughout all the age categories with the exception of less than 20. This was not unexpected since only minimal numbers of licensed practical nurses (LPN's) would have fit the less than 20 category. Categories of respondents included: 20-30 years, 31-40 years, 41-50 years and greater than 50 years (see Table 1).

Educational preparation. All six levels of educational preparation were represented, with the majority of respondents being baccalaureate prepared nurses (40.9%). This finding is somewhat higher than the national average of 30 % (National League for Nursing, 1997) but is not unexpected since North Dakota requires the baccalaureate degree to practice as a registered nurse and was included in data collection. See Table 2 for educational preparation of respondents.

Table 1
Age of Respondents

Age Range	Frequency	Percent
20-30	59	23.2
31-40	86	33.9
41-50	72	28.3
>50	37	14.6
Total	254	100

Table 2
Educational Preparation of Respondents

Degree	Frequency	Percent
Licensed Practical Nurse	34	13.4
Associate Degree (RN)	65	25.6
Diploma (RN)	43	16.9
Baccalaureate (RN)	104	40.9
Master's	7	2.8
Doctorate	1	0.4
Total	254	100

Length of practice. Respondents' years in nursing practice ranged from less than one year to greater than 20. The largest number of nurses had practiced 0-5 years followed by those who had practiced greater than 20 years. These

distributions are consistent with employment patterns in rural hospitals who generally employ large groups of nurses who are permanent residents of the area and tend to stay for longer periods of time and also employ larger groups of newly graduated nurses who work in small hospitals for a few years and then after some experience, move on to larger cities. One hundred ninety-seven respondents (77.6%) were employed full-time in nursing while 57 (22.4%) were employed part-time. See Table 3 for length of practice of respondents.

Table 3
Length of Practice of Respondents

Length of Practice	Frequency	Percent
0-5 yrs	79	31.1
6-10 yrs	38	15
11-15 yrs	39	15.4
16-20 yrs	32	12.6
>20 yrs	66	26
Total	254	100

Practice area. The majority of respondents (52.4%) identified general practice as their major practice area. None of the nurses identified pediatrics or psychiatric/mental health as their practice area. These findings are consistent with the common configuration in rural hospitals in which few specialty areas are

identified and nurses care for all types of patients. Forty-five (17.7%) identified other areas of nursing as their area of practice. These respondents identified “other” as administration, geriatrics (nursing home), home health, clinic, surgery, outpatient or infection control. There were two nurses licensed as nurse practitioners in private practice as primary care providers. These nurses practice in advanced practice roles as independent health care providers in rural health clinics. A summary of major practice areas identified by the respondents appears in Table 4.

Table 4

Major Practice Areas

Area	Frequency	Percent
Obstetrics/Nursery	2	0.8
Medical/Surgical	43	16.9
Critical Care/Emergency	31	12.2
General	133	52.4
Other	45	17.7
Total	254	100

The types of positions held were categorized by the respondents as either administration, staff nurse, charge nurse, clinical specialist, or other. Twenty-seven (10.6%) were in administration, 135 (53.1%) were staff nurses, 83 (32.7%) were in

charge nurse positions, two (0.8%) were clinical specialists and seven (2.8%) were in other positions. Those who identified other types of positions identified themselves as infection control nurses, nurse practitioners or instructors in nursing schools.

Certification. Sixty (23.6%) of the respondents indicated they held specialty certification. Of those 60, a variety of 15 different certification types were identified by the participants. Many respondents indicated they hold more than one specialty certification. Table 5 indicates the various certifications identified by the respondents.

Licensure. Seventy-nine (31.1%) of the respondents reported they were required by their states to obtain continuing education credit for relicensure while 175 (68.9%) reported they were not required to obtain continuing education credit for relicensure. The difference in numbers is notable since the surveys were mailed to an equal number of states who require continuing education and states who do not require continuing education for relicensure. Those rural nurses who resided in states with continuing education mandates for relicensure appear to be more willing to volunteer to complete the questionnaire for this study. It is conceivable that those nurses who are mandated by their states to obtain continuing education credit are more entangled in the difficulties associated with access to educational opportunities and subsequently were more willing to

participate in a study examining related issues.

Table 5
Certification Types

Certification Type	Number	Percent of Certified
Critical Care	8	13.3
Emergency Nursing	9	15
Advanced Cardiac Life Support	35	58.3
Neonatal Advanced Life Support	9	15
Infection Control	1	1.6
Trauma Nursing	15	25
Administration	1	1.6
Pediatric Advanced Life Support	6	10
Obstetrics	2	3.3
Trauma Educator for Rural Nurses	2	3.3
Operating Room	1	1.6
Childbirth Educator	1	1.6
Prehospital Trauma Life Support	1	1.6
Rural Trauma Nursing	2	3.3
Geriatrics	2	3.3

Distance traveled for continuing education. Respondents were asked to indicate the distance they travel on average to continuing education offerings. Distance traveled was categorized as either less than 30 miles, 31-50 miles, 51-100 miles, greater than 100 miles, or whether they were provided continuing education at their own institutions. One hundred-eighty (70.9%) of the respondents traveled greater than 50 miles to attend continuing education offerings. Only 8.7% were able to attend continuing education activities at their own institution. Table 6 indicates the distances traveled by the respondents.

Table 6

Distance Traveled to Continuing Education

Distance	Frequency	Percent
<30 miles	24	9.4
31-50 miles	28	11.0
51-100	103	40.6
>100	77	30.3
No travel required	22	8.7
Total	254	100

Computer usage. Of the participants, 201 (79.1%) indicated they did have access to a computer while 53 (20.9%) indicated they did not. Eighty-eight (34.6%) had access at work only, 32 (12.6%) had access at home only, 69 (27.2%)

had access at both work and home and 13 (5.1%) indicated they had access somewhere else. Other areas of access identified by the participants included their public library, their children's school or a university or community college.

For those using computers, 63 (31.2%) indicated they use computers less than once a week, 94 (46.5%) indicated they use computers more than once a week but not every day, and 45 (22.3%) indicated they use computers every day. Despite 68.8% of the computer users indicating they use computers more than once a week, only seven (3.4%) respondents rated themselves as highly skilled with a computer. One-hundred-one (50%) rated themselves as moderately skilled and 94 (46.5%) rated themselves as poorly skilled.

Hypothesis Testing

As has been previously stated, this study examining rural nurses' attitudes toward computers is based upon six research hypotheses:

- H_1 : There is a difference in attitudes toward computers between male and female nurses.
- H_2 : There is a relationship between the age of rural nurses and their attitudes toward computers.
- H_3 : There is a difference in attitudes toward computers among rural nurses with different levels of educational preparation.
- H_4 : There is a difference in attitudes toward computers among rural

nurses who hold certification and those who do not hold certification.

H₅: There is a difference in attitudes toward computers among rural nurses who are required to obtain continuing education credit for relicensure and those who are not required to obtain continuing education credit for relicensure.

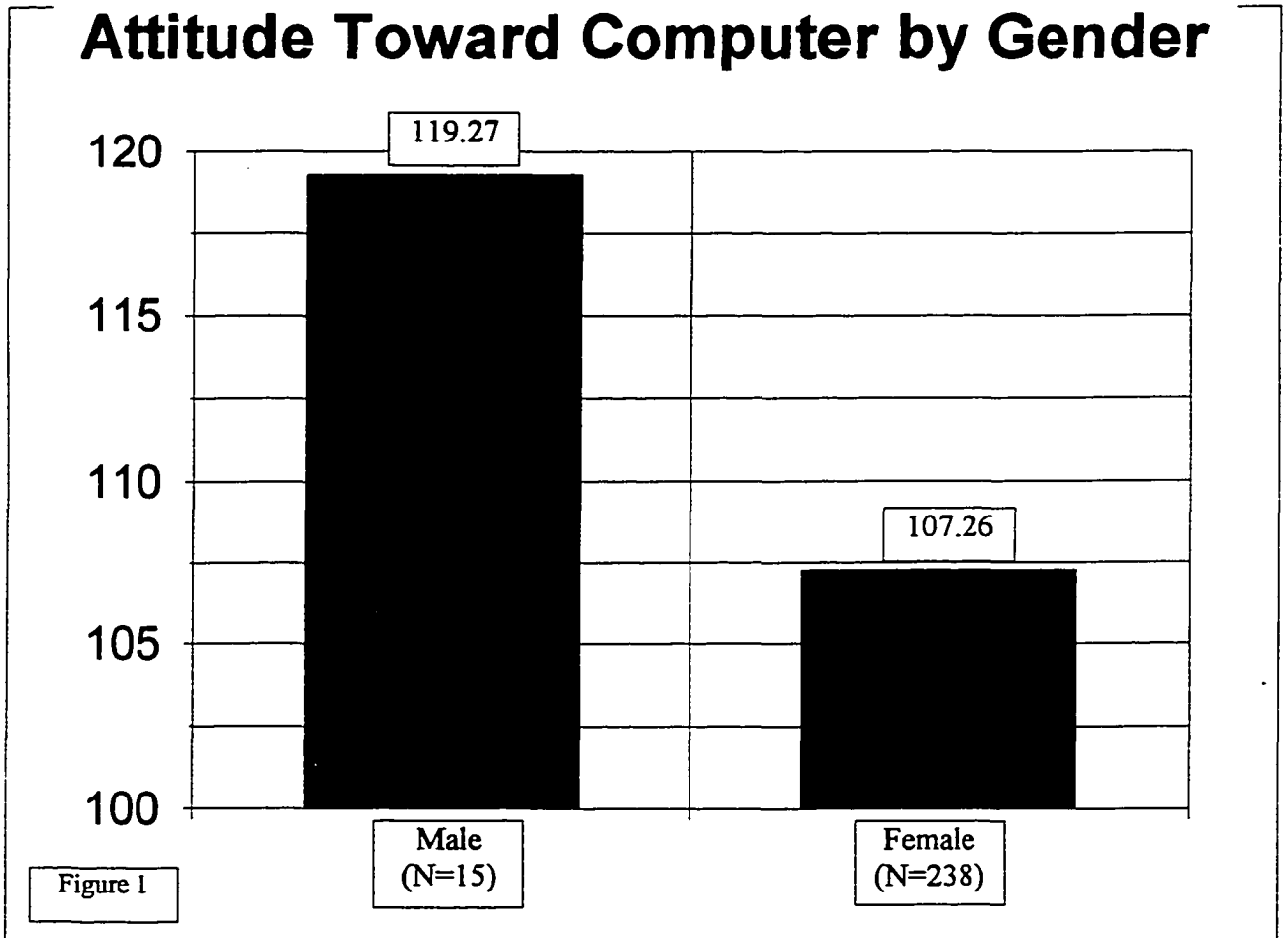
H₆: There is a relationship between rural nurses' attitudes toward computers and computer usage.

The results of the statistical testing of these hypotheses are as follows:

H₁: There is a difference in attitudes toward computers between male and female rural nurses.

Using t-tests, analysis showed a significant difference in mean attitude scores between male and female rural nurses ($t=2.577$, $p=.011$). Male nurses had significantly higher attitude scores, indicating more positive attitudes toward computers than female nurses (See Figure 1). The mean score for the male nurses ($N=15$) was 119.27 ($SD=16.75$) and for the female nurses ($N=238$) was 107.26 ($SD=17.54$). Thus, the first hypothesis was supported.

This finding is unique in that none of the studies reviewed for this dissertation included gender differences among the nurses surveyed despite having both male and female nurses participating. In one study (Sultana, 1990) the



number of males responding was so small that gender as a variable was excluded from statistical analyses. Only Simpson & Kenrick (1997) examined gender as a variable and found no significant difference in attitudes toward computers between male and female nurse. Other research studies either had small sample sizes with too few males to warrant statistical analyses or the gender differences were not studied.

The finding in this dissertation with regard to gender differences is consistent with current educational and technological research. Wilder, Mackie and Cooper (1985) found that males and females alike perceived computers to be more appropriate for boys than girls and that male respondents reported more positive attitudes toward computer use.

Chen & Milton (1985) surveyed 1,138 high school students before and during their high school years. Findings indicated that males had greater exposure to computers, were more frequently enrolled in computer classes and were more apt to voluntarily participate in home computer use. Overall, the findings indicated that males had more positive attitudes and more confidence in computers than females. These findings are supported by later studies in which males were also found to have more positive attitudes toward computers (Harrison, 1990; Makrakis & Sawada, 1996).

While men still comprise a minority of the nursing population (5.4%) there

are increasing numbers of men entering the nursing profession. Currently 13% of students enrolled in nursing schools are male (National League for Nursing, 1997). Despite fewer numbers, male nurses are often in more prestigious and influential nursing specialty positions such as administration or high skill areas (Williams, 1995). These types of positions are instrumental in implementing change; thus, the male nurses have the potential to greatly impact the attitudes toward computer technology in their respective health care facilities.

In this study, nine of the 15 males responding (60%) identified themselves as administrators or in charge nurse positions and six of the 15 (40%) specialized in emergency nursing. In comparison, of the 253 female nurses responding, 96 (40%) were in administrative or charge positions and 24 (10%) of the female nurses specialized in emergency nursing. For this sample, male nurses held positions similar to Williams (1995) findings.

Often times by virtue of their positions male nurses have the opportunity to influence and shape change within health care organizations. The positive attitudes of male nurses toward computers that was demonstrated in this dissertation has implications for rural hospitals. As computer technology is introduced as a viable means of improving communication and access to health care resources in rural hospitals, male nurses may be in positions to influence attitudes toward computer usage.

H₂: There is a relationship between age of rural nurses and attitudes toward computers.

There was a negative correlation between age and attitudes toward computers in this study ($r=-.266$, $p=.006$). There was no statistically significant difference in scores between the first two age groups. The mean score for the 21 to 30 age group was 112.03 and the mean score for the 31 to 40 age group was 112.84. However, there was a significant drop in attitude scores for the 41 to 50 age group ($M=102.65$) and for the 50+ age group ($M=100.32$) (See Figure 2). Using analysis of variance, it was determined that there was a significant difference in attitude scores between age groups ($F=8.268$, $p=.0001$). For this sample, older nurses had lower attitude scores. Lower scores indicated less positive attitudes toward computers. The second hypothesis was supported.

Results were similar related to years in practice. Nurses who had practiced 0-5 years had similar scores as those having practiced 6-10 years (See Table 7). Analysis of variance showed that nurses that had practiced longer had less positive attitude scores than nurses who had practiced less than ten years ($F=4.186$, $p=.003$).

Other studies examining nurses' attitudes toward computers have included age as a variable, but results have been inconsistent. Many studies have produced no significant correlations between age and attitude. Bongartz (1984), Brodt &

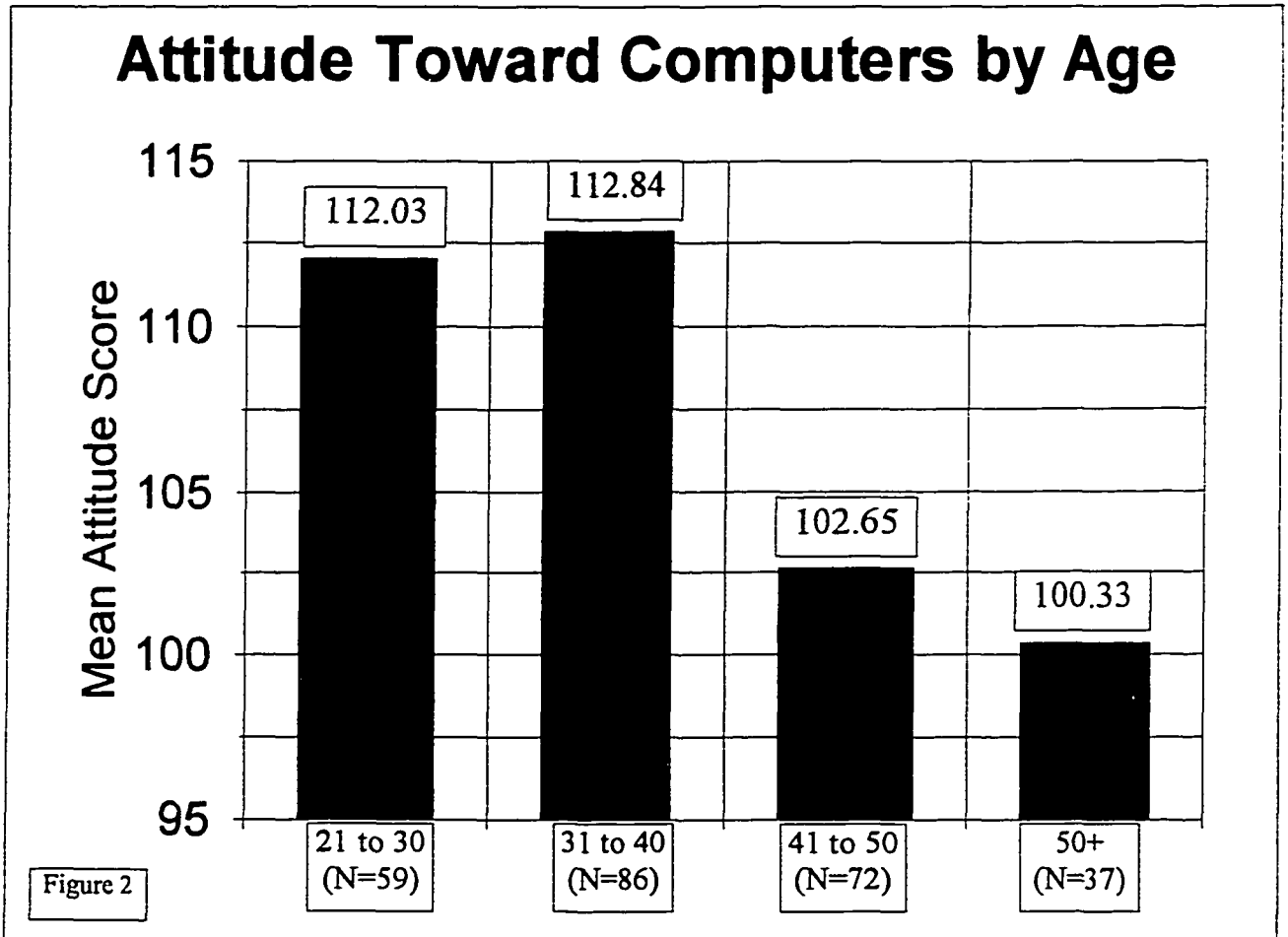


Table 7
Years of Nursing Practice

Yrs Practice	<u>M</u>	<u>SD</u>	<u>N</u>
0-5 yrs	111.13	16.88	79
6-10 yrs	111.71	15.78	38
11-15 yrs	110.77	14.06	39
16-20 yrs	106.87	17.54	32
> 20 yrs	100.82	19.93	65

Stronge (1986), Burkes (1991), Scarpa, Smeltzer & Jasion (1992) and Sultana (1990) found no difference in attitudes toward computers among age groups ($p > .05$). However, other studies supported the findings of this dissertation in that older respondents had less favorable attitudes toward computers.

Chang (1984) found a significant correlation between younger respondents and willingness to use computers. Schwirian, Malone, Stone, Nunley & Francisco (1989) reported more positive attitudes toward computers among nursing students who on average were younger, in comparison with nurses already in practice. The authors suggested caution be used in interpretation of those results, however, because both groups did have positive scores.

In the most recently published study, Simpson & Kenrick (1997) did find that age was a major factor related to attitudes toward computers. Younger nurses

had more positive attitudes toward computers than older nurses in that sample ($n=208$, $p<.05$).

It is interesting to note that most of the studies published 5 or more years ago found no significant differences among age groups with relation to attitudes toward computers while the latest research does indicate a difference. With the increases in computer technology in educational settings over the past few years, it is possible that these age related differences are a result of the younger nurses having greater exposure to computers in their precollegiate experiences. These nurses are then more familiar with the advantages and uses of computer technology.

In addition to the statistical analyses regarding age differences, the qualitative data included many responses that identified age as a factor. Several comments from respondents in this study were related to the age of the nurses. Many comments from nurses in the 50+ age group indicated they were uncomfortable with computers in some way. Responses ranged from concerns that they were too old to learn a new technology to lack of time or interest before they retired. Comments included:

“Levels of competency vary. I believe some older nurses are very anxious about the use of computers in nursing. Newer nurses or more recent graduates use computers more and they all take Boards on computers so they’re more familiar-those of us who’ve been out of school longer are not as familiar.”

“They’re too complicated. I avoid them and don’t plan to learn about them--I’m too close to retirement.”

“I’m amazed at how little some nurses my age know about computers. Granted, I’ve only been out of school 2 years and had computers in my nursing program but some of the older nurses here won’t even try to learn.”

Other nurses in the 50+ age group were more positive and expressed a desire to learn even though they were uncomfortable. One nurse stated, “Computer literacy can begin at any age.”

Currently nursing programs have focused major resources toward improving computer access and use for nursing students. As these students move into the work force it will be crucial to monitor their level of comfort with computer technology. Implications for further research will be discussed in Chapter 5.

Additionally, elementary and secondary school systems have committed to increasing computer technology in the precollegiate setting. As more prospective nursing students increase their computer experience prior to college, it will be interesting to note whether these students enter nursing school with a higher level of comfort related to computer use.

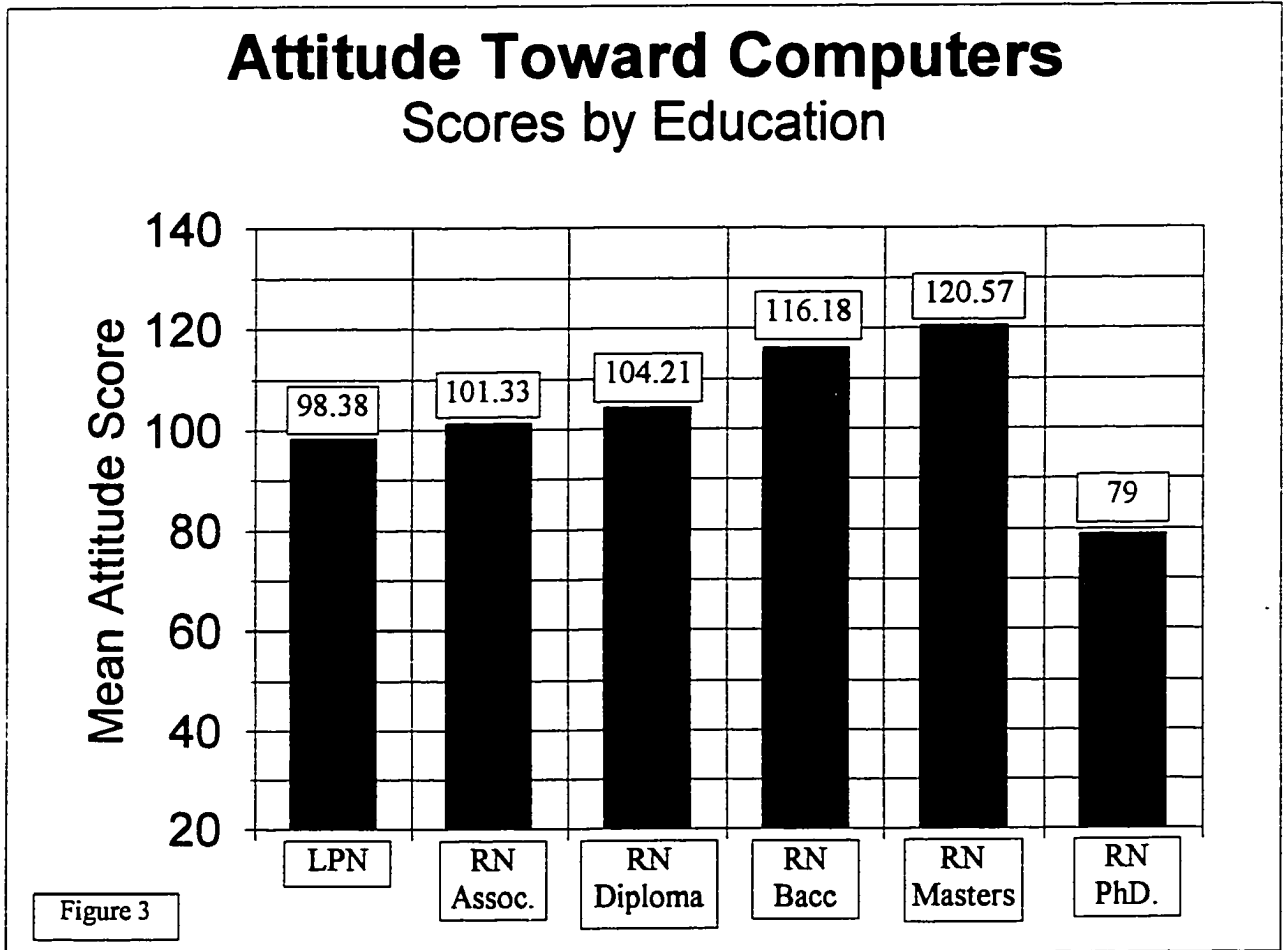
H₃: There is a difference in attitudes toward computers among rural nurses with different levels of educational preparation.

There was a positive correlation between educational preparation and attitudes toward computers ($r=.390$, $p<.001$). As educational preparation increased, so did attitude scores (See Figure 3). The exception was the one nurse prepared at the doctoral level who had a lower score but no conclusion can be made with only one nurse in this category. Analysis of variance was applied to determine whether there was a difference among levels of education. A statistically significant difference in attitude scores among various levels of educational preparation was found ($F=44.988$, $p<.001$). The third hypothesis was supported.

Findings in this study related to educational preparation and attitudes toward computers are consistent with much of the research done in the urban settings. Krampf & Robinson (1984) found that nurses with a higher level of educational background perceived computers to be a challenge rather than a frustration.

Brodts & Stronge (1986) also compared educational levels and attitudes toward computers. They determined that registered nurses were more favorably disposed toward computers than were licensed practical nurses.

Burkes (1991) stated that educational level "was expected to correlate with greater computer-use attitude" (p.195). However, results showed that there was no correlation between educational level and attitudes toward computers for that



sample. Additionally, Simpson & Kenrick (1997) found that level of education was not significantly associated with nurses' computer-related attitudes.

H₄: There is a difference in attitudes toward computers among rural nurses who hold certification and those who do not hold certification.

Using t-test analysis to determine the difference in attitudes between the two groups, a statistically significant difference in mean scores was found between rural nurses who were certified and those who were not ($t=2.418$, $p=.016$). Nurses who were certified in a specialty area had higher computer attitude scores ($M=112.75$, $SD=18.10$) than those nurses who were not certified ($M=106.49$, $SD=17.35$). The fourth hypothesis was supported.

Attaining speciality certification has become increasingly popular among nurses nationwide, including the rural area. Certification is a way to validate a nurse's knowledge and experience related to caring for a particular type of patient. Maintaining specialty certification requires continued evidence of practice in a particular area as well as obtaining continuing education pertaining to the area of specialization. It is especially noteworthy that these rural nurses are committed to specialty certification when access to the continuing education necessary to maintain the certification is so difficult to obtain.

In today's health care environment, consumers are shopping for health care rather than accepting the status quo. The trend for consumers to evaluate health

care facilities and providers is supported and encouraged by insurers, through publications and the media. For the rural hospital this may mean that local consumers may consider traveling to larger, more specialized health care facilities. It is crucial that the rural hospital be able to compete with these urban centers by promoting the level of expertise held by its health care providers.

Rural nurses who are certified in speciality areas are an asset to a hospital in that they provide assurance of competence in advanced practice. These nurses need to be supported in their efforts to maintain certification. However, because of the difficulties facing rural nurses with regard to distance traveled to obtain continuing education, it is becoming increasingly difficult to maintain specialty certification. The results of this study indicate that rural nurses with specialty certification have positive attitudes toward computers. The use of computers to provide certification specific continuing education could be a viable means of assuring that these nurses continue to maintain their credentials.

H₅: There is a difference in attitudes toward computers among rural nurses who are required to obtain continuing education credit for relicensure and those who are not required to obtain continuing education for relicensure.

T-tests were used to determine whether there was a difference in attitudes toward computers between the nurses from states requiring continuing education and nurses from states who do not require continuing education. Analysis showed

little statistical significance between the two groups at the .05 level ($t=.860$, $p=.391$). The mean attitude score for those nurses who are required to obtain continuing education was 109.39 ($SD=17.53$) and for those who are not required to obtain continuing education was 107.33 ($SD=17.78$). The fifth hypothesis was not supported.

Despite having little statistical significance, there were several comments made by nurses who felt that they would be interested in obtaining continuing education credit by computer. Qualitative analyses of respondents' comments resulted in the use of computers for continuing education arising as a major theme. This is discussed later in the chapter.

H₆: There is a relationship between rural nurses' attitudes toward computers and computer usage.

Respondents identified whether they used a computer less than once a week, more than once a week but not every day, or every day. For this study there was a positive correlation between computer usage and attitudes toward computers ($r=.360$, $p<.001$). Regression analysis also indicated there was a relationship between computer usage and attitudes toward computers (See Table 8). Based on these findings, the conclusion was made that computer usage and attitudes toward computers are related. For this study, two-hundred-two nurses indicated they had access to a computer. Those nurses who used a computer more frequently had

Table 8

Regression Analysis: Relationship Between Attitude
Toward Computers and Computer Usage

	Beta	t	Sig.
Computer Usage	.360	5.465	.000

*Dependent variable: Attitude score

more positive attitudes toward computers as indicated by higher mean attitude scores (See Table 9).

Table 9

Mean Scores by Computer Usage

Computer Usage	<u>M</u>	<u>SD</u>	<u>N</u>
<once/week	101.43	18.11	63
>once/week but not every day	112.68	14.87	94
every day	118.04	15.54	45
Total	110.37	17.24	202

The literature regarding computer usage and attitudes toward computers is inconsistent. In the articles reviewed for this dissertation, it was the common assumption that computer experience would correlate positively with attitudes toward computers; however, this was not always the case. Bongartz (1988) found that nurses who used computers more in the work setting were less favorable about

computers than those nurses who did not use computers ($p < .05$). Stone (1988) reported that nurses using hospital based computer systems were less favorable toward computers than nurses who had no computer experience and Sultana (1990) found no significant difference in attitudes between nurses grouped by computer experience.

Burkes (1991) expected greater computer experience among nurses to correlate with greater computer satisfaction, beliefs and motivation but found a negative correlation. Nurses who reported more computer experience actually were less satisfied with computers and those nurses who reported less computer experience had greater satisfaction ($p < .01$).

Other results were consistent with the results of this dissertation. Ngin, Simms, & Roesemann (1993) demonstrated a positive relationship between work excitement and computer usage ($F = 4.249$, $p < .01$). Chang (1984); Scarpa, Smeltzer, & Jasion (1992) and Birx, Castleberry & Perry (1996) all found positive relationships between computer experience and attitudes toward computers ($p < .05$).

Based on the finding that increased computer usage was related to more positive attitudes toward computers, it is crucial that experience with computers be afforded rural nurses. Formal and informal opportunities for working with computers need to be provided. Rural health care institutions will need to acquire

and maintain computer hardware and software so that nurses who use the equipment not only understand the relevance of the technology, but become comfortable with its use.

It is interesting to note that in some cases increased computer experience was associated with more negative attitudes toward computers. Several reasons may account for this occurrence. Qualitative analysis of responses in this study indicated that one major source of frustration for nurses using computers is the lack of a back-up system when the computer system is not functioning. Other nurses expressed frustration with the lack of support personnel to assist them with problems and/or the lack of education or training available. Some nurses also reported that they felt the computer was not time-saving and was actually more work. Participants' responses related to overall efficiency of computers will be discussed separately.

Efficiency of computers. Proponents of computer systems in hospitals have purported that using the computer will actually decrease clerical workload for nurses, thus enabling them to spend more time with their patients. Upon assessment of the responses on this questionnaire, respondents affirmed the belief that computers increase efficiency and could improve patient care by allowing the nurse to spend more time with the patient. For the portion of the questionnaire regarding efficiency, 188 (74%) responded they agree or strongly agree that

computers could save time and are efficient, 41 (16%) were unsure and only 25 (10%) disagreed.

Many nurses commented on the efficiency they feel computers offer them as nurses. The respondents noted that computer charting was as efficient as paper charting, computers were time-saving and accurate, and resulted in better storage and retrieval of medical record information. Several respondents noted that computers had simplified many aspects of nursing care and recognized computers as cutting workload for nursing staff so that they could spend more time with their patients. Computers were used most efficiently for writing care plans, writing and printing of patient education information, and for administrative tasks. Comments supporting the use of computers for increasing efficiency included:

“Computers can save time and reduce effort in nursing especially in rural areas where nurses have to do several job skills after office hours and on weekends--then we also become administrative personnel and medical records personnel.”

“Our computer system has been great for preparing Medicare forms, writing policies and procedures. It’s also great for storage and retrieval of information such as drugs and patient teaching sheets. Bedside charting with the hand-held computers is great-it saves time and decreases errors in charting because we can write it down right away. I wonder how we got anything done before.”

“It’s very helpful in creating documents, letters and handouts that are professional looking and legible. Really decreases time spent on these things for me.”

However, some comments from nurses in this study suggest that an increase in

available time with patients has not occurred. Comments included:

“We rely on them too much. When the system goes down there’s a lot of confusion with lab and discharging patients. We don’t remember how it used to be done so it ends up costing the nurses and the patient much frustration and delay.”

“They seem to be beneficial with speed and accuracy sometimes but our computer system has been down at the hospital a lot and this really causes problems for the nurses due to lack of a back-up system.”

“Can be an asset but you must make sure that there’s a back-up way to do things when they go down-because they will. The technology is unbelievable but when we have problems, I find I spend much more time trying to figure out the computer and getting my paperwork done than I do with my patients-very sad.”

“Computers in our facility don’t decrease paperwork at all-they actually increase it. I do think it’s because the nurses haven’t been properly trained so we’re often at the computer terminal two at a time trying to help each other figure something out. Maybe once we get a handle on it, we’ll see some positive results for our patients in terms of time we have available for them.”

“Computers seem to work well for administrative functions like doing the schedule but charting actually takes more time. If there are only a few terminals, nurses have to wait in line to use them and have to write everything down first so you don’t forget while you’re waiting.”

Some respondents voiced concerns about efficiency related to a specific area of the hospital. For the nurses working in the emergency department, most comments were negative related to computer charting. In rural hospitals, nurses are most often staffing the emergency department alone. Thus, when paperwork

needs to be done, the nurse is expected to do that as well as care for the patient. In a non-emergent situation this scenario would be manageable but as noted in this study, concern about timeliness of a computer system was a factor. Nurses commented:

“I don’t type well enough or fast enough when in an emergency--yet we’re expected to enter all the patient data in this lengthy system just to produce cards for x-ray and lab.”

“I strongly feel that charting on a very sick patient by computer takes much longer than charting on paper. After using a computer at our local hospital, I was very frustrated with time spent charting and re-charting when the system went down. I also believe that some charting gets missed when you cannot just quickly write something down and reviewing past nurse’s notes is more difficult to accomplish.”

Confidentiality issues have been identified as concerns in earlier research (Barhyte, 1987; Romana, 1987; Stronge & Brodt, 1985; Sultana, 1990). Nurses reported anxiety about unauthorized access to patient data and concerns about the accuracy of computerized patient data. Respondents in this dissertation also had concerns about confidentiality.

Confidentiality. Respondents indicated an uncertainty related to confidentiality of charting patient data and storage of patient information on computers. Sixty-six (26%) indicated they agreed or strongly agreed that confidentiality could be problematic, while 122 (48%) were unsure. Only 66 (26%) agreed or strongly agreed that confidentiality could be maintained.

While concerns about confidentiality have surfaced in the literature, some studies have shown that nurses feel that confidentiality can be maintained. Results from Sultana (1990) showed that 82.4% of the participants felt that patient privacy is not violated by the use of computers.

For this dissertation, the large percentage of people who are unsure about confidentiality suggests that further education is needed about the use of computers for storage and retrieval of patient data. Several comments were made by respondents that indicated they really did not know whether confidentiality was an issue or not. However, one respondent commented that the current paper record was no more confidential than a computer record would be as hospital personnel would still have access to the information. The other concern voiced regarding patient privacy was not related to access of the information by health care personnel but by outsiders. One comment summed up others:

“I do worry about who can read the information. You hear all kinds of horror stories about computer hackers who get into some system and make changes, etc. If they can figure out how to get into a university system or some business, they could get into the hospital as well. Maybe insurance companies would break in and use the information against the patient when it came time to renewing coverage. Test results could be altered so that conditions were misdiagnosed. Maybe I’m way off base but I can’t help wondering about these kinds of situations. Maybe I’m just used to living in my own little world and don’t want to be connected to any outsiders in any way!”

Overall attitudes toward computers were measured using the modified

Thomas (1990) questionnaire. The analytical results were enriched by qualitative data obtained from the participants. In addition to hypothesis testing, the purpose of this dissertation was to determine the attitudes of rural nurses toward computers.

Attitudes Toward Computers

For each questionnaire a total attitude score was determined. Possible scores ranged from 30-150. Respondents' scores ranged from 54-147, with a mean score of 108 (SD=17.69). See Figure 4.

Based on a score of 90 as an indication of neutrality, the rural nurses in this study had slightly positive attitudes toward computers. Many nurses commented on the importance of becoming computer literate in today's society. Computer use was seen as necessary and even though some nurses expressed apprehension or a sense of feeling overwhelmed, they did recognize the value in computers for many functions.

Several variables were identified as having a relationship with attitudes toward computers. Zero-order correlation indicated that gender, age, computer usage, level of education, and years of practice had statistically significant correlations with attitude (See Table 10). In order to understand the importance of the relationships between each of the independent variables under question and attitude toward computers, multiple regression was run with attitude score as the dependent variable.

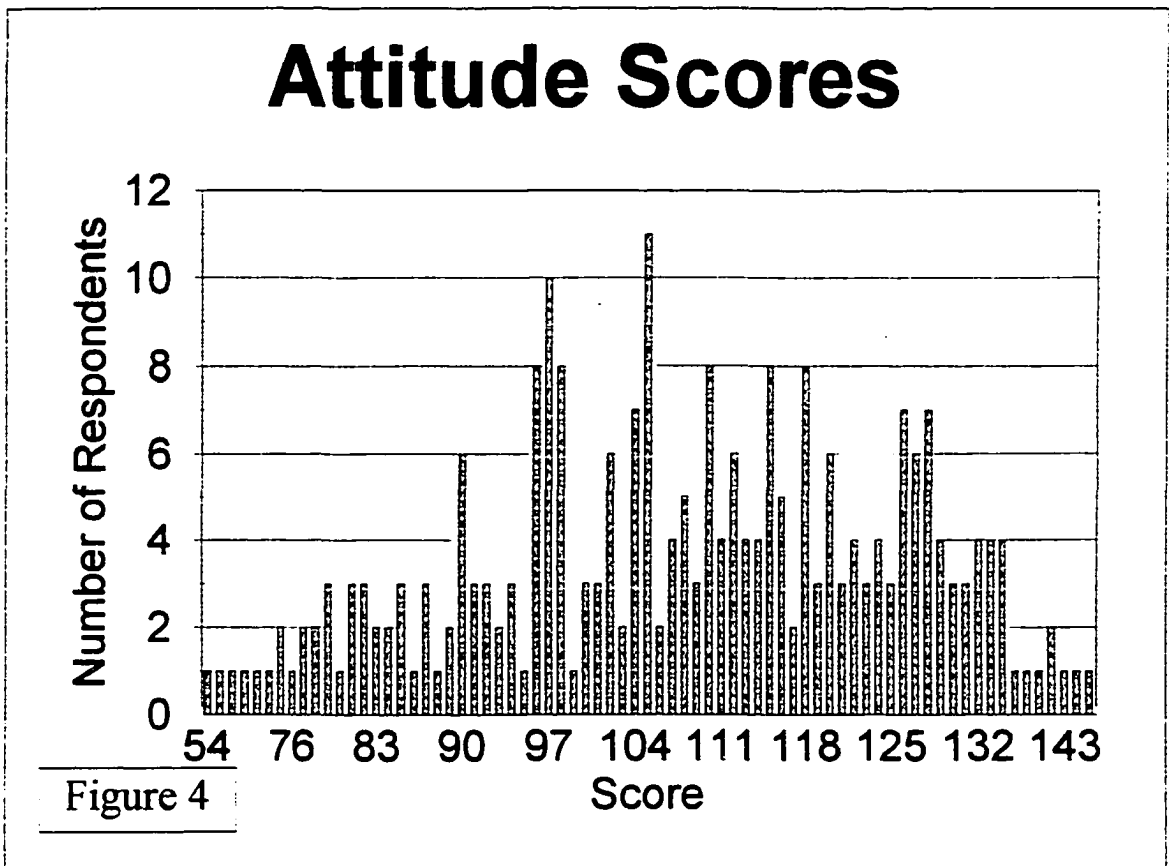


Table 10
Zero-order Correlations

Variable	Attitude Score
Age	-.2895 p= .000
Gender	-.1751 p= .013
Computer Usage	.3604 p= .000
Nursing Education	.3384 p= .000
Certification	-.0896 p= .205
Licensure	-.0120 p= .866
Years of Practice	-.2033 p= .004
Nursing Position	-.0185 p= .794

Multiple regression. Stepwise multiple regression was run with attitude score as the dependent variable. Computer usage ($\beta=.360$, $p=.000$), age ($\beta=-.297$, $p=.000$), and level of nursing education ($\beta=.226$, $p=.000$) emerged as the strongest predictors of attitude. Years of nursing practice ($\beta=-.226$, $p=.043$), gender ($\beta=-.125$, $p=.001$), and whether or not the respondent held specialty certification ($\beta=-.156$, $p=.011$) were also predictors of attitude but to a lesser degree. Table 11

provides a summary of the stepwise regression analysis.

Table 11

Stepwise Multiple Regression Results
Predicting Attitudes Toward Computers

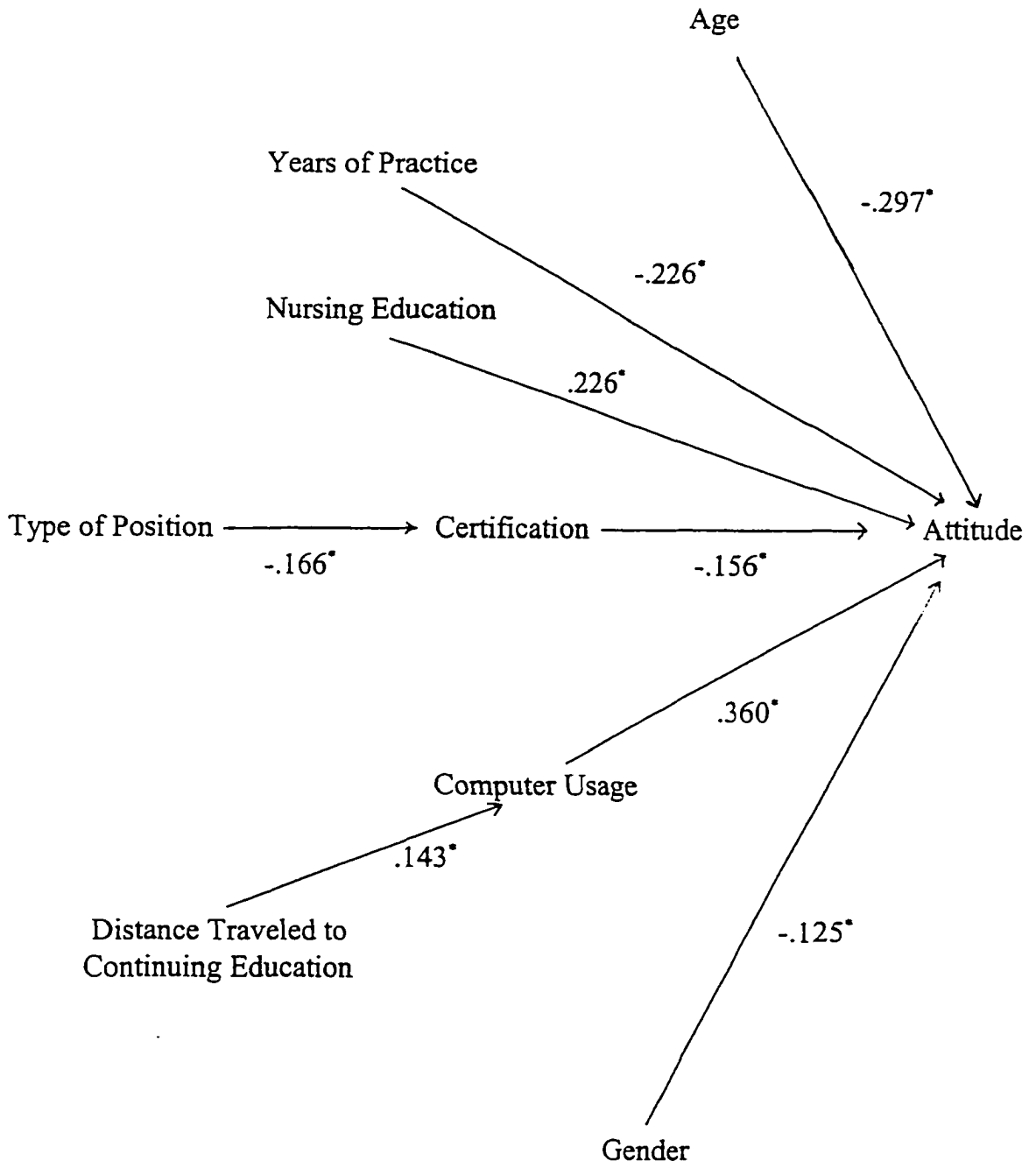
Predictors	Beta	t	% Explained Variance	Sig. Level
Educational level	.226	3.554	26.5	.000
Age	-.297	-4.744	21.8	.000
Computer Usage	.360	5.465	13.0	.000
Gender	-.125	-2.033	9.0	.000
Certification	-.156	-2.569	7.5	.011
Years of Practice	-.226	-3.671	5.1	.043
Total			82.9	

Six variables were identified as direct predictors of attitude toward computers (see Table 11) and explained 82.9 % of the variance in attitude scores. Educational level and age of the respondent were the strongest predictors of attitude toward computers, accounting for almost half (48.3%) of the variance, while computer usage accounted for 13%. There were three variables that had no direct effect on attitudes scores: distance traveled, type of nursing position, and whether or not the nurse was required to obtain continuing education credit for relicensure. In an attempt to determine whether these three variables had any indirect effect on attitude, path analysis was run.

Path analysis. Path analysis is a statistical method used to test the theoretical validity of causal relationships between three or more variables that have been studied using a correlational design. When using path analysis, the researcher attempts to support a theoretical model about hypothesized relationships between the variables under study, determines the strength of those relationships, and concludes whether the resulting data are consistent with the model. Path analysis is similar to regression analysis. However, in regression analysis, the dependent variable is regressed on all independent variables in question in a single analysis. With path analysis, numerous regression analyses may be needed as the dependent variable is regressed on all the variables assumed to have an effect.

The resulting path coefficients leading from the independent variables to the dependent variable formulate a path diagram (See Figure 5). The path diagram is used to graphically represent the pattern of relationships between the variables. For this study, the path diagram generated was recursive. A recursive model is unidirectional, implying a causal relationship in one direction only. The path diagram (Figure 5) illustrates the unidirectional relationship between the variables under investigation in this study.

Path analysis was used to determine any indirect effects on attitude toward computers. For this study, educational levels of the nurses, age, computer usage, gender, whether or not the respondents held specialty certification, and years in



Path Analysis Diagram

* $p < .05$

Figure 5

nursing practice had direct effects on attitude toward computers. As a result of path analysis it was also determined that type of nursing position held indirectly affected attitude toward computers through certification ($p=.008$). Additionally, distance traveled had an indirect effect on attitude toward computers through computer usage ($p=.043$). Whether or not a nurse was required to obtain continuing education credit for relicensure was neither directly nor indirectly related to attitude toward computers.

The direct effects demonstrated by the path analysis support the hypotheses that guided this study. For the first hypothesis, it was determined through the use of t-tests that attitude scores did differ by gender. Path analysis also showed that gender had a direct effect on attitude toward computers.

The second hypothesis was supported in that age was determined to influence attitude scores. Analysis of variance indicated that the older age groups had less positive attitudes toward computers. This was validated through path analysis, as attitude was also directly affected by age.

The third hypothesis related to level of educational preparation was supported. Through analysis of variance it was demonstrated that attitude toward computers did differ among various levels of educational preparation. For these nurses, those with more advanced educational preparation had more positive attitudes toward computers. Path analysis supported these findings. Educational

preparation directly affected the attitude score.

The fourth hypothesis regarding certification was also supported. T-tests indicated that nurses who held certification had more positive attitudes toward computers than those nurses who were not certified. Path analysis also showed a direct effect on attitude scores by certification.

The fifth hypothesis examined differences in attitude toward computers related to whether or not the nurse was required to obtain continuing education for relicensure and was not supported. There was no statistically significant relationship between attitudes toward computers and continuing education requirements for relicensure. Path analysis supported these findings and showed neither a direct nor indirect effect on attitude by licensure requirements.

Computer usage was a strong predictor of attitude toward computers. Computer usage and attitude score were positively correlated and regression analysis indicated that there was a relationship between computer usage and attitude toward computers. Path analysis also demonstrated that attitude toward computers was directly affected by computer usage.

The path diagram (see Figure 5) illustrates the relationship between the variables that directly or indirectly affect attitudes toward computers. The significance of the path analysis for this study is two-fold. First, the earlier analysis of the six hypotheses was validated. Second, two other variables were

identified that influenced attitude toward computers through indirect paths: distance traveled to obtain continuing education and type of nursing position held.

Distance traveled to obtain continuing education was indirectly related to attitude toward computers through computer usage. Those nurses who traveled the farthest identified themselves as more frequent users of computers who then had more positive attitudes toward computers. This suggests that those nurses who are faced with the greatest limitations related to access to continuing education have already identified computers as valuable tools.

Nursing position was also indirectly related to attitude toward computers through certification. Nurses who valued and attained specialty certification had more positive attitudes toward computers and those nurses who held nursing positions in which certification was attained also had more positive attitudes toward computers.

The indirect relationships demonstrated through path analysis have important ramifications for this study. These two predictors of attitude toward computers, along with the other predictors of attitude previously discussed, represent target groups of rural nurses that are most likely to have positive attitudes toward computers. Implications for rural health care facilities will be discussed in Chapter 5.

In addition to the statistical results presented in this dissertation, the

qualitative analysis provided clear insight into the respondents' beliefs about several areas. In an attempt to generate qualitative data and provide the respondents an opportunity to describe their beliefs, a comment section was included on the questionnaire. Respondents were asked to include their comments about computer usage, continuing education, and to provide any other feedback they thought was important for the study. Analysis of the respondents' comments follows.

Qualitative analysis. Respondents were asked to provide their comments about broad categories of information in an attempt to gather data about the individual experiences of the respondents. This opportunity for respondents to add information in their own words was a crucial piece of this study in that it was used to enhance the meaningfulness of the statistical data. As stated in LoBiondo-Wood & Haber (1998) ..."qualitative approaches explore all dimensions of human uniqueness that may aid the researcher in understanding the meaning of the experience for the participant" (p. 218).

Respondents were asked to comment on their attitude toward the use of computers in general. This provided them the opportunity to provide data about their personal experiences with computer usage beyond those areas that the questionnaire addressed.

Respondents were also asked to comment on continuing education. The

rural health literature is replete with concerns about access to continuing education for rural health care providers and the respondents had the opportunity in this study to support or refute those claims based on their individual experiences. Participants also had the opportunity to include any general comments related to the study of rural nurses' attitudes toward computers.

Data analysis of the qualitative portion of this study was completed using the constant comparative method (Strauss & Corbin, 1990). Respondents' written comments were examined carefully for similarities and differences and grouped into categories. The data was clustered to form categories. The categories were then expanded or collapsed based on further analysis of the data. Four major categories evolved from the grouping of participants' comments:

- 1) lack of recognition of the value of computers for nurses,
- 2) lack of resources pertinent to computer use,
- 3) issue of access to continuing education, and
- 4) use of the computer for continuing education.

Each of these areas will be discussed individually.

Lack of recognition of the value of computers. Numerous comments were made suggesting there was a lack of value placed on computer use by nurses. In many cases, nurses reported having computers available in their facility but not being able to use them. Additionally, some institutions had computers but were

not using them to their potential. Nurses reported they enjoyed having a computer at work but felt limited in the amount of use. Comments included:

“Our hospital does not permit anyone but the ward clerks to use the computer. We don’t have computer charting but we feel it’d be nice to use for other tasks.”

“We have a computer in our facility and I feel it could be time saving if we’d use them more. Right now the only use of the computer the nurses have is to make patient labels for the chart forms. What a waste.”

“I find it interesting that patient care areas and nursing departments in general are the last areas in the hospital to computerize-I hear so many nursing staff express their unease with computers. If we could use them more and were aware of the ways they could help us, I think that negativity would improve.”

“Unfortunately, our use of computers is very limited in our facility. All we use them for is insurance information and addresses, etc. We could improve greatly.”

Lack of resources regarding computers. Many of the respondents who commented on their surveys expressed dissatisfaction related to available resources regarding computer use. The lack of resources were not only related to lack of money but lack of technical support. Another resource issue was the perceived lack of adequate education or training about the computer and its function. Most common were responses voicing concern that computer systems were brought into a facility and inadequate computer training or inservice was provided or that there were inadequate technical support personnel when problems

occurred. Comments included:

“It’s very frustrating to have problems and have no one around who can fix them--we don’t have appropriate technical support or back-up if something goes wrong. Don’t get me wrong, I feel that computers are necessary and important but I find little help or instruction at work so have had to learn it on my own and that takes longer. I’ve learned almost everything from the Dummies books.”

“It’s great until I run into a glitch, then I have to ask for help and its not often there. I wish we could get more computer training so I could handle the glitches myself. We had very little education-a couple of classes and then we were on our own. Every time one of us figures something new out it’s a surprise!”

“For those of us who did not have computers available to us in our schooling this is just an additional headache to have to use one. Also, if an institution expects the staff to use one they should provide at least a basic computer course. We have a little manual to help us but I don’t know what half the terms mean.”

Several comments were made regarding cost, both personally and professionally. Individuals stated they could not afford a computer themselves so did not have access at home. Others were concerned about the cost the institution was incurring in light of the financial difficulties facing rural hospitals. Many of the cost issues were related to the cuts they as nurses had experienced in their institutions and discontent was expressed that the facilities were cutting education budgets and then purchasing computer systems. The result was that they had computer systems but no educational resources for the staff and the computers were not being used effectively.

Access to continuing education. For the rural nurses responding to this survey, access to continuing education was a major issue. Numerous comments from respondents supported the findings of articles cited in the review of the literature for this dissertation. There were several difficulties related to access that were identified as major problems for the respondents: distance require to attend continuing education, lack of financial support from their institutions, and inability to either get days off or have someone else cover their absence. These findings are consistent with the literature regarding difficulties facing both nurses and physicians working in rural areas (Lockyer, Parboosingh & McDowell, 1987; Hedman & Lazure, 1990; Office of Rural Health Policy, 1993; Busack, 1994; Forti, Martin, Jones & Herman, 1995; Weinert, 1996).

Rather than experiencing one specific problem area, respondents often described numerous problems with access to continuing education within their institutions. It was evident that there are multiple interrelated issues facing rural nurses who are either committed to or mandated by the state to maintain continuing education. Many nurses commented on the value they place on keeping current through continuing education and feeling a professional responsibility to the patient to maintain a current practice, despite facing difficulties of access. Most often traveling distance was mentioned in conjunction with financial constraints. Comments included:

“Some nurses here have just plain quit doing continuing education since it’s not required by our state to renew your license. It’s just too far to travel and there aren’t many classes here. Plus, we don’t get any money from the hospital--just one day per year paid. One day will only cover the day of the class--you still need at least another day to drive.”

“So difficult to obtain living in an area that is very rural--would be easier if most things could be taught over telemedicine or such to bring things to us so we wouldn’t have to travel as much. From where I live, we travel 190-320 miles to get decent continuing education. I think continuing education is crucial in rural areas--we don’t see a lot of really serious patients and so we need to be current for when we do get one. It’s especially hard in the winter.”

“I think continuing education is a fair requirement providing it is within a reasonable driving distance and expense range--that’s a problem for us.”

The most common complaint was that education budgets had been cut so that a variety of education related benefits were no longer available. Nurses were concerned about the lack of money to pay for a course’s registration, lack of money to pay for driving and motel accommodations, and lack of financial support to pay for a day off to attend a course. Additionally, facilities were either unable to cover the financial cost of bringing in another nurse to cover the time away or did not have additional personnel available. These similar concerns were voiced by respondents from all areas. Comments included:

“I work in a rural setting and want administration to realize that continuing education is highly important and it shouldn’t have to be such a struggle to attend a conference (ie. they don’t allocate enough funds for the staff nurse or allow the time off to improve

upon one's education).”

“Even though we have to travel about 100 miles to Billings it's always been worth it to keep current. However, now we no longer get money or days off to attend workshops. It's so difficult to go anymore that I end up doing continuing education articles just to get the credits even if the topic is not applicable--very disappointing. We're in the process of trying to get someone to come to us to teach a course-that would be great.”

“It's harder to get now because we don't get days off anymore and I don't like to use my regular days off to go to classes 100 miles away. I do read continuing education articles in nursing journals. Sometimes they don't interest me at the time but it's better than using my days off to go to a class.”

“After moving to a small town I'm beginning to see how hard it is to keep up continuing education credits. Our budget for continuing education is very small and we don't have many nurses to cover for us when we need to travel.”

While many staff nurses seemed to direct their frustration with lack of resources toward their administration, many nurse administrators also expressed disappointment with their inability to provide financial support for the nurses. They echoed the concerns related to lack of money for travel and the difficulty finding another nurse to cover for the nurse who was away. One administrator responded:

“My continuing education budget has been cut dramatically over the last few years with the financial difficulties facing rural health care facilities. My nurses must travel almost 100 miles one way to go to classes and I can't reimburse them for expenses like I used to. I still try to find ways to support some of them going each year so they get a chance to network with other nurses but I only

have the budget for 2-3 per year. I also have had to cut the number of staff so if someone leaves for a few days, we really feel it.”

There were 46 (18.1%) of the respondents who were able to obtain continuing education at their facility or had to drive less than 30 miles to attend. These nurses, particularly those who were certified in a specialty area, indicated they were appreciative of the access to continuing education. Other administrators indicated that after decreasing their education budgets to the point where they could no longer send nurses to programs, bringing in an outside speaker was the only way they could afford to offer continuing education at all. Comments included:

“Both our hospital and the state require continuing education. I’m very glad we are able to get the classes here. Once in awhile we have to (or want to) go somewhere else to attend something but mostly it’s too far to make it worth your while. Our nursing director is very good about coming up with ways to bring someone in.”

“I have to have continuing education to keep up my certification and that’s so important to me. I’d travel if I had to but most of it I can get here. I know that it’s unusual for a small hospital to be able to offer as many classes as we do. I’m thinking we’re very fortunate to have an administrator that supports this.”

Continuing education by computer. The respondents were overwhelmingly interested in obtaining continuing education by computer. Only 25 (10%) disagreed that computers could be effective for continuing education and 20 (8%) were unsure. Eighty-two per cent either agreed or strongly agreed that computers

could be used to meet their continuing education needs. Several respondents qualified their agreement by stating they would need to balance the continuing education on the computer with “hands-on” practice of nursing skills or that they’d need education or training on the use of the computer first.

Several respondents were currently pursuing or planning to pursue further academic education and felt the use of the computer was imperative. Students who were returning for a baccalaureate degree or going on for graduate study using distance technology indicated that computer usage was an expected skill for completing their degree requirements. Comments included:

“My state does not require continuing education but it does require a BSN. Since I only have an Associate Degree I only have a short period of time to go back and get a degree. I’m involved in a program where part of the coursework can be done at a distance and I use my computer all the time. I’d never be able to go to school and continue to work if I couldn’t use a computer. I think it’d be great to expand this and deliver the continuing education classes this way too.”

“I could never have finished my master’s degree living where I live if I didn’t have a computer. I wanted to go to school and we ranch so I knew I’d have to do most of it from a distance. I could get to the library from my home and contact other students and faculty. Instructors would send papers back and forth and give me feedback. I knew very little about computers and was sure scared it wouldn’t work but it did. Now I’d be lost without it!”

Other nurses indicated that the convenience of doing continuing education courses from home and on their own time would be an advantage. Other

advantages cited were the increased variety of choices using the computer, greater access to health care resources, and the ability to complete the course at their own pace. Most respondents who commented on obtaining continuing education by computer indicated it would help alleviate the problems with access due to distance. Comments included:

“Too many nurses think they are finished with their education once they graduate from nursing school, especially since we don’t require continuing education in our state to be licensed. I see computers as a great way to bring continuing education to the rural area.”

“Traveling to continuing education courses is difficult and often not within our budget so courses by computer would be helpful and make continuing education much more attainable for myself and my colleagues.”

“I’ve only been out of school less than a year so I haven’t really done any continuing education yet but think doing it by computer would be great. I think it’d be easier for those of us who recently graduated though because now we have to take boards on computers and it’s not so scary.”

Some respondents expanded the comments to focus on using the Internet for continuing education. Internet sources were noted to be pertinent for nursing continuing education and a variety of topics were available. Additionally, nurses with speciality certification saw the Internet and other computer education as a viable means for completing the requirements for maintaining their credentials. Others indicated that the continuing education available at the local hospital was

not always of the quality they expected and viewed the Internet as a means of delivering higher quality continuing education. One nurse responded:

“I’ve started to take some continuing education courses online and find the variety of topics exciting. In a small hospital we don’t have continuing education provided and we can’t get the time off. Now I keep up my CCRN partly by taking computer classes- however I still like to go to a class once in awhile to interact with other nurses. It sure does help the frustration with wondering if I’ll have enough CEU’s to meet the requirements.”

“I personally enjoy the opportunity to go somewhere sometimes to get continuing education even though it’s difficult. On the other hand, quicker, easier access to new information using a computer could prove very beneficial.”

There were some comments indicating a concern for completing continuing education via computer. Respondents emphasized that much of nursing is a “hands on” profession and felt that computer classes would have to be supplemented with demonstration experiences. Others were concerned that nursing is relying on technology too much and “has moved away from the personal care we used to give.” One respondent felt the cost of obtaining continuing education on the Internet was prohibitive. She stated, “I’ve tried to take continuing education on the Internet but it was too costly for its quality and value.” Another was concerned about the inability to interact with an instructor and ask questions.

Overall response to obtaining continuing education by computer was

positive, although it was clear that respondents felt they needed more computer training to feel comfortable with the technology. Increasing the number of opportunities for rural nurses to use computers is an important first step in improving attitudes toward computers. The implications for nursing practice and further research are discussed in Chapter 5.

Chapter 5

Summary, Implications, Conclusions

Summary

This study was conducted to determine the attitudes of rural nurses toward computers and identify variables that influence those attitudes. Computers have recently been introduced into many health care settings for use with storage and management of patient data, administrative functions and communication tasks. Traditionally, rural hospitals have been hindered by the cost of implementation of computer technology, however these costs are decreasing. Thus, more rural health care facilities have begun to introduce computer technology in their institutions.

Computer technology has been identified as one method to alleviate several problems facing rural health care providers. The Office of Rural Health Policy supports the widespread use of telecommunications as viable means to decrease barriers to professional isolation, provide degree program courses and continuing education, provide for consultation among other health care providers and attract new personnel (Puskin, 1992).

For the use of computer systems to be effective for rural nurses, computers must be viewed positively by the users. Unfortunately, as described in this dissertation and in the literature, computers are often introduced without the proper technological support or educational preparation for those who would be

operating the technology. As a result, computers are often not viewed favorably or used to their capacity. Attitudes of the nurses toward computers must first be determined prior to implementation of computers in rural health care institutions.

Many studies have been published that examine nurses' attitudes toward computers and were discussed in previous chapters. Since all of the previous studies were conducted in larger or more urban health care settings, results could not be generalized to the rural nursing population. This study was conducted to investigate rural nurses' attitudes toward computers.

The rural nurses in this study had slightly positive attitudes toward computers. Attitudes were significantly related to age, gender, level of education, whether or not the nurse held specialty certification, years in nursing practice and computer usage. Through path analysis, it was demonstrated that distance traveled to obtain continuing education and type of nursing position held were indirectly related to attitudes toward computers. Whether or not the nurse was required to obtain continuing education by his/her state of licensure was not a factor, either directly or indirectly, in the attitude scores. Nurses responding to this questionnaire were clearly committed to delivering quality patient care as evidenced by their commitment to maintaining specialty certification and their desire to continue to learn. Respondents repeatedly stressed that continuing education was crucial in their nursing practice and that despite the difficulties with

access, they were committed to maintaining a current, skilled practice. Many nurses clearly identified the desire to improve their nursing practice by furthering their education, however, they were faced with barriers related to distance, inadequate staff to cover their absence, or inadequate funding to provide financial support for attending educational programs.

Based on these findings, several conclusions were made with implications for rural hospitals and for nursing education. The exploratory nature of this study also resulted in areas for further research regarding computer usage by rural nurses.

Implications for Rural Hospitals

For rural hospitals introducing computer technology into their institutions, several recommendations can be made based on the results of this study. First, it would be ideal if nurses could be involved in choosing a system that is user friendly and meets the needs of the specific institution. Next, hospitals must provide adequate technological training for nurses using the technology and technological support must be available for nurses as questions and problems arise. Further, a policy for back up procedures needs to be developed prior to implementation of the computer system so that efficiency of day-to-day operations is not jeopardized when the computer is not functioning or problems occur.

For a computer system to be successful, change agents in the institution

need to be identified. These key people need to have positive attitudes about computers and would be instrumental in promoting effective use by other nurses. The strongest predictor of positive attitudes toward computers in this study was computer experience. Thus, nurses with previous computer use within an institution need to be sought out as possible positive role models for implementation of computer systems. Additionally, for this study, male nurses, those nurses who held specialty certification, those nurses who were younger, and those with higher levels of educational preparation all had higher attitude scores. Because distance traveled to continuing education and type of nursing position held were indirect predictors of attitude, these variables need to be considered when determining a target audience. Rural nurses with the above characteristics are possible target audiences for identifying key change agents in developing programs for implementation of computer technology in rural hospitals.

There is clearly a need for evaluation of the cost-benefit ratio for rural hospitals in light of the current financial climate. Fortunately, in recent years, the cost of computer technology has decreased. Improvements in technology and lower costs have resulted in computer systems becoming an option for an increasing number of rural hospitals.

Prior to implementing a new system it is crucial that these institutions conduct a needs assessment to determine the level of comfort and experience of

the nurses and other employees who would use the system. Computer knowledge has only recently been introduced into nursing educational programs so it is important to assess the level of computer knowledge of current nurses. Based on the results of the needs assessment, plans for appropriate computer training courses can be developed and implemented. Specific educational programs need to be put into effect that are both responsive to the nurses' needs and the needs of the institution. Nurses should be involved in the development of the courses to ensure that content is applicable to and reflects current clinical practice. During the training period, nurses must receive frequent evaluation of performance and feedback as to their mastery of the content. It is also imperative that nurses become comfortable with the computer to the point that they recognize the efficiency of the system and the benefits of having more time to spend with their patients.

Comments from nurses in this study reflected the daily pressures nurses feel with regard to record keeping, information storage and retrieval. While computers can theoretically improve these conditions, the advantages will only become evident if the nurse can use the computer effectively. One nurse commented on the efficiency of computers as a function of the education provided regarding their use: "Computers are only as good as their operators--we need lots of education."

In addition to computer orientation programs, nurses must have access to

opportunities to improve their computer skills. As software changes, nurses need to be updated and allowed to practice so that they can take full advantage of the technology. Computer laboratory areas need to be available so that nurses can practice the skills outside of the actual patient care setting. Computer support systems can be made available by identifying nurses who are most comfortable with computers and instituting a mechanism by which these nurses provide encouragement and support to those nurses who may be less comfortable.

Hospitals must also establish a mechanism for technical support. If trainers are brought in from the outside to institute a computer system and do the training, a system needs to be in place that provides assistance when problems arise or when the computers malfunction after these trainers are gone. Back-up procedures need to be implemented prior to computer usage so that nurses are familiar with the policies and understand what to do in event of problems. Ideally, one or more individuals from within the organization need to achieve a high level of competence with the computer system in order to have technical support readily available. Once nurses are comfortable with the technology and aware of the advantages the computer has to offer, they will be ready to begin implementing them into their daily routine. Additionally, once nurses begin to use computers routinely in the institution, they will be ready to explore other possible uses of the computer such as library and Internet access for patient care information and

continuing education opportunities.

Implications for Nursing Education

The introduction of computers into hospitals and other health care settings has important implications for nursing education. Educators must assume major responsibility for preparing nursing students to function in a more technical environment. Computer literacy should be a requirement of every nursing education program, whatever the level of preparation. Specific applications of computer technology for nurses need to be identified and incorporated into basic nursing curricula. Renshaw & Granley (1987) identified two areas important for implementation of computer education in nursing: teaching about computers and teaching with computers. Teaching about computers is the broader concept that will familiarize nurses with computers in general and their broad scope for application to nursing. Nursing educational programs need to include such topics as: the benefits and constraints of computer information systems, legal issues associated with computer use, types of computer hardware and software, and information management programs (Renshaw & Ganley, 1987).

Using computers to teach in a nursing program will increase levels of comfort among nursing students and prepare them for the use of computers in the clinical setting. This experience will also decrease the fear evidenced by many nursing students entering nursing school.

It will also be important for nursing programs to assess the level of comfort of entering students. Since more emphasis has been placed on computer technology in primary and secondary schools in recent years, one would hope that entering college students would have an increased level of knowledge about computers in general. However, it is extremely important that nursing students' familiarity with computers be assessed rather than assumed as they enter a nursing program, since level of computer knowledge will differ depending on the level taught in their precollegiate setting.

Continuing education. For nurses practicing in areas with a rural focus, telecommunications and computer technology have been touted as playing a major role in both generic and continuing nursing education. Many nurses are required by either their state or their hospital to obtain continuing education credits yearly. Others participate because of their innate desire to maintain a high level of competence. Still others are required to maintain continuing education to remain certified in a specialty area. Regardless of the reason, it is imperative that rural nurses stay abreast of the rapidly changing health care environment, maintain sharp skills, and increase their knowledge base.

For these rural nurses, the difficulties associated with access to continuing education often preclude their participation. Continuing education via computer is a practical mechanism that needs to be promoted among rural nurses.

Based on the path analysis employed in this study, several groups would be appropriate to target for continuing education programs. Nurses with specialty certification and those with higher educational preparation had positive attitudes toward computers. Organizations designing computerized continuing education programs could benefit from developing specific courses to meet certification requirements and to provide coursework pertaining to graduate education in nursing.

Research has already demonstrated the advantages of completing continuing education via computers. Neafsey (1997) identified the flexible access, opportunity for animated graphics, and immediate feedback as attractive features of computer continuing education. Additionally, users proceed at their own pace, can leave and return to the program at their will, and can stop to look up unfamiliar terms or topics. These features have important implications for nurses who live the farthest distances from educational programming. Distance traveled was an indirect predictor of attitude toward computers in this study, so computerized education programs have the potential for being well-received by the rural nurses who travel the greatest distances to obtain continuing education.

Another capability of computer based instruction is the “embedded instruction” available. In this instance, programs can be interactive using case studies and questions. “Incorrect answers can provide more information to help

the learner choose a more appropriate answer. Such embedded instruction can free the learner to explore incorrect answers” (Neafsey, 1997, p. 165).

Many organizations are now publishing continuing education programs on the Internet. This offers the rural nurse immediate access to a large variety of clinical nursing topics. Currently many of the publishing companies and professional nursing organizations have included continuing education opportunities via the world wide web (Nicoll & Ouellette, 1997). As nursing educators make students aware of these opportunities, nursing graduates then can disseminate this knowledge to practicing nurses. It is crucial also that the availability of Internet resources be publicized to practicing nurses and that responsibility lies partly with the nursing professional organizations. Fortunately, several large nursing organizations are now including sessions on computer literacy at national conventions and publishing information in nursing journals.

Equally important is the fact that nurses need to know what type of hardware and software will be required to access the continuing education available via computer, whether through computer assisted instruction programs or on the Internet. Recently, several articles have been published in a variety of nursing journals that do assist the nurse or the hospital in determining whether or not he/she has the technological capability and describe the resources available (Bridges & Thede, 1996; Hendrickx, 1997; Tomaiuolo, 1995). This information is

also important when a hospital institutes a computer system so that they purchase an appropriate system.

For organizations involved in specialty certification of nurses, the knowledge that certified rural nurses had positive attitudes toward computers is important data. These organizations develop written review materials for the certification exams and conduct review courses for nurses contemplating sitting for the exams. These courses are most often held in large cities so many rural nurses have difficulty attending. Delivery of these review courses via computer has the potential to reach rural nurses who otherwise might not have considered these options. For re-certification, continuing education opportunities that are specific to specialty areas could be developed for computer delivery. In this way, nurses could have accessible, pertinent continuing education that would facilitate their maintenance of specialty certification.

Implications for Research

The most important factor related to further research is that computer usage by rural nurses had not been studied prior to this dissertation. The results of this study can be generalized only to those rural nurses working in similar geographic settings. This study should be replicated in other rural settings in order to determine factors associated with attitudes toward computers for those nurses.

This study resulted in the identification of several factors related to positive

attitudes toward computers for rural nurses. Gender, age, years of nursing practice, specialty certification, level of nursing education and computer usage were all related to attitudes toward computers. Distance traveled to continuing education and type of nursing position held were indirectly related to attitudes toward computers. Based on these findings, rural health care institutions have data upon which to base their assessments of nurses' readiness to use computers. According to the Theory of Reasoned Action, the nurses with more positive attitudes will be those that are more receptive to using computers in the work setting. The attitudes of the rural nurses in this study were only slightly positive, suggesting that rural nurses are not aware of the advantages to using computers in a health care setting or had negative experiences with computer technology.

Longitudinal evaluation studies need to be conducted to examine effectiveness of implementation of computer education in formal nursing curricula. As educational programs implement more computer technology, two major areas merit further study. First, the question of whether or not increased computer use among nursing students leads to more positive attitudes as they enter the nursing profession needs to be addressed. Additionally, outcome evaluation of nursing programs instituting computer education needs to be carried out. The overall effectiveness of these programs on nurses' attitudes toward computers needs to be determined.

Possibly most important is the examination of how rural nurses' attitudes change over time with regard to computer usage. As computer technology is implemented, it is important that research be conducted to measure changes in attitudes for nurses who experience more exposure to computers. The evaluation of individual hospital computer orientation and continuing computer educational programs needs to be assessed.

Conclusions

This study provided a unique view into the experiences and attitudes toward computers of rural nurses. While validating some of the research conducted in urban settings, this study goes beyond validation to identify factors specific to the nurse practicing in rural health care. The findings in this study provide clear guidelines for rural health care institutions in their implementation of computer technology, identification of specific areas for nursing educators to address when planning for the inclusion of computer curricular content in nursing education programs, and providing a basis for further research regarding computer technology usage.

Rural nurses in this study had positive attitudes toward computers, but had concerns related to educational preparation for computer use. Respondents were also concerned about the lack of technological and financial support with regard to implementation of computer technology. Because there are considerable learning

opportunities for computer skills available in nursing programs and in other societal venues, one might erroneously assume that practicing nurses had more experience with computers than was actually the case. In this sample, male nurses, younger nurses, nurses with more computer experience, and nurses with higher levels of nursing education had the most positive attitudes toward computers. These nurses would be important target groups to access as change agents when instituting computer technology and computer training in rural health care facilities.

Access to continuing education for rural nurses is crucial to ensure that these nurses are receiving the information and skills necessary to practice in an ever-changing health care environment. Rural nurses also need to maintain credibility and expertise in a health care setting that is generalized and encompasses a wide variety of patient care issues. Further, continuing education activities increase nurses' interest in decision making and participation in professional issues, active awareness of problems facing nursing practice, and the need to maintain clinical competency.

Continuing education via computer technology is a viable mechanism of delivery that should be explored by nurses and hospitals in rural areas as an alternative or adjunct to traditional on-site continuing education programs. However, assumptions about rural nurses' attitudes toward computers could lead

to premature implementation of computer technology, resulting in inefficient use of the technology and nurses' time. Therefore, the recommendation is made that rural health care facilities use the results of this dissertation to guide them in determining their nurses' readiness for the introduction of computer technology in their facilities.

If rural health care facilities are to be successful with the implementation of computer technology for nursing use, the attitudes of those nurses must first be assessed. It would appear, as suggested by responses of the rural nurses in this study, that many rural nurses are not well informed about the advantages computers provide for nurses, which ultimately would lead to improvements in delivery of patient care. Results of this study suggest that rural health care facilities must provide education and support for their nurses as they institute computer technology. This will enable rural nurses to fully appreciate the benefits computer technology can have for them as health care professionals.

Appendix A

Letters to Directors of Nursing



The University of
Montana

Department of Educational Leadership
and Counseling
School of Education
The University of Montana
Missoula, Montana 59812-1053
Educational Leadership: (406) 243-5586
Counseling: (406) 243-5252

May 26, 1997

Dear Director of Nursing:

I am a doctoral candidate in Educational Leadership at the University of Montana and a faculty member at the Montana State University College of Nursing. I have been involved in a variety of educational and practice activities that require the use of computers and am interested in computer usage among rural nurses. My dissertation is entitled, "Attitudes of Rural Nurses Toward Computers: Implications for Continuing Education". Your rural hospital was randomly chosen for invitation to participate in this study.

Completion of the questionnaire takes 15-20 minutes. I would appreciate your participation in this study by distributing the enclosed questionnaires to your nurses and asking them to return the forms to me in the stamped envelope I have included. Please feel free to participate yourself as well. Participation in this study is voluntary and the questionnaires will remain anonymous and confidential. Participants should not put their names on the questionnaires. This study has been approved by the Institutional Review Board of the University of Montana.

My advisor is Dr. John Lundt and can be reached at (406) 243-5204. If you have questions or comments, please contact me at (406) 243-2610. Thank-you in advance for your participation.

Sincerely,

Lori Hendrickx, RN, MSN, CCRN
Doctoral Candidate
University of Montana

Appendix B
Questionnaire

Attitudes Toward Computers Questionnaire

Please do not put your name anywhere on this form. Your responses will be kept confidential and included with those from other nurses for the purpose of gaining an understanding of rural nurses' attitudes toward computers.

Please complete the following:

1. Gender

- Male
 Female

2. Age

- less than 20 years
 20-30 years
 31-40 years
 41-50 years
 greater than 50 years

3. Nursing Education (Check highest degree earned)

- LPN
 RN: Associate Degree
 RN: Diploma
 RN: Baccalaureate
 RN: Masters
 RN: Doctorally Prepared

4. Years in Nursing Practice

- 0-5 years
 6-10 years
 11-15 years
 16-20 years
 more than 20 years

5. Employment Status

- Employed full-time in nursing
 Employed part-time in nursing

6. Major Practice Area

- Obstetric/Nursery
 Medical-Surgical
 Pediatrics
 Critical Care/Emergency
 Psychiatric/Mental Health
 General Practice (No specialization)
 Other, please specify _____
-

7. Type of Position

- Administration
 Staff nurse
 Charge Nurse
 Clinical Specialist (Master's degree)
 Other, please specify _____

8. Certification

Yes, I hold certification in a speciality area

If yes, what area? _____

No, I do not hold certification in a speciality area

9. Licensure

My state requires continuing education (CE) credit for re-licensure.

My state **does not** require continuing education (CE) credit for re-licensure.

10. How many miles do you usually travel to obtain continuing education credit?

0-30 miles

31-50 miles

51-100 miles

greater than 100 miles

I don't have to travel, I am able to receive CE in my own town.

11. Do you have access to a computer?

Yes (Go on to question 12)

No (Go on to Page 4)

12. I use a computer:

At work only

At home only

At both work and at home

Other, please specify: _____

13. Computer usage

I use a computer less than once a week

I use a computer more than once a week but not daily

I use a computer every day

14. Please rate yourself regarding your skill using a computer:

Highly skilled

Moderately skilled

Poorly skilled

Please feel free to comment regarding:

15. The use of computers:

16. Continuing education:

17. Comments in general:

ATTITUDES TOWARD COMPUTING IN NURSING

This questionnaire asks for your beliefs and attitudes about computing in nursing. There are no right or wrong answers. Please be candid and report your true reaction to each item. The scale for the 30 items is as follows:

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neither Disagree nor Agree (Neutral)
- 4 = Agree
- 5 = Strongly Agree

- | | | | | | | |
|-----|---|---|---|---|---|---|
| 1. | Use of the computer would save me time researching my patients' conditions. | 1 | 2 | 3 | 4 | 5 |
| 2. | Computer programs are efficient for administrative functions. | 1 | 2 | 3 | 4 | 5 |
| 3. | Computer staffing is much easier than other approaches. | 1 | 2 | 3 | 4 | 5 |
| 4. | If I had a choice, I wouldn't learn more about computers. | 1 | 2 | 3 | 4 | 5 |
| 5. | Computers malfunction easily. | 1 | 2 | 3 | 4 | 5 |
| 6. | Computer systems can be adapted to assist nurses in many aspects of patient care. | 1 | 2 | 3 | 4 | 5 |
| 7. | The most sensible use for computers in hospitals is for billing and scheduling rather than more complex administrative tasks. | 1 | 2 | 3 | 4 | 5 |
| 8. | Taking courses by computer would be an efficient way to obtain continuing education credit. | 1 | 2 | 3 | 4 | 5 |
| 9. | I believe most computer assisted instruction programs are so difficult to use that they result in frustration rather than learning. | 1 | 2 | 3 | 4 | 5 |
| 10. | Computer literacy should be part of all nursing programs. | 1 | 2 | 3 | 4 | 5 |
| 11. | There is little job satisfaction in nursing management using computer-based information systems. | 1 | 2 | 3 | 4 | 5 |

- | | | | | | | |
|-----|--|---|---|---|---|---|
| 12. | One needs a background in computer science to use computers. | 1 | 2 | 3 | 4 | 5 |
| 13. | Most computer skills have no application to nursing. | 1 | 2 | 3 | 4 | 5 |
| 14. | Computers are down so often that they're not available when you need them most. | 1 | 2 | 3 | 4 | 5 |
| 15. | I am comfortable using computers. | 1 | 2 | 3 | 4 | 5 |
| 16. | If I had a choice, I would never have to use a computer. | 1 | 2 | 3 | 4 | 5 |
| 17. | I would like to use the computer more to save time in my work. | 1 | 2 | 3 | 4 | 5 |
| 18. | I feel that computers create more problems than they solve in nursing practice. | 1 | 2 | 3 | 4 | 5 |
| 19. | I'm afraid to depend on the accuracy of computer data where patient records are concerned. | 1 | 2 | 3 | 4 | 5 |
| 20. | Taking courses by computer would be more difficult than attending a traditional continuing education course. | 1 | 2 | 3 | 4 | 5 |
| 21. | The use of computers improves patient care by giving the nurse more time with the patients. | 1 | 2 | 3 | 4 | 5 |
| 22. | Charting by computer is slower than traditional charting. | 1 | 2 | 3 | 4 | 5 |
| 23. | I feel anxious about the increased use of computers in nursing. | 1 | 2 | 3 | 4 | 5 |
| 24. | Due to the ease of access, confidentiality is nearly impossible if computers are used for patient records. | 1 | 2 | 3 | 4 | 5 |
| 25. | I am pleased that the use of computers is making nursing care more efficient. | 1 | 2 | 3 | 4 | 5 |
| 26. | When nurses I know discuss the effectiveness of computers, I feel out of place. | 1 | 2 | 3 | 4 | 5 |
| 27. | I expect to expand my knowledge of computers. | 1 | 2 | 3 | 4 | 5 |

28. The use of computers de-humanizes nursing care. 1 2 3 4 5
29. Confidentiality of patient records must be sacrificed if they are to be computerized. 1 2 3 4 5
30. Delivery of courses by computer could meet my continuing education needs. 1 2 3 4 5

Appendix C

Permission for Use of Questionnaire



September 30, 1996

Lori Hendrickx, MSN, RN, CCRN
Montana State University
College of Nursing
UM North Corbin
Missoula, MT 59812

Dear Lori:

Here are copies of Forms A and B of "Attitudes Toward Computing in Nursing."

As noted in my e-mail to you, you have my permission to use these instruments.

The items to be reverse-scored are:

FORM A 1, 2, 4, 6, 7, 8, 15, 19, 21, 22, 24, 28 and 30

FORM B 4, 7, 9, 11, 13, 14, 16, 18, 20, 21, 22, 23, 24, 26, 28, 29, 30

Good luck with your study!

Sincerely,

Barbara S. Thomas
Professor

BST:pvg

Appendix D

Research Rationale for Questionnaire

Research Question Rationale

The questionnaire for this dissertation was modified from an instrument developed by Thomas (1990) and designed to measure nurses' attitudes toward computers. Items on the questionnaire were constructed based on Fishbein & Ajzen's (1975) Theory of Reasoned Action. The following discussion identifies research results supporting each question included on the instrument.

Demographic Variables

Questions 1-17 of the Attitudes Toward Computers Questionnaire were written for this study. Questions 1-7 are similar to demographic variables in previous studies examining nurses' attitudes toward computers (Burkes, 1991; Scarpa, Smeltzer & Jasion, 1992; Stonge & Brodt, 1985; Thomas, 1990).

1. Gender
2. Age
3. Nursing education
4. Years in nursing practice
5. Employment status
6. Major practice area
7. Type of position

This demographic information will not only provide general, descriptive data about the sample but address research areas 4 and 5: the difference in attitudes

toward computers between male and female rural nurses, and the difference in attitudes toward computers between rural registered nurses and rural licensed practical nurses.

Question 8: Certification

Question 8 asks whether or not the nurse holds certification in a specialty area. This question has not been asked on any studies found in the literature review but was deemed important given that rural nurses who need continuing education to maintain certification may be an important target group for courses delivered by computer (Weinert et al. 1996). This question will also provide information to address the research area concerning the difference in attitudes toward computers between rural nurses who hold certification and those who do not hold certification.

Question 9: Licensure

Question 9 asks whether or not the nurse is required to obtain continuing education credit for relicensure. Yoder-Wise (1998) identified the states that do require continuing education credit for re-licensure, many of which have substantial rural populations. Nurses working in these rural areas might also benefit from the ability to obtain continuing education via computer. This information will be used to address the research area concerning the difference in attitudes toward computers between rural nurses who hold certification and those

who do not hold certification.

Question 10: Distance traveled to obtain continuing education.

10. How many miles do you usually travel to obtain continuing education credit?

The purpose of this question is to determine the distance rural nurses are currently traveling to take continuing education courses. The information will also be used to describe the sample.

Question 11-14: Computer usage.

11. Do you have access to a computer?
12. I use a computer:
 - At work only
 - At home only
 - At both work and home
13. Computer usage:
 - I use a computer less than once a week
 - I use a computer more than once a week but not daily
 - I use a computer every day
14. Please rate yourself regarding your skill using a computer.

These questions will identify the respondents' current computer usage.

Several studies have reported positive correlations between computer usage and

attitudes toward computers (Chang, 1994; Melhorn, Legler, & Clark, 1979; Schwirian et al., 1989), however Bongartz (1988) and Burkes (1991) found that nurses with more computer experience were actually less positive about computers than those nurses who had less computer experience. Questions 11-14 will address the sixth research area dealing with the relationship between rural nurses' attitudes toward computers and computer usage in the work setting.

Question 15-17: Comment section.

15. Comments regarding the use of computers
16. Comments regarding continuing education
17. Comments in general

These questions were designed to solicit qualitative feedback from respondents regarding the use of computers and/or continuing education.

Difficulties obtaining continuing education and concerns about computer technology in rural areas have been identified in the literature as areas for further study (Crandall & Coggan, 1994; Gordon, Meister & Hughes, 1992; Lockyer, Parboosingh & McDowell, 1987; Weinert et al., 1996).

Questions 18-47 were original questions based on Thomas's (1990) work or were adapted from Thomas' questionnaire for this research. This data will be analyzed to address the first research area concerning rural nurses' attitudes toward computers.

Questions 18, 19, 23, 34, 38, and 42: Efficiency.

18. Use of the computer would save me time researching my patients' conditions.
19. Computer programs are efficient for administrative functions.
23. Computer systems can be adapted to assist nurses in many aspects of patient care.
34. I would like to use the computer more to save time in my work.
38. The use of computers improves patient care by giving the nurse more time with the patients.
42. I am pleased that the use of computers is making nursing care more efficient.

These questions address the efficiency of computers in nursing. Anderson et al. (1992) found that computers were efficient in tasks such as writing administrative reports and keeping patient records. Respondents in Anderson's et al. (1992) study also felt computers were less useful in saving time and improving efficiency for health care workers and rated lowest as a method for helping people learn (Anderson et al., 1992). Ngin, Simms & Erbin-Roesmann, (1993) found that computer users in a hospital setting were more positive about their work and responded that computers made their work easier. Sultana (1990) showed that 87.8% of respondents felt there was no reduction in paperwork with

the use of computers and that computers did not make the nurses' job easier.

Schwirian et al. (1989) found that while considerable learning opportunities regarding computer usage exist, nursing students had less experience than expected. Results of this study indicated 25% of respondents reported favorable attitudes regarding computer usage including increased efficiency of nursing care and more time to spend with patients (Schwirian et al. 1989).

Questions 21, 22, 26, 29, 31, 32, 35, 40, 44, and 45: Comfort using computers.

21. If I had a choice, I wouldn't learn more about computers.
22. Computers malfunction easily.
26. I believe most computer assisted instruction programs are so difficult to use that they result in frustration rather than learning.
29. One needs a background in computer science to use computers.
31. Computers are down so often that they're not available when you need them most.
32. I am comfortable using computers.
35. I feel that computers create more problems than they solve in nursing practice.
40. I feel anxious about the increased use of computers in nursing.
44. I expect to expand my knowledge of computers.
45. The use of computers dehumanizes care.

These questions pertain to the degree of comfort nurses feel working with computers. Several studies indicated respondents were comfortable using computers (Chang, 1984; Schwirian et al., 1989; Stronge & Brodt, 1985; Thomas, 1990). However, Birx, Castleberry and Perry's study (1996) identified several problems that nursing students identified as being related to computer usage. Students had problems troubleshooting, complained of hardware and software malfunctioning, and stated "computers have the potential to be helpful, but it seems as if there are so many bugs to be worked out that the computers are more trouble than they are worth at this time" (Birx et al., 1996, p. 110). On the positive side, one-third of the students felt that computers saved time, stated that they were comfortable using computers and expressed a desire to expand their computer skills. Perry & Mornhinweg (1992) also found that nurses' preparation for using computers was not adequate, resulting in nurses feeling uncomfortable using computers.

Nurses have also identified concerns that technical computer systems are replacing hands-on nursing care, that nurses are giving up part of their role and that computers are frustrating and anxiety-provoking (Ngin et al., 1993). In the same study by Ngin, nurses that identified themselves as experienced computer users were comfortable using computers. Results from Ngin et al. (1993) provide support for items 32, 35, 44 and 45 on the questionnaire. Additionally, Bongartz

(1988) and Dowling (1980) suggested that negative attitudes about computers at the bedside were responsible for interfering with acceptance of computer system implementation and support the inclusion of the above items on the questionnaire.

Schwirian et al. (1989) also reported frustration on the part of respondents regarding working with computers. Nursing students participating in the study were frustrated with the unreliable nature of computer systems and difficulties encountered with software and hardware. Study participants commented on the perception that computer background was necessary to understand computers well enough to use them in nursing.

Questions 36, 41, and 46: Confidentiality

36. I'm afraid to depend on the accuracy of computer data where patient records are concerned.
41. Due to the ease of access, confidentiality is nearly impossible if computers are used for patient records.
46. Confidentiality of patient records must be sacrificed if they are to be computerized.

These questions will address concerns about privacy and confidentiality with computer use. Patient privacy and confidentiality issues have been explored by several researchers (Barhyte, 1987; Romano, 1987; Stronge & Brodt, 1985; Sultana, 1990). Each of these authors has reported nurses' concerns that

computerized patient data may not be protected from access by unauthorized persons. Nurses also expressed concern about the accuracy of data maintained on computers. Legal ramifications with regard to privacy of patient data and confidentiality were included as a major area of concentration for the Stronge-Brodt instrument that has been widely used in studies of nurse's attitudes toward computers (Stronge & Brodt, 1985).

Questions 25, 26, 27, 37 and 47: Use of computers for continuing education.

25. Taking courses by computer would be an efficient way to obtain continuing education credit.
26. I believe most computer assisted instruction programs are so difficult to use that they result in frustration rather than learning.
27. Computer literacy should be part of all nursing programs.
37. Taking courses by computer would be more difficult than attending a traditional continuing education course.
47. Delivery of courses by computer could meet my continuing education needs.

These questions pertain to the increase of computer usage in nursing educational programs. Using computers in educational programming has been studied by several authors (Allen, 1986; Renshaw, 1987; Thede, Taft & Coeling, 1994; Wichowski & Kubsch, 1995). Each of these studies identified a need to

increase the use of computers in educational settings and provide computer-assisted instruction as an option for nursing educational programs. Greenhalgh (1993) and Spohn & Sponseller (1988) also recommended that computer education be a part of all basic nursing programs.

Sherwood, Armstrong, & Bond (1994) also identified computers as an efficient method for delivering continuing education. Two other major studies supported using computers to increase the efficiency of delivering continuing education to rural nurses. Weinert et al. (1996) identified computers as a viable option for delivering continuing education to rural nurses, while also decreasing isolation and increasing networking capabilities. Lockyer, Parboosingh & McDowell (1987) in a study of rural health care providers, ranked inservice education via telecommunications technology as the most useful form of continuing education.

Questions 20, 24, 28, 30, and 39: Computers for administrative function.

20. Computer staffing is much easier than other approaches.
24. The most sensible use for computers in hospitals is for billing and scheduling rather than more complex administrative tasks.
28. There is little job satisfaction in nursing management using computer-based information systems.
30. Most computer skills have no application to nursing.

39. Charting by computer is slower than traditional charting.

These questions will address the nursing administrative functions that are done using computers. The use of computers for administrative functions in nursing was studied by Greenhalgh (1993) and Spohn & Sponseller (1988). Areas in which computers were considered favorable were staffing and scheduling using computer programs, charting of patient data and development of patient care plans. These authors also found nursing managers reported increased job satisfaction in relation to computer use.

Questions 33 and 43: General attitudes about computers.

33. If I had a choice, I would never have to use a computer.

43. When nurses I know discuss the effectiveness of computers, I feel out of place.

These questions were developed based on numerous studies about nurses' attitudes toward computers. Stronge & Brodt (1985), Thomas (1990), Anderson et al. (1992), Birx et al., (1996) all reported similar comments from nurses indicating their desire to avoid using computers and feeling uncomfortable when others discuss the advantages of computers in nursing.

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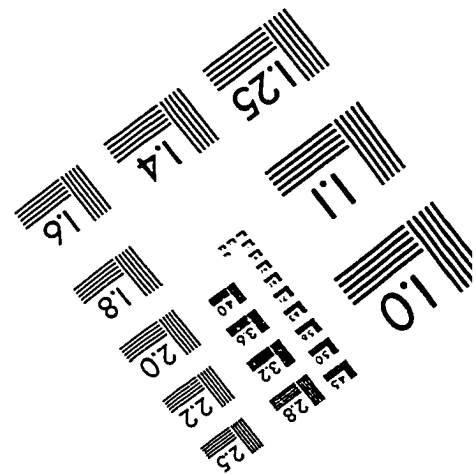
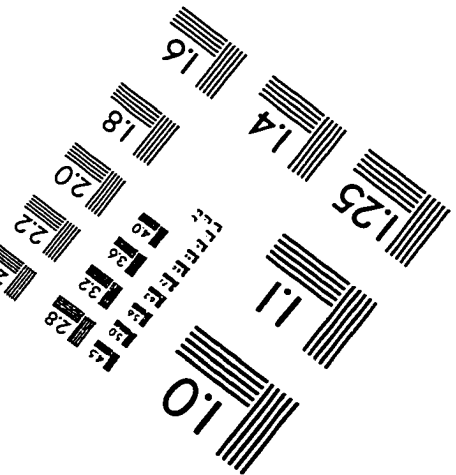
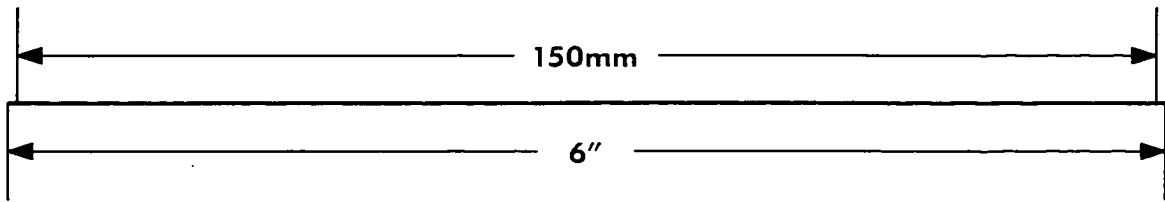
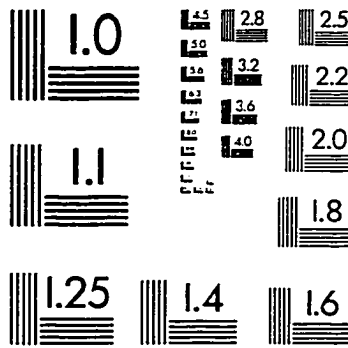
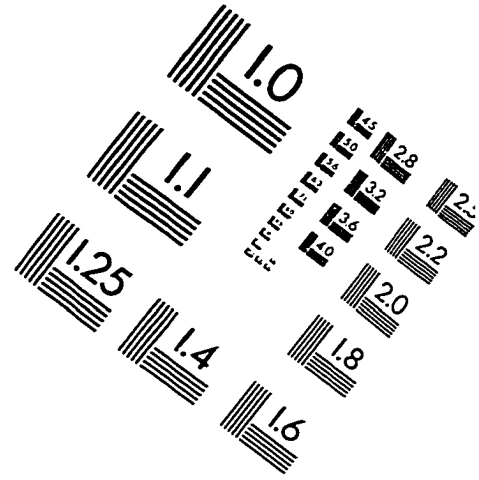
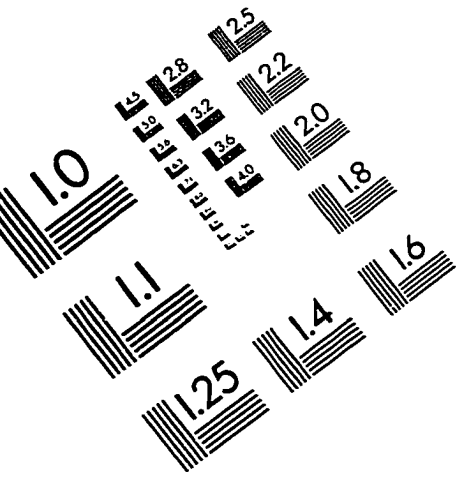
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IMAGE EVALUATION TEST TARGET (QA-3)



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