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Computer literacy for nursing educators : attitudes, behaviors and education.

Andrea Jane Wallen
University of Massachusetts Amherst

COMPUTER LITERACY FOR NURSING EDUCATORS: ATTITUDES, BEHAVIORS AND EDUCATION

A Dissertation Presented

by

ANDREA JANE WALLEN

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Approved as to style and content by:

Dr. Thomas Hutchinson, Chairperson of Committee

Dr. Robert Sinclair, Member

Dr. E. Ann Sheridan, Member

Mario D. Fantini, Dean
School of Education

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ABSTRACT

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ANDREA JANE WALLEN

B.S. California State University, San Francisco

M.S. University of California,
San Francisco Medical Center

Ed. D. University of Massachusetts

Directed by: Dr. Thomas Hutchinson

The primary purpose of this study was to investigate nursing educator's attitudes towards computers. Attention was focused on identifying whether positive or negative attitudes predominated, and if a correlation exists between attitudes and behaviors. In addition, an experimental design examined the relationship between attitude change and an inservice program designed to increase nurse educators' knowledge and improve their attitudes towards computer use.

Three null hypotheses were tested for statistical significance to 1) identify the percentage of nursing educators holding positive or negative attitudes towards computers, 2) identify if a relationship exists between nursing educators' attitudes and computer use behaviors, and 3) determine if participation in an inservice education program designed to increase knowledge, and promote positive attitudes towards computers was effective.

Attitudes towards computers and self-reported computer use behaviors were collected by mailed questionnaires to a randomly selected population of undergraduate baccalaureate nursing educators. Data on the inservice program's effectiveness came from one selected school by using an experimental and control group design. The instruments used were a/an Attitude Scale, Demographic Data Form, Current Use Instrument, and a Needs Assessment Questionnaire. Statistical analysis on existing attitudes, current use behaviors, and on inservice attitude changes were done.

The evidence points to the idea that a majority of nursing educators possess positive attitudes towards computers. A slightly positive, but non-significant, correlation exists between attitude scores and self-reported computer use behaviors. Attitudes towards computers were positive initially and did not show a change after nursing educators participated in an inservice program.

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INTRODUCTION

Statement of the Problem

Computers are impacting our society. The health care system and institutions of higher education are rapidly becoming computerized. Proliferation in the use of computers in hospitals, universities and colleges is putting pressure upon educators in the health professions to become computer literate. Nursing educators are one group of health professionals currently being impacted.

Health care administrators are beginning to expect that graduating nurses will be comfortable using computers for patient care. Institutions of higher education want educators who are able to successfully use computers. Currently, few nursing educators are computer literate and herein lies a problem for nursing education.

One significant factor reported as explaining why so few nursing educators are computer literate relates to their supposed negative attitudes toward computers (Grobe, 1984b; Merrow, 1985; Huckaby, Anderson, Holm, & Lee, 1979; Murphy, 1984; Ronald, 1982). This negativity is postulated as preventing nursing educators from becoming computer literate. The assumption in this postulate appears to be

that a positive attitude towards computers results in an increased chance for computer literate behaviors to develop.

Attitude refers to a feeling which is evaluative in nature (Fishbein & Ajzen, 1975, p. 11). In the first part of this study the attitudes of nursing educators towards computers are being investigated. The attitudes will be identified as either positive or negative in nature. Attitudes are learned, and as such, are based on one's knowledge about the object, person, or event. It is postulated that nursing educators have developed negative attitudes towards computers because of minimal exposure in the use of computers in nursing education. An exploration of nursing educator's attitudes towards computers and ways to help them develop more positive attitudes will be useful information for the future of nursing education. "Teacher's acceptance is the greatest challenge to the use of computers in education" (Ackerman, 1982, p. 59).

Computerization of the health care system is one force pressuring nursing educators to become computer literate. Future nurses will be expected to use computers comfortably. "All nurses should have a generalized knowledge about the computer and data processing" (Ronald, 1979, p.5). Some of the current uses of computers includes patient monitoring, planning and recording care, and interdepartmental communications (Grobe, 1984a, p. 89). Patient monitoring has

become increasingly complex. Originally, computers were used to store and report data. Now health care providers enter data which the computer is programmed to organize into a system which will alert health care providers to problems, and at times suggest treatment modalities. Planning and documentation via computers provides an organized method for recording nursing care. The following is a list of available applications for computers in clinical nursing:

1. Planning nursing care and updating nursing care plans:
2. Entering nursing documentation:
3. Charting of other occurrences (medication, treatment, etc.):
4. Requisitioning supplies and communicating with other hospital departments:
5. Scheduling surgery, medicating patients, admitting patients for special procedures: and,
6. Processing room reservations and routine admissions and discharges (Grobe, 1984a, p. 92)

Interdepartmental communications by nurses promotes quick exchange of information between them and other health care providers. Computer use by nurses will minimize clerical error, improve speed, adequacy and accuracy of information,

free up professional nursing time, and improve the quality of patient care (Grobe, 1984a). Thus, the use of computers in a health care system impacts all aspects of nursing care. Consequently, nurses need to learn how to become comfortable using computers.

Since computers are new tools in nursing, nurses are just beginning to define their role in relation to computers, Kathleen McCormick (1984) refers to the staff nurse as an information specialist:

> An information specialist will be a nurse who has a basic understanding of what a computer is and how it works. An information specialist will know how computers have been applied in nursing care, what kind of computers are used in hospitals and community health programs in the country today, and what kind of software exists. An information specialist will know how to search the literature using computer systems. An information specialist will use personal computers, laboratory microcomputers, or minicomputers to learn and to keep informed about computer applications (p. 4).

Thus, staff nurses have a new body of knowledge to learn, different from, but compatible with nursing. The two places where nurses can be taught computer skills in relation to nursing care are: hospitals and schools of nursing.

Currently, many hospitals are allocating resources to train staff nurses to become computer comfortable. McCormick (1983) predicts that by the 1990's

> Hospitals will no longer be able to afford the costs of teaching nurses for these technologies. For instance, if a nursing department maintains a turnover rate near 20 percent, and if orienting

> new nursing personnel to computer literacy continues to take 20 to 40 hours to teach, it will cost a hospital an additional $20,000 per month to keep a 500 member nursing staff capable of documenting nursing practice (p. 381).

As a result, hospitals will look for graduates who are being trained in computer use in their schools of nursing. Computer literate graduates will be "more attractive to employers" (Nelson & Carlstrom, 1985, p. 86). Thus, the indications are that undergraduate nursing programs will need to prepare nurses for their new responsibilities to interface with computers (McCormick, 1983; Nelson & Carlstrom, 1985). This indication leads to the logical conclusion that nursing educators teaching and planning such programs will themselves need to become computer literate.

Other powerful forces, pushing nursing educators towards computer literacy are the colleges and universities housing the nursing programs. These institutions are computerizing for teaching and administrative purposes. This computerization process is occurring rapidly because of the decreased cost in purchasing computer systems and increased understandability of instructions when using microcomputers. "User friendly" microcomputers are programmed so that the user does not need to learn a programming language for their operation. Consequently, colleges and universities are encouraging their faculties to become computer literate. Computers are seen as beneficial in

higher education, and reports from nursing researchers documents the computer's effectiveness in nursing education (Ahern, 1982; Grobe, 1984; Huckaby, Anderson, Holm & Lee, 1979; Mirin, 1981).

Nursing educators currently using computers are finding multiple benefits. Susan Grobe (1984) categorizes current educational use into four areas: "Instruction by computers, instruction about computers, use of computers by learners and faculty to complete instructional tasks, and for research" (p. 115). Knowledge about each of these four activities opens new potentials for educators. However, the ability to use computers in each area requires that educators become computer literate. The four categories will be discussed briefly to show the potential benefits and the subsequent need for the nursing educator to develop computer literacy skills.

Category one, instruction by computers, is labeled computer assisted instruction (CAI). CAI learning occurs when students learn with computer support (Brose, 1984, p. 532). Meadows (1977) sub-divides CAI into different levels of learning ranging from simple to complex tasks. Table 1 demonstrates her seven subdivisions. According to complexity, these levels are labeled: page turner, drill and practice, tutorial, discovery, dialogue, simulation, and exam.

The definitions, advantages and disadvantages of each level are presented in Table 1. In addition, the nursing literature reports that nursing educators are responsible to develop, use, and evaluate CAI software in terms of content, technical adequacy, and student interactions (Grobe, 1984a; Skiba, 1985).

Category two, instruction about computers, is seen as a process where student nurses learn to become computer comfortable, or "information specialists" according to McCormick (1984). Nursing programs vary as to how instruction about computers is integrated into their curriculums. Some programs integrate content and hands-on experiences into existing courses (Bitzer & Bitzer, 1983; Ronald, 1979; Ronald, 1983b). Other programs develop courses as an elective or required component of the curriculum. Overall, the general objectives of this category are to familiarize students with the impact and use of computers on nursing care, and to provide hands-on experiences. Variations occur in the teaching method and specific curriculum objectives; however, agreement exists in the view that "Educators must include computer literacy as required content in baccalaureate nursing programs" (Fields, 1983, p. 223). Educators are responsible for developing curricula in order to graduate computer comfortable students.

Table 1: SUMMARY OF COMPUTER TEACHING STRATEGIES

↓ System Capacity ↓ Involvement Interaction of Student Control ↑ System capacity ↑ Involvement Interaction of Student Control

←SIMPLE COMPLEX→

Teaching Strategy	Page Turner	Drill & Practice	Tutorial	Discovery	Dialogue	Simulation	Exam
Definition	Screen or printout used like a book to display information in textual or graphic form.	Traditional format where student works through questions involving previously learned materials.	Student is presented information and given problems and/or questions.	Student presented instruction & questions and is guided to form own conclusion.	Allows free communication with student; student interacts with program in his unique way.	Uses graphic capability & advanced programming techniques to construct a model of a "real life" situation.	Tests student's knowledge & presents information contingent upon the incorrect answers.
Advantages	Immediate information, distribution, updating of files, display of tables. Good adjunct use of CAI.	Easy to program; compact instructional lessons. Presents problems and questions while testing mastery.	Variety of effective ways to present material, immediate feedback to student branching for remediation.	Student is led to the salient points quickly by his response indicating knowledge of material. Best method for this.	Student guides the process of his own learning and is not confined by the linear format.	Provides every student with a "hands on" controlled laboratory experience. Student forced to understand applied content.	Teaches for mastery; student is given only information he doesn't demonstrate.
Disadvantages	Poor, ineffective essential use of CAI.	Limited student control: lower level learning outcomes.	Student dependent upon lesson.	Danger of frustrating students by causing student to go more steps than necessary. Writing lean is caveat.	Anticipation of all possible student responses very difficult. Testing stage therefore most important; time consuming.	High quality simulations are difficult and time consuming although more widely used than other type programs.	Cannot he used reliably for testing; students forced through info they already know, may diminish positive attitudes.
Uses	Good use as adjunct in hospital info systems as well as educational systems for reaching people on system.	Very exciting to use with gaming. Useful for rote or for simple learning outcomes.	Useful format for many types of instruction. Large variety of types of data transmitted.	Useful for many types of instruction, e.g. higher levels of learning concept recognition, theory, analysis, synthesis.	Used in combination with other strategies to allow freedom from interaction.	Provides quality simulated clin. exper; tests decision making based on knowledge; allows freedom to experiment with safety.	Useful for demonstrating experiential learning, immediated reinforcement through correct answers.

Note: From "Nursing education in crisis, a computer alternative" by L.S. Meadows, Journal of Nursing Education., 16:5, May, 1977

Category three, use of computers by learners and faculty to complete instructional tasks, refers to managerial activities. Examples of this category include the following: record keeping, examinations, grading, word processing, scheduling clinical rotations, tracking learning experiences, biographical files, course schedules, and test construction (Grobe, 1984a; Konikow, 1984). This category includes computer managed instruction (CMI). With CMI, students participate in managing their own learning. The computer is programmed to provide "learning resources and self-testing" (Day & Payne, 1984, p. 236). Students are instructed to use these programs and tests to identify individual learning needs. Thus the student benefits by having available individual feedback, and through assuming some responsibility for their learning. The educator's responsibility is to provide needed information so that the computer can be programmed properly. This process assumes that nursing educators understand how computers can be used to provide computer managed instruction.

Category four, research, refers to data collection and statistical analysis of these data. This aspect of computer usage tends to be most familiar to nursing educators because of graduate requirements needed to obtain a master's degree in nursing. (A master's degree is a minimal requirement to teach in N.L.N. approved baccalaureate nursing programs.)

Graduate nursing programs use computers to teach the statistical component of the research process. Most nursing educators have a basic understanding of computer usage for research. However, most educators need an update of the various ways computers can be useful for research beyond statistical analysis.

These four categories identify how computers can be used for instructional purposes in nursing education. These uses point out how important it is to be aware of the need for nursing educators to become computer literate in order for them to function within the parameters of each category. Knowledge of the computer opens up new benefits for nursing educators in context of teaching, managerial skills and research. The benefits are documented; yet few nursing educators have gone extensively beyond their masters degree skills. At this time, only a few nursing degree programs provide for computer literacy of its students (Ronald, 1979). "Computer technology is here to stay and nursing educators must lead the way in familiarizing the profession with its applications" (Hassett, 1984, p. 34). Nursing educators need to become computer literate to train future nurses and to maximize their teaching capabilities.

In two national surveys, nurses indicated that computer literacy is important for nurses to obtain (Heller, Romano, Damrosch & Parks 1985; Ronald, 1979). In a 1984 survey the

deans/directors of National League for Nursing accredited nursing schools were questioned about their faculty's computer literacy skills. "Faculty lack of interest or skills was perceived by the deans and directors to be a serious block to computing in nursing education. Only 44 (28%) deans and directors reported having any faculty with expert computing skills, the range was from 1 to 30 percent of the faculty in these programs" (Thomas, 1985, p. 176).

Historically, health professionals have been reluctant to accept new technologies. "The microscope took 169 years to be integrated, the stethoscope took 103 years, and the electrocardiagram (EKG) took 15 years" (Ball, 1985, p. N-6). Thus, from a historical perspective it comes as no surprise that the use of computers is slow to be accepted in the health care system. Nurses and nursing students may have more negative attitudes towards computers than other health care professionals (Startsman & Robinson, 1972; Melhorn, Legler, & Clark, 1979; Reznikoff, Holland, Stroebel, 1967). Thus, some nurses are saying they need to become computer literate, yet many maintain negative attitudes toward such education.

Nursing educators are no exception to the nursing profession's dichotomy between verbal affirmation of the value of computers and reluctance to take computer training. Judith Ronald (1983a) in a descriptive study on attitudes of

nursing educators with respect to computers reported, "Nursing educators had positive attitudes towards computers. They were most positive with respect to the computers efficiency and importance in society and least positive in relation to their willingness to use and accept the use of computers" (p. 523). Cheryl Merrow's (1984) study on nursing personnel and educators found similar results, "Nursing educators had more people who were rated neutral in feelings than did nursing service personnel. Nursing service personnel tended to have either positive or negative attitudes" (p. 91). Nursing educators have exhibited negative or neutral attitudes when questioned about computer usage. "Computers will not be used productively in education unless teachers have positive attitudes toward them and believe computers to be viable instructional tools" (Stevens, 1980, p. 230).

Multiple reasons have been postulated as to the causes for nursing educators to have negative attitudes. Six specific reasons are commonly cited as to why nursing educators may have such feelings. They are as follows: computer anxiety, lack of computer expertise, fear of role change/loss, lack of a contractually recognized reward system for computer activities, questioning the value of CAI, and the cost of software and hardware. These are the six reasons most often postulated as explanations for

nursing educator's negative attitudes toward computers.

It is not the purpose of this present study to validate or discredit the six variables identified in the literature. This study is conducted with the idea that these six variables may be significant determinants of negative attitudes towards computers. The assumption in this study is that if negative attitudes exist they do so because of minimal exposure to computer use in nursing education. Several investigations have documented that the amount of time spent learning about computers and using computers correlates with positive and negative attitudes (Ball, Snelbecker, & Schechter, 1985; Bitzer & Bitzer, 1973; Hardin & Skiba, 1982; Klonoff & Clark , 1975; Merrow, 1984; Ronald, 1982; Rosenberg, Reznikoff, Stroebel & Ericson, 1967). This study is focused on three areas. First, data on existing attitudes are gathered; and second, data on attitudes and self-reported current computer use are analyzed for their correlation with each other. Third, nursing educator's attitude changes are explored, after participation in an inservice education program designed to expose nursing educators to computer uses in nursing education.

In summary, nurses nationally agree that they need to know how to use the computer. Health care systems and schools of higher education are rapidly becoming computerized. Both institutions are demanding that nursing educa-

tors become computer literate. However, few nursing educators demonstrate computer literate behaviors in nursing education. It has been postulated that nursing educators possess negative attitudes towards computers. These attitudes may be a significant variable, explaining why nursing educators are computer illiterate. Consequently, nursing educator's attitudes towards computers need to be investigated. Then attitudes can then be correlated to self-reported computer use behaviors. Understanding attitudes and the attitude-behavior relationship is one way to promote computer literacy among nursing educators.

Purpose of the Study

The purposes of the study are to 1) identify the percentage of nursing educators holding positive and negative attitudes towards computers, 2) identify the relationship between nursing educator's attitudes towards computer use and their computer use behaviors, and 3) determine if an inservice education program designed to meet nursing educators self-identified learning needs will foster positive attitudes towards computer use. First, the researcher will identify the proportions of nursing educators with positive and negative attitudes towards computers. Then, the correlation between nursing educator's attitudes and their current computer use behavior will be studied. Finally, the association between an inservice educa-

tion program and attitudes towards computers will be analyzed.

Specifically the study will test the following three null hypotheses:

I. The distribution of nursing educators with a positive attitude towards computers is greater than or equal to 50 percent.

II. No correlation exists between nursing educators scores on an "Attitude Scale" and their scores on a "Current Use Instrument".

III. A specific inservice education program designed to meet educators self-identified learning needs for becoming computer literate will not cause a greater percentage of nursing educators to have a positive attitude towards computers.

Meaning of Terms

The following definitions of key terms used throughout the study are provided.

Attitude: ". . . a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to any given object" (Fishbein & Ajzen, 1975, p. 6). In this investigation the favorable and unfavorable manners relate to positive and negative feelings which nursing educators have towards computers. The learned predisposition refers to the degree of exposure to computers which nursing

educators have experienced.

Computers: These are electronic machines which collect information, store, and process information following a step-by-step set of instructions, and deliver such information back to us in the form we wish. Either the personal computer, or mainframe system may be used since these types of computer are used for teaching and management. (Ahern, 1982: Grobe, 1984).

Nursing Educators: These educators are registered nurses who are employed full or part time in a Baccalaureate Nursing Programs that are voluntarily accredited by the National League for Nursing (NLN). When undergraduate and graduate curriculum exists within the same program, the primary responsibilities of nursing educators sampled will be on the undergraduate level and on teaching (not administration).

Computer-literacy: ". . . can be defined as an understanding of computer capabilities (how the computer works); computer applications (how computers can be used and their relative advantages/disadvantages) and the knowledge of algorithyum design (an introduction to the notion of algorithms and their representation in flow charts)" (Skiba, 1983, p. 8). Computer literacy behaviors of nursing educators may be seen by participation in the following activities: test scoring and analysis, research and statistics,

clinical practice, curriculum planning, CAI, CMI, word processing, and designing and evaluating software. The home use of computers for personal business and games may also be reflective behavior of the educator's computer literacy abilities. The existance of a positive attitude towards computers is identified as a desirable prerequisite toward computer literate behaviors. The logic being as follows: if a nursing educator has a positive attitude towards computers then willingness to learn about and use computers will be enhanced. When a negative attitude exists, the educator is less likely to engage in activities involving computer use.

Inservice-Education Program: These are presentations of instructional material at one's place of employment. In this study the goal of the inservice is for nursing educators to increase their knowledge about computers and to develop positive attitudes towards using computers. An inservice program on computer uses in nursing education was designed with the content based on the nursing educators self-identified learning needs, and an adult learning model of instruction.

Significance of the Study

The present study will have significant value to future patients, the health care system, as well as nursing educators. If the findings of this study demonstrate that

negative attitudes towards computers exist among nursing educators, and demonstrate some method which decreases this negativity, then ways to help nursing educators become computer literate can be provided. Once nursing educators as a group have become computer literate, then future nurses can be trained in school to use computers knowledgeably, and provide input into how computers can potentiate quality nursing care.

Future patients would be the group directly benefited by computer literate nurses. Computer usage could enable nurses to remain knowledgeable about the latest treatments, provide and synthesize data on patients, and efficiently communicate with a vast network of providers. These nurses would also be able to input ways in which computers could be used to benefit their patients. The quality of patient care would improve as a result of the ability of the computer to provide and process information, as well as interact with other computer systems.

The health care system benefits by being able to hire computer-comfortable nurses. The money and resources currently needed for inservice education could be used for other identified needs. This would be an enormous financial savings for today's financially strapped health care systems. In addition, computer literate nursing educators with students in health care agencies could positively influence the system's use of computers.

As nurses collectively become computer literate the profession could develop in accord with other disciplines. Computer literacy is a societal force affecting nurses (Nelson & Carlstrom, 1985). Nurses need to keep up with this force and become pacemakers into how computers can be useful for nurses. "To ignore the computer revolution in health care is to decide not to be a meaningful part of it. If this is the choice that nurses make, they may find themselves stripped of their traditional prerogatives within their domain of expertise" (McAlister & Covvey, 1983, p. 22) Computer-literate nurses can make conscious choices for nursing; computer-illiterate nurses leave the door open for others to make the decisions.

This last statement is also true for nursing educators and nursing education. Nursing educators need to knowledgeably decide how computers can best enhance the educational process. Students and educators could both benefit by nursing educators choosing to use computer assisted and computer managed instructions (CAI and CMI).

Students using computers learn how to interact with such machines and how to develop more responsibility for their learning. Exposure to computers is one way to provide experiences to develop graduates who are comfortable with computers. Students using CMI also develop more responsibility for their own learning. Jane Meadows (1977)

refers to this responsibility as the conative domain of learning. She sees this as a crucial, yet neglected, component of the educational process. Conative learning occurs when students assume personal responsibility for their learning needs. This process is important to assimilate as students develop professional responsibility for their actions.

The advantage for nursing educators is found in the opportunity to participate in the development of computer usage in nursing education. Many options for the use and development of CAI and CMI exist. Today's computer literate nursing educators have the opportunity to participate in determining how computers can be used in the future. This unique chance to participate in decision-making exists because computer usage in nursing at present is in the infancy stage of development. It behooves nursing educators to become computer literate to help determine how the computer will be used for nursing and nursing education. If nursing educators as a group have negative attitudes towards computers, then computers to benefit nursing education may be thwarted or even planned by non-nurse educators. This study can indicate ways in which nursing educators can be helped to develop positive attitudes towards computers via inservice education programs.

Furthermore, this study suggests important topics for

further research. For instance, this study may show the need for nursing educators in graduate programs to re-examine their curricula. If developing computer literacy is learned in graduate schools, then the inservice education plan can be a temporary solution. Undergraduate programs also need to determine how their curricula foster computer comfortable nurses. Students' attitudes, as well as nursing educators' attitudes, may need to be analyzed when computer literacy is being developed.

This study is one way to address the need for the nursing profession to become computer literate. The education of the educators is of primary importance. "Teacher acceptance is the greatest challenge to increased use of technology in education" (Ackerman, 1982, p. 59). This study may indicate ways by which nursing educators can develop positive attitudes towards computers, a significant step in the process of becoming computer literate.

Approach to the Study

This study is both descriptive and experimental in design. Descriptively, nursing educator's attitudes towards computers and a correlation of these attitudes to self-reported current use behaviors are investigated. The randomly selected sample are drawn from a pool of fourteen N.L.N. accredited Baccalaureate nursing programs in Massachusetts. The experimental design investigates

attitude changes in relation to completing an inservice education program designed to increase nursing educators knowledge about computer use in nursing education. Nursing educators at an N.L.N. accredited Baccalaureate nursing program in Massachusettsare were randomly divided into two groups.

Delimitations

Attitude towards computers is a difficult concept to study. Since attitude is a feeling, the definitions vary and accurate measurements of attitude are difficult. In this study, nursing educators' attitudes towards computers were measured by a paper and pencil response scale. Although this method to evaluate an attitude is an accepted and often used method for research; such scales are challangeable. The scale used in this study has been tested for validity and reliability in two earlier studies. Both studies found the attitude scale suitably reliable and valid for the intended purposes. Therefore it is assumed that the attitude scale is an accurate reflection of nursing educators attitudes towards computers.

Quantity and not quality of information is being gathered in relation to knowledge and use. Thus data on the quality of the knowledge which currently exists among nursing educators is not being gathered, i.e. Comprehension as opposed to introductory understanding is not directly questioned. Data on the number of hours of current computer

use will be identified, but the quality of these hours will not be addressed.

Another delimitation exists with the Current Use Instrument used to measure computer literate behaviors of nursing educators in that this scale has not been previously tested for validity and reliability. The literature review by the author indicates that most significant teaching behaviors and related outside activities are included in the ten content areas. However, it is acknowledged that inadvertently a content area may have been omitted from the scale. The instrument will be tested for validity and reliability during the course of this study.

Ideally, a random selection of control and experimental group membership would have been taken from all acceptable nursing programs in Massachusetts. This is not feasible due to the complexities of implementing such an extensive inservice education program. Thus, one nursing school was selected to test the inservice attitude correlation. This school is selected because of the large number of nursing faculty available, and the ability of the researcher to encourage nursing faculty at this program to commit their time to attending the inservice education program.

Another delimitation exists in the parameters of the sample. The elimination of non-accredited NLN programs is one way to ensure quality control on the nursing educators' educational background and current expertise. Omission of

Diploma and Associate Nursing programs was done due to the variations in the educational background of nursing educators at these programs. A Bachelors degree in Nursing is an acceptable educational level for educators teaching in in Diploma and Associate Programs, as opposed to a Masters in Nursing degree needed for Baccalaureate programs. In addition the NLN looks at nursing educators continued self-development. Lastly, graduate level nursing educators are excluded because they potentially have a greater amount of contact time with computers than undergraduate faculty due to their educational background. (A Doctorate Degree is required for teaching graduate students and generally means that the educator has had more exposure to computers while obtaining this terminal degree). Due to their different exposure to computer graduate and undergraduate faculty are viewed as two different populations.

Studying attitudes, computer literate behaviors and using samples of small populations all present delimitations to this study. It is hoped that the critical selection of instruments; random sampling and attention to design will allow for a meaningful study producing meaningful information for nursing educators.

C H A P T E R II

REVIEW OF THE LITERATURE

This chapter provides a theoretical foundation for the present investigation. It is divided into three parts; the purpose of the first section is to explore nursing educators' attitudes towards computers, this section begins with a discussion of the concept attitude; the second section presents a definition of what it means to be a computer literate nursing educator; in the third and final section, attention is given to educational programs which have been used to promote positive attitudes and establish computer literacy. This discussion includes a presentation of adult learning theory as a conceptual basis since the nursing educator participating in an inservice program is an adult learner.

Nursing Educators' Attitudes Towards Computers

In this day and age it is desirable for nursing educators to use computers for teaching and management purposes. Positive attitudes towards computers enhances nursing educators' willingness to use computers; thus, understanding the concept "attitude" and ways to promote positive attitudes is one way to attempt to promote computer literacy among nursing educators.

Attitude Defined

Attitude as a concept, is difficult to define because

it is a human emotion. For the purpose of this study the work of Fishbein and Ajzen (1975) on attitudes, behavior, and change is used. Their attitude theory is based on their research and on an extensive analysis of other attitude theorists.

Fishbein and Ajzen define attitude as "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (1975, p. 6). This definition has three significant components which are: (a) attitudes are learned, (b) attitudes predispose action, and (c) actions are consistently favorable or unfavorable towards an object. Fishbein and Ajzen further divide an attitude into four major characteristics, which are: (a) affect, (b) cognition, (c) conation, and (d) behavior. "Affect refers to a person's feelings toward and evaluation of some object, person, issue or event. Cognition denotes his knowledge, opinions, beliefs and thoughts about the object and conation refers to his behavioral intentions" (Fishbein & Ajzen, 1975, p.12). Behaviors, the fourth characteristic refers to one's actions in relation to the object.

Cognition develops through a person's past and present life experiences. As one gains information about an object, various opinions, beliefs and thoughts arise. The type of experience by which knowledge is gained is significant in

relation to belief strength. Fishbein and Ajzen classify the type of learning experience into descriptive and inferential categories. Descriptive learning is based on one's five senses, and thus one rarely questions these first hand beliefs. Inferential beliefs go beyond direct experiences and may be formed based on prior descriptive beliefs and indirect experiences. An example of indirect experiences may be knowledge gained through reading or listening to another person.

As cognition develops the individual begins to label objects as having specific attributes; "the associated attribute may be any object, trait, property, quality, characteristic, outcome or event." (Fishbein & Ajzen, 1975, p. 12). This object-attribute link is called a belief. An individual may hold several beliefs about a given object. However "it appears that only a small number of beliefs serve as determinants of his attitude at any given moment" (Fishbein & Ajzen, 1975, p. 218). Five to nine significant beliefs about an object form an individual's attitude. These significant beliefs are called "salient beliefs".

Salient beliefs place parameters on how one thinks about the object. What then happens is that an evaluation of the object occurs. This evaluation results in a valuing of the object in the context of a good/bad paradigm. This bipolar evaluation and labeling of an object produces an

affective response. This response stabilizes over time and becomes a consistent emotion. The individual now is said to have a consistent affective feeling about the object.

The bipolar labeling by individuals is why bipolar scales can be used to measure attitudes. "Most attitude-scaling procedures arrive at an attitude score on the basis of a person's responses to a set of such opinion items . . . these items are statements of belief or intention and the person's response indicates his location along a probability dimension, i.e. it is a measure of the strength of his belief or intention" (Fishbein & Ajzen, 1975, p. 61). Likert scales are one example of frequently used bipolar measurements of attitudes.

Once beliefs and attitudes are formulated intentions develop. Intention is "a person's subjective probability that he will perform some behavior" (Fishbein & Ajzen, 1975, p. 288). Understanding intentions is important because some attitude studies presume that identification of an existing attitude is predictive of specific overt behaviors. This type of attitude to behavior causal relationship is inaccurate because of conation.

The intent of predisposition to behave in a specific manner is labeled conation. Conation is determined by two intentional factors: "his attitude toward the behavior and his subjective norm concerning that behavior" (Fishbein &

Ajzen, 1975, p. 289). The attitude towards the behavior is the individual's perceived consequences of the behavior, and the evaluation of those consequences (Fishbein & Ajzen, 1975, p. 301). Social norms refers to the person's beliefs about what others expect or want to happen. The individual's motivation to comply with societal norms, and perceived personal consequences shapes overt behavior (Fishbein & Ajzen, 1975, p. 332). Thus one's overt behavior may be different from what one would anticipate based only on evaluating existing attitudes. When attitudes and other influences are stable, then it is likely that that overt actions will be consistent with attitudes. However, conation prevents a causal or predictive relationship between attitudes and behaviors.

Summarizing this section on attitudes begins with the idea that attitudes are learned. As object-attribute links develop, significant beliefs become salient. Salient beliefs result in a bipolar evaluation of the object. The resulting feelings then become consistent and predispose behaviors. The behavior exhibited depends upon the evaluative process, feelings and environmental norms. If all variables remain consistent the person's behaviors are consistently favorable or unfavorable.

Principles of Attitude Change

Developing different overt behaviors towards an object

may be indicated for a variety of reasons. One method for promoting a behavior change is to change attitudes since attitudes are thought to predispose action. This attitude change is done with the hope but not the expectation of creating a specific behavioral change.

Attitudes may be modified by "changing influential salient beliefs, introducing new salient beliefs, and by changing the evaluation of an attribute so that the favorable-unfavorable outcome shifts from one pole to the other" (Fishbein & Ajzen, 1975, p.396). Each of these modifications presents difficulties. "One of the fundamental problems in any influence attempt, therefore, is the identification of those beliefs that need to be changed in order to influence the dependent variable under investigation" (Fishbein & Ajzen, 1975, p. 389). Another equally difficult process is to change how a person believes about an attribute, i.e. is the attribute itself seen in a positive or negative context. "The main point is that, in the final analysis, attitude change involves changing a person's beliefs, whether they are beliefs about the object or beliefs about its attributes" (Fishbein & Ajzen , 1975, p.398).

Active participation and persuasive communication are methods used to change beliefs, with participation the

individual personally observes that an object has a given attribute, i.e. direct knowledge. Persuasive communication relates to being told by an outside source that the object has the attribute, i.e. implied learning. Each of these processes are useful ways to influence significant beliefs, help people to learn new beliefs and change the individuals evaluation of an attribute.

Nursing Educators' Attitudes

Few studies are reported focusing on nursing educators' attitudes towards computers. Health professionals in hospitals and student nurses in schools are the two closely related groups who are frequently investigated. The postulation about nursing educators' attitudes are drawn from the two studies focusing on nursing educators and investigations of nurses and student nurses.

In 1967, Reznikoff, Holland and Stroebel conducted one of the earliest studies on hospital personnel. They investigated attitudes towards computers among employees of a psychiatric hospital. They intended to "obtain more objective and comprehensive information on existing attitudes towards computers among the hospital personnel and to evaluate these attitudes in terms of possible contributing background variables" (p. 420). A 35 item questionnaire given to employees showed:

> The professional and medical staffs were significantly more favorable in their attitudes than were the other employees; clerical; housekeeping; and maintenance personnel were in an intermediate position; and the nursing group was the most negative . . . . it was found that the student nurses constituted the group that was most consistently less positive than the other group. Staff nurses, as a whole, did not differ significantly in their attitudes from any of the other occupational groups (p. 420).

When analyzing these data Reznikoff, Holland and Stroebel (1967) found that formal education is the one variable which contributes to group differences. These researchers postulated that the student nurses found the computer to be dehumanizing, which is a perceived incongruent dichotomy to their newly developing professional role.

A follow up study, using a quasi-experimental design, investigated the attitudes of student nurses (Rosenberg, Reznikoff, Stroebel and Ericson, 1967). They used a two group, pre- and post-test format. The control group of student nurses, during their psychiatric affiliation, had no exposure to computers. The experimental group were exposed to computers in the context of their psychiatric clinical rotation. No initial statistically significant differences existed; however, the post tests show that the experimental group had statistically significant changes ($p = .001$) in the direction of more positive attitudes towards computers. Another follow-up at the same institute also documented that

training was a significant variable in relation to attitude (Friel, Reznikoff, Rosenberg, 1969).

Startsman and Robinson (1972) conducted an attitude study on medical and paramedical personnel in a general hospital. A total of 338 personnel at a 500 bed university medical center participated. This group included; "84 medical students, 69 nursing students (diploma school), 44 house officers (residents and interns), 42 faculty members, 39 registered nurses, 37 ancillary personnel . . . and 23 medical record librarian students" (p. 22). In the conduct of their study they developed a highly reliable Likert-type attitude questionnaire.

This scale originally consisted of 20 questions. focusing on beliefs about computers. Startsman and Robinson felt the total score was inadequate to yield a comprehensive description of attitudes towards computers; consequently, they did a factor analysis and ended up with four factors utilizing 16 of the original twenty questions.

The four factors are as follows:

> Factor I. This dimension represents a general evaluation of computers, that is , whether or not they are good, efficient, necessary and so forth . . .
> Factor II. The majority of these statements deal with a willingness to use or accept the use of computers . . .
> Factor III. The statements representing this factor are all concerned with the potential threat of computers to employment . . .

> Factor IV. The two statements on this factor both suggest the possible benefit of the application of computers to the problem of hospitals (Startsman and Robinson, 1972 pp. 224-225).

The split half method for reliability resulted in a coefficient of .87 for all participants.

The results indicate that faculty members were the highest scorers, i.e. held most positive attitudes. The lowest scoring group consisted of staff nurses, nursing students and ancillary personnel. Due to the group difference in exposure to computers they postulated "that the difference in the attitudes of the two cluster groups can be attributed in part to familiarity with computers"(Startsman & Robinson, 1972, p.225).

Melhorn, Legler and Clark conducted a replication study in 1979. They used the four factor-16 question instrument and added items beyond the sixteen questions which were specific to their general hospital setting. A total of 180 personnel participated consisting of forty-four medical faculty members, thirty staff nurses, six student nurses, forty-one medical records librarians, and forty-seven ancillary personnel. Nurses and student nurses, as did all other groups, had "no statistically significant differences" (p.332) from the original study. In both studies the average mean score was 64% of the total possible score. In the factor analysis, staff nurses were neutral in their

evaluation of computers, negative in a desire to use or learn about computers, and felt most threatened in context of employment. Melhorn et al. found that "The none (no courses), one course (one course in computers), and some experience groups (some computer use) had lower total attitude scores than did the people with extensive (frequent computer use) and daily user (p.333). This again indicates that degree of contact with computers is maybe a significant variable in affecting attitudes.

Klonoff and Clark (1975) measured staff attitudes toward computerization and measured knowledge about computers. Their questionnaire was completed by twelve physicians, psychiatrists, and psychologists; twenty-seven nurses, social workers, and psychiatric assistants; and three health care administrators on a psychiatric unit of a general hospital. They intended to study "the effects of a structured course on staff knowledge and attitudes and to measure the attitudes of staff who were not directly involved in the computerized health informational system or in the structured course" (p. 823). Twenty-eight completed a questionnaire after attending a two and one-half day course on health information systems. Fourteen nurses and assistants who did not attend the course acted as a control group. There was a significant difference in scores between the two groups. "The greatest differences related to

dehumanization (t = 3.24, p .05), problems in the work environment, (t = 2.09, p .05) and lack of efficiency, (t = 2.61, p .02) . . . Job security (t = 2.05, p .05), and patient-doctor confidentiality (t = 2.21, p .05)" (p. 825). They concluded that involvement with and knowledge about computers were significant variables.

Thies (1975) investigated hospital personnel. He studied their attitudes and perceptions using a Thurston attitude scale. One hundred sixteen hospital personnel completed the instrument with twenty participating nurses. "Nurses were significantly more negative than technicians and physicians" (p.21). In a multivariant correlation and regression analysis they found that females, nurses, little work experience, rural hospital, and no prior computing contact are correlated with negative attitudes toward computer applications in health care.

Ball, Snelbecker and Schechter (1985) were interested in "Knowing nurses' views about the influence of computer technology on nursing and the nurses' roles . . . . The second purpose of this study was to determine the extent to which a 2 hour computer literacy presentation might influence nurse's self-reported perceptions concerning computer usage" (p.24). Nurses were given a pre- and post-questionnaire (N=205 pre-test and N=191 post-test). The findings indicated that nurses have favorable attitudes

and are "receptive to considering ways in which they might use computers" (p. 31). After attending the two hour inservice, improved attitudes were present in the inservice group.

Brodt and Strong (1986) also gathered data on nurse's attitudes towards computers. They first developed a suitably reliable and valid twenty item Likert-type scale (Strong and Brodt, 1985). Their purpose was to measure attitudes and evaluate these attitudes in the context of possible contributing variables. Of 185 nurses employed in a midwestern community hospital they found that "educational preparation, length of service in the nursing profession, and type of nursing unit statistically implied a difference in the nurses' attitudes towards computers. In this study the higher the level of education the more favorable the attitude towards computers" (p.85).

Judith Ronald (1982) studied the attitudes and learning needs of nursing educators with respect to computers. She mailed the Startsman-Robinson Attitude Scale nationally to nursing educators. The 159 respondents had a mean score of 43.69 on a scale of 0 - 64, which is slightly positive in relation to the group mean scores in the Startsman and Robinson (1972) and Melhorn et. al. (1975) studies. In context of the four factors she found the following:

> The nursing educators in this study had the most positive attitudes toward Factor I . . . with a mean of 3.23 . . . or standard deviation of .44. The least positive feelings toward computers were with respect to Factor II which related to willingness to use or accept the use of computers . . . . The standard deviation for this mean of 2.10 was .59. The means of factors III and IV were relatively close to each other 2.8 and 2.6 respectively, with a greater amount of variation indicated by standard deviation of .68 and .70 respectively. This supports the findings of both the Startsman-Robinson study and one by Mellhorn, Legler and Clark in which Factor I was the most positive and Factor II, the least (Ronald, 1982, p. 71).

Several independent variables showed no significant difference, however, in a crosstabulation she found that "24 percent of those with instruction had high positive scores as compared to 18.6 percent of those with no instruction" (p. 74). This finding supports the previous studies findings of a relationship between knowledge and attitude.

Merrow (1984) gathered data on nursing educators' attitudes towards computers as one component of her study. She developed her own asessment tools including a questionnaire and interviews. She found that "nursing educators had more people who were rated neutral in feelings than did nursing service personnel. Nursing service personnel tended to have either positive or negative attitudes" (p. 91). Thus Merrow's findings of neutral attitudes by nursing educators were not consistent with Ronald's findings of slightly positive attitude. Consistent

with the other studies she found a relationship between level of knowledge and attitude. "Everyone who was rated as having a negative attitude toward computer use in nursing practice had less then six hours of didactic computer instruction ($p = 0.0120$) (Merrow, 1984, p. 91.) indicating that no one with a negative attitude had more than six hours of exposure to computers.

It is interesting to note that most studies indicate that student nurses and nurses have negative attitudes when compared to other health professionals. Nursing educators, the focus of two studies, have been found to have neutral (Merrow, 1984) or slightly positive (Ronald, 1982) attitudes. Nursing educators are nurses so one may conclude that their attitudes would be negative. However, nursing educators, as a group, hold higher terminal degrees then hospital nurses. The degree may be important because there is a correlation between increased knowledge about computers and attitudes towards computers. (Ball, Snelbecker, & Schechter, 1985; Brodt & Strong, 1986; Friel, Rezinkoff & Rosenberg 196; Klonoff & Clark, 1975; Melhorn, Legler, & Clark, 1975; Merrow, 1985; Reznikoff, Holland & Stroebel, 1967; Rosenberg, Resnikoff, Stroebel & Ericson, 1967; Ronald, 1982; Startsman & Robinson, 1972; Strong & Brodt, 1985; Thomas, 1985; Thies, 1975). If one postulates that nursing educators learn more about computers within their

graduate programs then they probably would have positive attitudes. However, learning about computers is new to most graduate nursing programs, and many educators graduated in the pre-computer era. Thus, the indication would be that nursing educators have negative attitudes even in light of Ronald's findings.

In the context of Fishbein and Ajzen's attitude theory, it is not surprising to find that a correlation exists between knowledge about computers and attitudes towards computers. Salient beliefs are based upon life experiences (i.e. knowledge). If one is exposed to how computers can benefit professional practice, then it comes as no surprise that knowledge may be a significant independent variable. The knowledge gained about computers impacts one's belief system and ultimately one's attitudes. Thus, the more knowledge one has about computers, the more likely a positive attitude will result.

Multiple reasons have been postulated as to the causes for nursing educators to have negative attitudes. Six specific reasons are commonly cited as to why such feelings may exist. They are as follows: computer anxiety, lack of computer expertise, fear of role change/loss, lack of a contractually recognized reward system for computer activities, questioning the value of CAI, and concern about the cost of software and hardware. These six reasons are

presented in the context of the knowledge-attitude relationship.

Computer anxiety has been identified as a major problem by Brose (1984). She examines this anxiety from two perspectives. "The first is related to the degree to which a person has been intimidated by an actually negative experience with the computer while the second refers to the impact of perceiving computers as math machines" (p. 7). Most nursing educators were introduced to computers in graduate school in order to learn about research and statistics. Generally these experiences were negative, because computers were not user-friendly and students didn't have sufficient knowledge about programming languages. When the computer didn't respond to commands as anticipated, students were often at a loss. This type of experience often was frustrating, leaving a negative impression long after the event had passed.

A second cause of computer anxiety relates to math anxiety. If a nursing educator has math anxiety, then this fear of mathematics may transfer to the computer. The computer is viewed as a math machine. Computer anxiety may prevent movement towards computer literacy because of negative attitudes associated with math anxiety.

Computer expertise is postulated as another issue for educators (Thomas, 1985). Most educators were educated in

the pre-computer phase and thus did not learn about computers. Nursing educators strive to keep current as both clinicians and educators. Learning about computers is interpreted as a demand to learn a foreign body of knowledge in an already hectic schedule. Even if an educator wants to become computer literate this is difficult due to the lack of opportunities in terms of resources available (Thomas, 1985) and time available to learn how to operate the computer.

The lack of a recognized reward system may also contribute to a low attainment of computer literacy. Higher education rewards research, clinical competence, community services, and publications. Learning about computers, and developing software, are not a part of the contractual reward system for tenure and promotion. "The current reward system in nursing education is a serious deterrent to the growth of computers in nursing" (Thomas, 1985, p. 179). If computer literacy is a desired behavior then the reward system needs to be reinforcing of the change (Frantz, 1976).

Potential role change or fear of loosing one's job is another problem area (Frantz, 1976). Current literature indicates that some responsibilities will be modified and that faculty-to-student ratios may be lowered (Ackerman, 1982, Huckaby, et al, 1979; Meadows, 1977, Murphy, 1984). The ominous threat that the computer will take over one's

job is a reality in numerous industries throughout the country. People resist that which they perceive as a threat to their security. This change may be perceived as a threat. Thus, the computer takes on a menacing presence due to lack of knowledge about how the computer can function in nursing education.

The value of CAI as a learning media is also questioned by some educators. Current research indicates that CAI as a teaching method is at least as effective as more traditional formats. Change is often difficult and anxiety provoking. Changing from the known lecture-discussion format to a CAI mode may create problems for nursing educators.

Finally, the financial costs are considered as a negative influence on attitudes. Cost refers to both hardware and software purchases (Thomas, 1985). Presently, nursing faculty wishing to use computers end up purchasing systems with their own money. It is a rare educator who is employed in an environment where computers are readily available for office and home use. Home use availability is important because extended periods of time are needed to use/learn to use the computer efficiently. Often such time is unavailable at work, where meetings, classes, and students chop up the day's schedule. Consequently, nursing educators wishing to take full advantage of the computer

often end up purchasing their own hardware and software for home use.

These are the six reasons most often postulated as explanations for nursing educators' negative attitudes toward computers. It is not the purpose of this study to validate or discredit the six variables identified in the literature but rather to identify nursing educators' attitudes and to see if increased knowledge about computers influences their attitudes. Interestingly, four of the six areas are likely to be addressed when the nursing educator gains more knowledge about computer use in nursing education. These areas are computer anxiety, lack of expertise, fear of role change, and questioning the value of computer assisted instruction (CAI). These concerns could be resolved when salient beliefs are changed through increased knowledge. Indirectly, contractual rewards for developing CAI software and reimbursement for personal purchases may change as computers are used, and seen as valid, and necessary teaching tools.

In summary, this section on nursing educators' attitudes towards computers began with defining the concept, attitude. Then reports on related investigations and postulated reasons for negative attitudes were presented. Attitudes were seen as including affective, cognitive, conative and behavioral components. Although attitudes are

not expected to predict behavior, one can hopefully influence behavior by changing attitudes. Based on existing studies it may be concluded that nursing educators, as nurses, hold negative attitudes towards computers. A correlation exists between knowledge about computers and the existence of a positive attitude. As increased knowledge about computers is gained by nursing educators, it is hoped that positive attitudes would develop. Thus promoting positive attitudes toward computers by increasing knowledge could be a way for nursing educators to begin to use computers in nursing education.

Computer Literacy Defined

Fostering positive attitudes enhances the potential for acquiring computer literacy. This term, computer literacy, refers generically to roles, knowledge and skills. When defining computer literacy, the term must be related to the user group. The definition of computer literacy for a high school student will differ from that of a computer literate nursing educator. What the term means when applied to each user group must be clarified. Currently ambiguity exists as to what it means to be a computer literate nursing educator. This situation is an obstacle to promoting computer literacy (Carrier & Hambrecht, 1984; Loney, 1985).

It is difficult to define computer literacy for nursing educators because these educators are both nurses and

teachers. Thus, any definition of terms would pull from both fields merging the two into a specific definition. Literature exists defining computer literacy for educators, nurses and nursing educators.

Elliott and Peele (1975) are educators who developed a program to teach future teachers computer literacy in teacher education. They define the computer literate teacher as having the following skills and knowledge:

- knowledge of computers (what a computer is, how it works, etc.)
- knowledge of computing (information processing, algorithms, etc.)
- knowledge of applications (what computers can/can't do)
- exposure in computing usage (man-machine interaction)
- using computers in teaching (computer-assisted instruction, computer managed instruction)
- programming (how to control the computer)
- issues and implication of computer ubiquity (data banks vs privacy, artificial intelligence, etc.) (Elliott & Peele, 1975, p. 28).

This definition is based on the premise that educators should be in the forefront of teaching computer literacy.

Skiba (1983) reviewed the literature in search of a definition of computer literacy for nurses. She found that numerous definitions exist. However, many were specific to a particular institution rather than generic to other situations. Skiba found that "In general, computer literacy, can be defined as an understanding of computer

capabilities (how the computer works); computer applications (how computers can be used and their relative advantages/disadvantages) and the knowledge of algorithm design (an introduction to the notion of algorithms and their representation in flow charts)" (1983, p. 8). Skiba believes that understanding of computer applications and functioning is increasing in frequency among nurses. However, the degree of knowledge seems to be an issue. Two reports focus on level of expertise needed by nurses.

One report, an international study, investigated the learning needs of health care professionals (Anderson, Grémy & Pages, 1974). A questionnaire was mailed to physicians, nurses, allied health professionals and nursing administrators. Anderson et al, found that they could divide health professional educational needs into three levels. These levels relate to computer literacy roles. Level one, is a general knowledge of computers and data processing for all users in a health care system. Level two, focuses on health care personnel primarily responsible to cooperate with experts in data processing. Level three, is for health professionals spending the majority of their time in computing and data processing (1974). Nursing educators unquestionably need to meet level one criteria when preparing future nurses to function in a health care system.

The second report, by McCormick (1984), focuses specifically on nurses according to their terminal degrees. Her 'information specialist' role is consistent with Anderson's et al. level one skills. However, the higher level system specialist role focuses specifically on practitioners, administrators, researchers and educators.

The information specialist is the basic level for all nurses.

> An information specialist will be a nurse who has a basic understanding of what a computer is and how it works. An information specialist will know how computers have been applied in nursing, what kind of computers are in use in hospitals and community health programs in the country today, and what kind of software exist. An information specialist will know how to search the literature using computer systems. An information specialist will use personal computers, laboratory microcomputers, or minicomputers to learn and to keep informed about computer applications in nursing (McCormick, 1984, p. 4).

All nurses need to be information specialists.

System specialists refers to graduate level nurses "Specializing in practice, administration, research, and/or education" (1984, p. 4). Computer literacy is then defined in the context of the specialty area. Graduate trained nurses will need to evaluate the need for documentation within the healthcare system. In doing so they need to describe how nurses' needs could fit into a computer system, and evaluate how the system effects the quality of nursing care. Administrators need to know how to use the computer

for management of faculty, students, and data. They also need to be able to select which hardware and software is useful for them. Nursing researchers need computers for literature search, statistical analysis and editing. They also need to study the use of computer systems use in nursing. They need to evaluate the computer systems, determine the impact of the computers on nursing, to compare the use of mainframe computers to micro- and minicomputers, and to document the costs of computerization (McCormick, 1984, p. 30). Lastly McCormick defines the role of the computer literate nursing educator as the following:

> Preparing and producing user manuals and other training material for nurses in practice, and evaluating the use of computers for patient education. In effect, the educators of tomorrow need to be prepared as system specialists to evaluate the training needs of tomorrow's users, to determine the impact of computer assisted instruction or the quality of nursing content and to design content for computer assisted learning (McCormick, 1984, p. 30).

Since many nursing educators also participate in research and specialized practice they need to be able to use computers in various capacities.

Programming as a role of computer literate nursing educators is currently a controversial issue. McCormick (1984) implies this when stating that educators need to design the content of computer assisted learning. Elliott and Peele (1975) clearly state that programming skills is

part of the definition of the computer literate educator. Armstrong (1983) and Hoth (1985) both state that educators do not need to become programmers "not every faculty member has to become a computer programmer to maintain interest, to use, or even consider starting computer instruction in the classroom" (Armstrong, 1983, p. 558). Armstrong reports that it takes 80-200 hours for a nursing educator to develop one hour of CAI software. Since this time ratio is an unrealistic use of nursing educators time, it is proposed that programming skills not be a necessary component of the computer literacy definition. The majority of nursing educators need to become knowledgeable evaluators of software; only a small percent need to be involved in the development of software, i.e. to be programmers.

No one definition exists as to what computer literacy skills are needed for all nursing educators. They do need knowledge and skills necessary to function as both educators and information specialist nurses. They need to be able to use the computer for teaching purposes. This includes evaluating and selecting CAI. A small percentage of educators need to be able to develop, i.e. program software. Educators manage student's schedules, grades, advising; and, as such, computers can be used to enhance the organization of these roles. Additional computer uses may be needed when nursing educators function as graduate level practitioners

and researchers. In conclusion, the computer literate nursing educator needs the knowledge and skills to function as an information specialist, an educator and at times an advanced practitioner and researcher. The specific roles which each educator chooses will add to the definition of an educational system specialist.

Programs to Develop Computer Literacy

After nursing educators define computer literacy, the issue is to create programs to promote computer literacy. Reports in the literature document numerous programs to develop computer literacy for educators, nurses, student nurses and nursing educators. In these reports can be found the specific programs: for teacher training (Carrier & Lambrecht, 1984; Elliott & Peele, 1975; Stevens, 1981); undergraduate student nurses (Jenkinson, 1972; Kellogg & Garcia, 1985; Kirchoff & Holzemer, 1975; Newborn, 1982; Ronald, 1979, 1981), graduate level nursing students and nursing educators (Armstrong, 1983; Holzmer, Slichter, Slaughter, Stotts, Chambers & Schectz, 1984; Kadner, 1984; Ronald, 1983b), and staff nurses (Butters, Feeg, Harmon & Settle, 1982; Carlson, 1982; Cumber, 1981; Edmunds, 1982; Kaplan, 1981; Guttman & Doyle, 1981). Each program contains potentially useful information. However, replication of any one program in another situation is questionable due to environmental uniqueness. However, general theories and

information can be used when developing programs to increase knowledge level among nursing educators.

Harden and Skiba (1982) reviewed the nursing literature and found four types of programs that currently exist in nursing. They are; vendor education, inservice/staff development, university-based continuing education, and professionally based nursing education.

> Vendors play an initiator role in the promotion of computer literacy . . . . Vendor is focused on the short term goal-- "how to" use the equipment . . . . The inservice/staff development plays an instrumental, and perhaps the largest role . . . specific objectives . . . are to promote acceptance . . . and to insure all nurses can successfully operate their particular system . . . University-based continuing education programs play a supplemental role . . . . provide basic knowledge about computer technology which may be generalizable but it does not provide specific knowledge . . . . Professional nursing education potentially plays a fundamental role in computer literacy . . . . But, unfortunately, even though many nursing leaders have supported the possibility of offering computer literacy courses within professional educational curricular, this innovation has not been generally accepted by those in the field (Harden & Skiba, 1982, p. 527).

Each model has a place in the process of developing computer literate nurses and nursing educators. Baccalaureate education courses meet the long-term goal of socializing nurses into this component of their future role. Vendor and continuing education through inservice or university courses are best able to meet nursing educators needs when planning

a program. The model appropriate to the situation needs to be selected.

In terms of content, Harden & Skiba (1982) found that six major content categories were useful for nursing education. Five cognitive areas to learn about were hardware, software and data processing, programming and algorithms, applications, and impact. The sixth objective is in the affective domain of learning--including student attitudes, motives and values.

In the context of affect learning and promoting positive attitudes; Thies' (1975) analysis of attitude changes among hospital personnel attending an inservice program was interesting. "This study revealed a pervasive deterioration in measured attitudes during the course of the project, with the exception of certain groups of nurses who had started with particularly negative attitudes" (p. 23). They found that circumstances at the time of measurement greatly affected the reported attitudes. This finding is inconsistent with the Fishbein and Ajzen's attitude theory which states that attitudes are persistent over time. It is not known if Thies' results are a reflection of the instrumentation, study conditions, or other unknown variables. This result is in contradiction with several investigations which reported positive attitude changes after participation in an inservice education program.

Participant involvement is found to be beneficial. Holloran's (1982) survey of hospital inservice programs on teaching staff nurses about on-line computer systems found that acceptance was better supported by user-involvement in planning and implementation. "Computer acceptance was also correlated positively with the area supervisor's attitude towards the automated system" (p. 532). These findings are supported by the principles of education for the adult learner.

Principles of Adult Education

Nursing educators are adult learners, i.e. "one who behaves as an adult--who performs adult roles (social definition) and also whose self-concept is that of an adult (psychological definition)" (Knowles, 1980, p. 24). One way to maximize the learning of adults is by following principles of adult education. Andragogy, the art and science of teaching adults, is based on four assumptions.

These assumptions are important when planning programs for nursing educators. First, educational goals are to produce competent people. The goal is not to produce a finished product. So a course on computer literacy would focus on the premise that on-going learning will need to occur. Second, the learner and not the teacher is the focus. This means that the adult learner is actively involved. Third, learning is lifelong, therefore learning

how to learn is important. Fourth, lifelong learning opportunities must be provided (Knowles, 1980, p. 18-20).

This philosophical framework differs from the more traditional pedagogical teaching defined as the art and science of teaching children. Because pedagogical teaching related to teaching children the learner was seen as dependent upon the "wiser" teacher. What, how, when and evaluation of learning was centered around the teacher and not the student (Knowles, 1984, p. 52). The learner assumed a passive and submissive role.

Pedagogy now relates to a teaching method. The learner may be any age, however old the learner, they remain in the passive recipient role. Teachers are seen as the experts and givers of knowledge.

Andragogical learning is a different teaching method. Knowles (1980) contrasts pedagogical learning and andragogical learning. In andragogical learning the adult learner is actively involved and responsible, life experiences are important, readiness to learn is determined by the learner and the orientation to learning is competency based. It is interesting to note that adults are seen as self directed except when an adult becomes "a student in the classroom." When the adult enters into the classroom they:

> sit back, fold their hands and say, "Teach me." The problem occurs when we assume that this is really where they are coming from and start treating them like children; for then we create a

> conflict within them between their intellectual model--learner equals dependance--and the deeper, perhaps subconscious psychological need to be self-directing (Knowles, 1984, p. 57).

Adults fall into this posture because of the pedagogical approach used in the American schools. The educator for the adult learner needs to carefully avoid this situation. Any program for adults need to follow principles of andragogical learning. It needs to be added that children are also being taught, and learn with an andragogical approach.

Table two has the role of the teacher in andragogical education. Included in this table are the learner's needs; learning environment; learner's goals, responsibilities, and involvement. Conditions of learning and teaching exist and need to be considered.

Knowles (1980, 1984) develops andragogical principles and recommends a process when developing programs for the adult learner. The seven steps are presented as follows:

- Step one is the establishment of a climate conducive to learning. This refers to both physical and psychological comfort. Physical comfort, friendliness, and informality are important as is mutual respect, support, friendliness, collaboration and trust.

Step two is the creation of an organized structure for participative planning. Ideally, the learner will be involved in planning. If everyone cannot be involved then a representative may need to be included.

- Step three is the diagnosis of learning needs. Tyler (1950) first introduced the idea of learning needs the difference between the present condition and acceptable norm. The gap in learning is referred to as a "need."
- Step four is the formulation of learning needs. This step is often referred to as doing a needs analysis.
- Step five, design of activities.
- Step six, operation of the activities refers to the actual conduct of the program. This includes actually engaging in learning, facilities, time, etc.
- Step seven, is when evaluation of the student's learning is done in relation to the learning objectives. (Knowles, 1980, 1984)

TABLE 2

Principles of Adult Education

CONDITIONS OF LEARNING	PRINCIPLES OF TEACHING
The learners feel a need to learn.	1. The teacher exposes students to new possibilities of self-fulfillment.
	2. The teacher helps each student clarify his own aspirations for improved behavior.
	3. The teacher helps each student diagnose the gap between his aspiration and his present level of performance.
	4. The teacher helps the students identify the life problems they experience because of the gaps in their personal equipment.
The learning environment is characterized by physical comfort, mutual trust and respect, mutual helpfulness, freedom of expression, and acceptance of differences.	5. The teacher provides physical conditions that are comfortable (as to seating, smoking, temperature, ventilation, lighting, decoration) and conducive to interaction (preferably, no person sitting behind another person).
	6. The teacher accepts each student as a person of worth and respects his feelings and ideas.
	7. The teacher seeks to build relationships of mutual trust and helpfulness among the students by encouraging cooperative activities and refraining from inducing competitiveness and judgmenttalness.
	8. The teacher exposes his own feelings and contributes his resources as a colearner in the spirit of mutual inquiry.
The learners perceive the goals of a learning experience to be their goals.	9. The teacher involves the students in a mutual process of formulating learning objectives in which the needs of the students, of the institution, of the teacher, of the subject matter, and of the society are taken into account.

(Continued on Next Page)

TABLE 2 (continued)

The learners accept a share of the responsibility for planning and operating a learning experience, and therefore have a feeling of commitment toward it.	10. The teacher shares his thinking about options available in the designing of learning experiences and the selection of materials and methods and involves the students in deciding among these options jointly.
The learners participate actively in the learning process.	11. The teacher helps the students to organize themselves (project groups, learning-teaching teams, independent study, etc.) to share responsibility in the process of mutual inquiry.
The learning process is related to and makes use of the experience of the learners.	12. The teacher helps the students exploit their own experiences as resources for learning through the use of such techniques as discussion, role playing, case method, etc.
	13. The teacher gears the presentation of his own resources to the levels of experience of his particular students.
	14. The teacher helps the students to apply new learning to their experience, and thus to make the learnings more meaningful and integrated.
The learners have a sense of progress toward their goals.	15. The teacher involves the students in developing mutually acceptable criteria and methods for measuring progress toward the learning objectives.
	16 The teacher helps the student develop and apply procedures for self-evaluation according to these criteria.

[Knowles, 1980, pp. 57-58]

It is interesting to note that the principles of adult education are consistent with Fishbein and Ajzen's attitude theory. The development and/or change of an attitude can be accomplished through a change in the belief system. The belief system can be altered by increased knowledge about the object. With an andragogical learning model the learner is actively involved in the learning situation. Active participation enhances learning, which means that one has increased knowledge. Increasing nursing educators knowledge about computer use in nursing education may be beneficial to promoting postitive attitudes. As knowledge increases, beliefs about computers change, and hopefully a more positive attitude towards computers develops. It is to be hoped that this attitude will enhance nursing educators' willingness to become computer literate. Although, one can not conclude that a positive attitude will result in a computer literate nursing educator.

Ronald (1982, 1983) developed a learning needs-assessment questionnaire for nursing educators based on the learning principle that adults learn more when they are involved in identifying their needs. The purpose of this study was to focus on nursing educators' attitudes and learning needs in relation to computers. She developed a questionnaire

> designed to identify the faculty member's perception of his educational needs with respect

> to the computer. It included statements describing specific knowledge and skills which could be included in a faculty development course on computers in nursing (Ronald, 1982, p. 58).

Content validity was established by a literature reference and review by two computer knowledgeable nurses. Her scale was based on Tyler's (1949) idea of a learning needs gap being the difference between the present and desired condition.

She had three scales. Scale one was current knowledge, scale two was desired knowledge, and scale three was the difference between scales one and two. The knowledge deficit scale is called the "learning-needs-scale." Reliability of the three scales was computed using coefficient alpha. "The reliability for the current knowledge scale was .95; for the desired knowledge scale .93; and for learning needs, .95" (Ronald, 1982, p. 77). Overall findings indicated that nursing educators do not "possess as much knowledge about computers as they would have liked to" (p. 86). She found her needs assessment scale to be a useful and reliable instrument. Use of this instrument is helpful when planning programs for nursing educators.

In summary, in this section it has been shown that programs to develop computer literacy exist in the literature. When planning a program for nursing educators the model, content objectives and learning process all need to be addressed. Vendor education, inservice development

and continuing education models are appropriate for nursing educators. Six objectives, five cognitive and one affective, need to be considered. The needs of the nursing educator as an adult learner need to be considered.

Summary

This review of the literature has explored nursing educators' attitudes towards computers, definitions of computer literacy, and programs to increase knowledge about computers. It has also discussed Fishbein and Ajzen's attitude theory in relation to the concept attitude. In addition, Knowles's principles of adult education was discussed in relation to planning programs for nursing educators. This has been done to identify the need for nursing educators to increase their knowledge about computer use in nursing education so that positive attitudes about computers could potentially develop. Creating positive attitudes may be one step for promoting computer literate nursing educators.

C H A P T E R III

METHODOLOGY

This Chapter includes the methodology for testing the three null hypotheses. Information regarding the sample population, the instrumentation and the research design are presented for each hypothesis. A description of the procedures used throughout the data collection process is also included.

Introduction

This study consists of two components. Each component follows a different research design and uses samples of different populations. Some instrumentation is common to both components. A descriptive study investigates nursing educators' attitudes towards computers, self-reported current use behaviors, and demographic data. Various variables are correlated to the scores on the attitude test. An experimental design study is used to determine if an inservice-education program for nursing educators caused a change in scores on a test of attitudes towards computers. Hypotheses I and II are descriptive designs while Hypothesis III is tested by the experimental design.

In designing the study, all N.L.N. accredited Baccalaureate nursing programs in Massachusetts were

considered. This totaled to fifteen programs. Fourteen of the fifteen programs were used to generate data for hypothesis I and II. The other school was used for hypothesis III. Three null hypotheses were tested.

Design and Sample for Hypotheses I and II

Null Hypothesis I

The distribution of nursing educators with a positive attitude towards computers is greater than or equal to 50 percent.

Null Hypothesis II

No correlation exists between nursing educator scores on an attitude-towards-computers test and their scores on the computer literacy behaviors instrument.

The nursing educators were randomly selected from lists of faculty provided by each school's chairpersons. On January 23, 1986 the fourteen chairpersons were mailed a letter requesting a list of undergraduate full and part-time faculty, (see Appendix A for the Letter requesting faculty names). By February 11, all but four chairpersons had sent written rosters. One school responded by asking for a note from the dissertation committee validating the researcher's status. The note was sent and a faculty roster appeared shortly thereafter. The remaining three chairpersons sent rosters after phone conversations assuring confidentiality and anonymity of faculty.

Of the fourteen schools, a total of 334 undergraduate nursing educator names were received. One hundred and ten names were randomly chosen using a table of random numbers. On March 11 a cover letter and the instruments for Hypotheses I and II were mailed to the 110 randomly selected nursing educators at their school address, (see Appendix B for the cover letter to faculty).

The cover letter assured anonymity in order to promote honest responses. The envelopes were coded and faculty so informed so that a follow-up contact could be initiated if an educator did not respond within three weeks time. The instruments and coded envelope were immediately separated upon receipt so that anonymity was maintained. Non-respondents were contacted by a second mailing on April 5. This mailing included a new cover letter and a duplication of the instruments, (see Appendix C for the repeat request cover letter to faculty).

Instruments for Hypothesis I

The instrument used to test the attitudes of nursing educators towards computers is an "Attitude Scale" developed by Terry Startsman and Robert Robinson (1972), (see Appendix D for the Attitude Scale). A replication study using their scale was done by Mark Melhorn, Warren Legler and Gary Clark (1979). Both studies reported that the Attitude Scale is suitably reliable and valid. For the two studies combined,

a sample of 518 health care personnel provided data. These personnel consisted of the following types: medical faculty (86), house officers (44), medical students (133), medical records students (23), staff nurses (69), student nurses (75), medical records librarians (4) and ancillary personnel (84).

The original Attitude Scale was an:

> Attitude survey consisting of ten favorable and ten unfavorable statements about computers presented in a Likert-type fashion . . . . These statements were extracted from a larger pool of 63 statements in a preliminary study . . . . The split-half method was employed in determining the reliability of the scale. A coefficient of .87 was obtained for all participants indicating that the form is quite reliable. (Startsman & Robinson, 1972, p. 220-221).

Startsman and Robinson felt that total scores of these twenty items were inadequate to measure various attitudes. Therefore individual responses were then subjected to a factor analysis by "the principle axis method of factor analysis" (1972, p. 221). From the original twenty, sixteen questions were used in the new factor analysis scale.

On this scale scores range from zero to four for each statement. The score range for the entire scale is zero to sixty-four when all sixteen questions are used. A high score indicates a more favorable attitude and a low score a more unfavorable attitude towards computers. High scores on questions 1, 2, 4, 5, 6, 9, 10, 12, 13 and 14 indicate

agreement. High scores on questions 3, 7, 8, 11, 15 and 16 indicates disagreement.

The sixteen questions yield four factors which discriminate four types of attitudes which individuals may have towards computers. "Four interpretative factors were extracted through the factor analysis procedures. These four factors represent an explanation of 42 percent of the total test variance and include 16 of the 20 original statements" (1972, p. 223). The factors are as follows:

> Factor 1. This dimension represents a general evaluation of computers, that is whether or not they are good, efficient, necessary and so forth . . . Questions 1, 2, 6, 7, 11 and 15 represent Factor 1.
>
> Factor 2. The majority of these statements deal with a willingness to use or accept the use of computers . . . Questions 4, 9, 12, 13 and 14 represent Factor 2.
>
> Factor 3. The statements representing this factor are all concerned with the potential threat of computers to employment . . . Questions 3, 8 and 16 represent Factor 3.
>
> Factor 4. The two statements on this factor both suggest the possible benefits of the application of computers to the problems of hospitals . . .

Questions 5 and 10 represent Factor 4.

(Startsman & Robinson, 1972, p. 224-225).

Along with the attitude scale there were ten questions gathering demographic data on individual variances, (see Appendix E for the Demographic Data). Questions one thru five gather general information. While questions six thru nine ask about quantity of time spent on using or learning about the computer. Question ten is an attitude question about comfort using the computer.

Data Analysis for Hypothesis I

The data were analyzed through taking the following steps:

1. Criteria for differentiating positive and negative attitudes were set by total scores on the Attitude Scale with hospital personnel. Table 3 has a breakdown of scores related to professions. Startsman and Robinson found the total mean score for all hospital personnel to be 51.38 based on twenty questions with potential range from 0 to 80. Melhorn et al. (1979), modified the original instrument by adding questions specific to their particular hospitals thus their total number of questions was twenty-three. Their mean score was 58.71 on a scale of 0 to 92. The average mean score of 51.38 in Startsman and Robinson's (1972) study is equivalent to a percentage score of 64% (51.38 of 80

total possible points). The average mean score of 58.71 in the Melhorn et al. study also yields a percentage score of 64% (58.71 of 92 total possible points).

Table 3

Attitude Scores of Hospital Personnel in Two Studies

Position	Combined Frequency	Startsman Robinson	Melhorn et al
Medical Faculty	44	70%	63%
Medical Students	49	70%	64%
Staff Nurses	30	60%	61%
Medical Records Librarians	4		67%
Ancillary Personnel	47	53%	64%

In this study the decision was to use the sixteen questions representing the four factors. The score range on sixteen questions is zero to sixty-four. Since 64% equated to mean scores on two prior studies, this percentage is used in this study. Thus 64 percent of a total possible score of sixty-four translates to a mean score of 40.96. Thus 40.96 is the score used to differentiate positive from negative attitudes. Educators with scores ranging from 0 to 40.96 will be defined as having negative attitudes. Those with scores from 40.97 to 64 will be said to hold positive attitudes.

1. Nurse educaters with scores from 0 to 40.96 were defined as having a negative attitude. Scores from 40.97 to 64 constitute a positive attitude.
2. Each educators score was tabulated.
3. Each educator was designated as belonging to the positive attitude or negative attitude group.
4. Hypothesis I was analyzed by a Chi square test for significance because the exact percentage of attitudes was an unknown and 50 percent was used as the theoretical frequency. .
5. In addition the relationship of the individual demographic data to attitude scores were analyzed by six one way analysis of variance.

Instrument for Hypothesis II

Current computer literate behaviors will be measured by the "Current Use Instrument" (see Appendix F). It included ten statements, seven related to nurse educators' roles, two to personal use, and one to self-instruction. Respondents circled the amount of time they currently use computers on a five category Likert-scale. The categories and corresponding points were: zero = not at all, one = rarely, two = occasionally, three = frequently, and four = daily. Thus, the ten behavior, five category scale has a possible range of zero to four on each item, with the total possible score ranging from zero to forty points. The total score

was used as a measure of how frequently nurse educators said they were using computers.

Content validity was established through 1) reference to the literature, and 2) personal experience. The categories of behaviors were drawn from the demographic data Likert scale used by Heller, Romano, Damrosch, and Parks (1985). Their scale consisted of nine questions, seven related to teaching and two to personal use of computers. The researcher added on content area (design and evaluate software) and changed one content area from "instructional planning" to "curriculum planning." In addition, textbooks and journal articles relating to computer use behaviors for educators were reviewed. Since the items listed on the instrument were frequency questions about actual behaviors, the Computer Use Instrument's total score was designed to measure the frequency which nursing educators used computers. Face validity included "eyeballing" the instrument. The length, instructions, and items all appeared to be clear and concise.

The reliability of the instrument was established using Crombach's alpha to test for internal consistency. Spearman Correlation Coefficient was used to supply additional data on how each behavior related to the nine other behaviors. The correlation coefficient resulted in forty-five behavior-paired correlations.

Data Collection Hypothesis II

The Current Use Instrument was attached to the Attitude Scale. Thus, the random sample, cover letter, mailing and all other procedures were collected in the same manner.

Data Analysis Hypothesis II

The data collected were analyzed by completing the following steps:

1. Each nursing educator's score on the Attitude Scale was calculated.
2. Each nursing educator's total score on the Current Use Instrument was calculated.
3. Statistically, the relationship between attitudes and computer literacy behaviors were analyzed by computing the correlation coefficient for scores on the scales. A Pearson Product Moment correlation coefficient (r) was used tested for significance (Ferguson, 1981, p. 111). The assumption of the Pearson correlation is that no relationship exists between the variables attitude and behavior.

Design and Sample for Hypothesis III

Null Hypothesis III

A specific inservice education program to meet nursing educators' self-identified computer literacy learning needs will not cause nursing educators to have more positive attitudes towards computers.

An experimental design was followed. The nursing faculty of one selected institution were randomly assigned to two groups, a control group and an experimental group. The control group received no inservice-education program. They were given an attitude questionnaire as a pre- and post-test. The experimental group participated in an inservice education program based on their identified learning needs. The goal was to increase nurse educator's knowledge about computers and develop positive attitudes towards computer use. This group was given the attitude questionnaire upon completion of the inservice education program. Table 4 displays the design:

TABLE 4

Hypothesis III Experimental Design

	Week 1	Week 2	Week 3	Week 4
Control	Attitude Scale	-	-	Attitude Scale
Experimental	Needs Assessment Questionnaire	Inservice Training	Inservice Training	Attitude Scale

The experiment began with the control group receiving the Attitude Scale. While this was happening the Experimental group (inservice training) received a Needs Assessment Questionnaire to complete along with an

availability schedule. Then a week's lag time occured so that faculty had enough time to answer questionnaires and for the educators in the inservice training to plan their schedules. After this, the experimental group members participate in the three-week-long inservice training for two hours each week. At the completion of the inservice both groups were requested to fill out the Attitude Scale. Both groups were asked several times not to discuss the scales, questionnaires, or inservice training. All faculty were told that confidentiality was important, and it was necessary for them not to discuss the questionnaires (both groups) and training (inservice group only). This message was repeated at the end of each session. To minimize contamination all questionnaires were mailed to the control groups at home along with a stamped self-addressed return envelope. When the experimental group had handouts these were collected each week so as not to be left lying around (and returned after the data were gathered). Confidentiality and anonymity was assured and maintained at all times. To maximize truthful responses the control pre- and post-attitude scales were not coded so only group comparisons could be done.

Sample for Hypothesis III

Nursing educators at Fitchburg State College in Fitchburg, Massachusetts were used for the sample. The

Department of Nursing employs forty-two full and part-time nursing educators teaching baccalaureate level students. All faculty not on Sabbatical or sick leave were asked to participate in the study. Two were on sick leave and three on sabbatical. This left thirty-seven potential participants.

A cover letter to the faculty was mailed on January 21, 1986 along with a consent to participate form, (see Appendix G for Cover letter; and Appendix H for the Participation consent form). In addition, the investigator attended the February 5th faculty meeting to present information about the study, answer any questions, and request participation. At this time three campus faculty refused to participate. Two part-time off campus faculty initially agreed to participate but then withdrew when the two hour round-trip drive to attend the inservice was discussed. In three of these five cases time limitations were given as a reason for non-participation. This left a population size of thirty-two.

The remaining thirty-two participating faculty members were randomly and evenly divided into two groups using a table of random numbers. After group assignments were made, letters indicating assignment were sent, (see Appendix I and J for Group Assignment Letters). After these letters were received two members of the experimental (inservice) group

said they could not participate due to time limitations. Thus the final sample size was sixteen in the control group and fourteen in the experimental (inservice) group.

The experimental group received the needs assessment questionnaire February 19. Thirteen were completed and returned by February 25th. From February 26 to March 13 twelve faculty completed the inservice program. The remaining two completed the training on March 26th (March 13-23 was Spring vacation and the two faculty members were unavailable). Thus, all fourteen educators completed the training. In addition all fourteen completed the attitude scale and demographic instrument data at the end of the training.

Due to prior commitments and illnesses several accommodations were made. Table 5 shows weekly group size at the inservice training sessions. Several points need to be made. First, the groups' composition changed each week due to teaching commitments. Second, group size ranged from one to five members. Third, three people completed all content in five hours because of individual instruction. This instruction was in five hours because it took less time for individuals to process the information when group discussion was not present. Fourth, one person chose not to participate in the one-hour hands-on experience because she had completed two computer courses in graduate school.

(Incidentally she was the most recent graduate on the faculty--May, 1985).

Table 5

Group Size in Numbers Attending the Inservice Program.

	Sessions			
	Week 1 (Feb. 26-28)	Week 2 (March 3-7)	Week 3 (March 10-13)	March 26****
Group Size in Numbers	3 3 3 2 2	2* 2 2 1 5 2	2 5*** 2 3 2	2 2
Total	13**	14	12	2

Each session was two hours long with the following exceptions:

* These two educator's had only one hour on March 5 and one extra hour on March 12 covering the two hours.

** One educator missed week one. She stayed an extra hour during week two to cover missed content.

*** One educator stayed only one hour and meet individually later in the day.

**** Two educators could not complete the inservice by March 13 but did so (after spring vacation) on March 26th.

In the control group the pre-test attitude scale and demographic data instrument were mailed on February 19, and fifteen out of sixteen were returned by February 28th. The post-test attitude scale was mailed March 11 and fifteen out

of sixteen were returned by March 30th. The sixteenth scale was returned in July and excluded from the study. From verbal comments made by one faculty member it appeared that the person not completing the pre-test scale was different from the person not completing the post-test scale.

Instruments for Hypothesis III

The Attitude Scale and Demographic Data Questionnaire described under Hypothesis I were to measure the control and experimental groups attitudes and to gather demographic date. The raw scores will be used to analyze attitude changes, (see Appendix D for the Attitude Scale).

Design of the Inservice Education Program

In addition the experimental group prior to starting the inservice program received a needs assessment questionnaire to complete. The "Needs Assessment Questionnaire" was developed and tested by Judith Ronald (1982). This instrument is based on the assumption that nursing educators as adult learners are the best determiners of their learning needs. The questionnaire is a needs assessment "describing specific knowledge and skills which might be included in a faculty development course on computers" (Ronald, 1983a, p. 523). Subjects are given statements and asked to rate each statement in two different ways using two Likert scales. The first response is in relation to the individual's self reported perception of

their present level of knowledge. The second response relates to the respondents ideal or desired ideal level of knowledge. "The difference between the two ratings compromises the learning-needs scores for that particular statement" (Ronald, 1983a, p. 524). "The reliability of the "current level of knowledge scale", using coefficient alpha was .93 . . . . The reliability of the "desired-knowledge scale" was .93 using coefficient alpha" (Ronald, 1983a, p. 524-525). The results of the assessment provides a meaningful learning environment for the nursing educators based on their self-identified learning needs, (see Appendix K for Needs Assessment Questionnaire).

An inservice education program was then designed to provide knowledge about how computers can be used in nursing education. The priorities were dependent upon the group's learning needs identified by the needs assessment questionnaire. Overall, the learning activities addressed both the awareness and functional levels as identified by Ronald (1983b) "The awareness level is concerned with providing the learner with opportunities to develop a working knowledge of computer terminology, history, applications to nursing, social and ethical issues. The functional level focuses on having students use computers with existing software and/or develop original programs" (p. 13). The specific objectives and content of the

inservice program can be found in Appendix L, (see Appendix L for Inservice Program Design). The premise of the inservice program was based on Fishbein and Ajzen's theory of attitude change, and Malcolm Knowles' theory of adult learning as can be seen in Table 6.

As discussed in Chapter II, Fishbein and Ajzen (1975) postulated that attitudes can be changed through changing the belief system, since beliefs are based on knowledge. Each of these ways involves increasing one's knowledge about the object. Thus it could logically be concluded that nursing educators holding negative attitudes towards computers could potentially change their attitudes if knowledge about computer use in nursing education is gained. This idea is supported by the numerous studies which say that increased knowledge is a significant independent variable in relation to attitudes.

Fishbein and Ajzen identified ways to maximize attitude change by active participation and persuasive communication. Active participation relates well to Knowles' principles of adult learning. While, persuasive communication relates to how the individual, i.e. teacher, presents himself or herself so that the knowledge presented is valued by the learners. Active participation and persuasive communication are consistent with Knowles' principles.

TABLE 6

Principles Supporting Design of the Inservice Program

Attitude Change	Andragogical Learning
1. Change beliefs to change attitudes.	1. The need to know. Adults need to know why they need to learn something before understanding it.
2. Active Participation	2. The learners self-concept. Adults have a self concept of being responsible for their own decisions for their own lives.
3. Persuasive communication. (Fishbein & Ajzen, 1975).	3. The role of the learners experiences . . .in any situation in which adults experience is ignored or devalued they perceive this as not rejecting just their experience but rejecting them as persons.
	4. Readiness to learn. Adults become ready to learn those things they need to know and be able to do in order to cope effectively with their real life situations.
	5. Orientation to learning . . . adults ate life centered.
	6. Motivation . . . the most potent motivations are internal pressures (Knowles, 1984, p. 55-61)

Data Analysis for Hypothesis III

The data were analyzed through taking the following steps:

1. Each nursing educators' attitude score was determined by using the Attitude Questionnaire. This was done once as a post test for the experimental group and twice as a pre- and post-test for the control group.

2. The control groups pre- and post-test mean scores were analyzed for significant differences.
3. The experimental groups post-test and the control groups post-test mean scores were analyzed for significant differences.
4. The control groups pre-test and the experimental groups post-test mean scores were analyzed for significant differences.

Summary

The methodology for testing the three null hypotheses were included in Chapter III. Hypotheses I and II sampling and data collection methods were mailed questionnaires to a randomly selected population. Hypothesis III, required an experimental design, and the population were nurse educators at one selected Department of Nursing. Instruments used were the Attitude Scale, Demographic Data Questionnaire, Current Use Instrument and Needs Assessment Questionnaire. Chapter IV presents the analysis of the data.

C H A P T E R IV

ANALYSIS OF THE DATA

This Chapter presents the results of the data analyses for this study. The findings and analyses of data are presented in relation to each hypothesis. In Hypothesis I the instrument was the Attitude Scale, with a Chi-square test for significance. In Hypothesis II data were gathered by the Attitude Scale, and Current Use Instrument, with a Crombach Alpha test of significance. Six one-way ANOVA'S were calculated to determine if a significant relationship existed between demographic data and attitude scale scores. A Chrombach's Alpha and Spearman Correlation coefficient examined the reliability of the Current Use Instrument. In Hypothesis III instruments used were the Needs Assessment Questionnaire, and the Attitude Scale. Three T-test's were done testing the significance of the inservice program. All hypotheses were tested at the .05 level of significance.

Demographic Data for Hypotheses I and II

Instruments were mailed to a random sample of 110 undergraduate nursing educators working at N.L.N. accredited Baccalaureate nursing programs in Massachusetts. Responses to the initial request numbered sixty-nine and twenty-six more were returned after a second mailing. The number of respondents was ninety-five (86%).

Data on faculty position, terminal degree, age, rank, quality of time, and level of comfort with computers were gathered. Of the respondents 94.7 percent consisted of faculty primarily teaching undergraduate students, 4.2 percent were working as both faculty and administrators, and 1.2 percent indicated administrator status at the present time. In relation to terminal degree the highest earned degrees were seventy-one Masters in Nursing (74.7%); nine non-nursing Masters (9.5%); and fifteen Doctorates (15.8%).

The frequencies and percents of respondents by categories of age and rank are found in Tables 7 and 8 respectively. The age distribution showed that 81% were between thirty and fifty-nine peaking at thirty through thirty-nine. The rank distribution was as follows: Instructors, 27.4%; Assistant Professors, 34.7%; and Associate Professors, 21.1%.

Table 7

Age Distribution of Subjects for Hypothesis I and II

Age	Frequency	Percent(%)
20-29	2	2.2
30-39	38	39.3
40-49	24	25.5
50-59	21	22.4
60-69	2	2.2
No Response	8	8.4
Total	95	100%

Table 8

Rank Distribution of Subjects for Hypothesis I and II

Rank	Frequency	Percent(%)
Lecturer	12	12.6
Instructor	26	27.4
Assistant	33	34.7
Associate	20	21.1
Full	2	2.1
No Response	2	2.1
Total	95	100%

Nursing educators' knowledge about computers was assessed by gathering data on the number of hours nurse educators had spent on formal instruction, self-instruction, and current use of computers. Since the intent was to gather information on contact hours, the three categories are seen as overlapping and not mutually exclusive variables. The distribution of the subjects' contact hours for these three variables can be found in Table 9.

When studying score distributions nurse educators appear to be having quantitative hour contact about equally through formal-instruction and self-instruction. Use tends to show less time in the 0-15 hours but a greater percent at over 30 hours (50.5%). It is interesting to note that 50 percent report over thirty hours of use while 39 percent report 0-15 hours of use. Sixty-seven percent report between none to fifteen hours of formal instruction and 60 percent report between none to fifteen hours of self-instruction.

The self-reported comfort level was obtained by a yes, no, or neither yes or no response to the question, "Do you consider yourself comfortable using a computer"? The results were that thirty-nine (41.9%) reported being comfortable, fifty (52.7%) stated they were not comfortable and six (6.4%) had hand-written comments qualifying their responses as neither solely yes or no. All Twelve written responses were not comfortable using the computer, each indicated that they plan to learn how to use computers, (see Appendix M for the written responses).

Table 9

Distribution of Subjects Knowledge about Computers in Context of Hours for Hypothesis I and II

Hours	Formal Instruction	Self Instruction	Use
None	15 (15.8%)	20 (21.1%)	17 (17.9%)
1-5	26 (27.4%)	24 (25.3%)	12 (12.6%)
6-15	23 (24.2%)	16 (16.8%)	10 (10.5%)
16-30	11 (11.6%)	8 (8.4%)	7 (7.4%)
Over 30	20 (21.1%)	27 (28.4%)	48 (50.5%)
No Response			1 (1.1%)
Total	95 (100%)	95 (100%)	95 (100%)

Attitude Scale Results for Hypothesis I

The null Hypothesis I which reads, "The distribution of nursing educators with a positive attitude towards camputers is greater than or equal to 50 percent" was tested by the Startsman and Robinson Attitude Scale. This scale was used to analyze the existing attitudes of nursing educators

towards computers. As discussed previously in Chapter III, this instrument has been found to be suitably reliable and valid for the intended purpose, (see Appendix N for the written comments of respondents about the Attitude Scale). Each nursing educator responding to all items on the sixteen item attitude questionnaire received a total score and factor scores.

In this study the mean total Attitude Scale score for a sample of ninety (95 %) nursing educators completing all questions on the scale was 43.69 with a range of 31 to 58 and a standard deviation of 6.31. This is based on a potential range of scores from zero to sixty-four. Based on prior research, 40.67 was deemed the average score for health professionals with 40.67 to 64 indicating existence of a positive attitude. Thus, in this study nursing educators' mean score indicated that on average a slightly positive attitude toward computers exists among nurse educators.

This finding is highly consistent with Ronald's (1982) findings. In Ronald's study nursing educators had a mean score of 43.69 with a range of 30 to 58 and a standard deviation of 5.67. The results of this study strongly support Ronald's study. Both studies indicate that nursing educators on average have a slightly positive attitude towards computers.

The Attitude Scale is subcategorized into four factors. Each factor is a type of attitude which individuals may hold. The mean scores for these factors can be seen in Table 10. Nursing educators had the most positive attitude on Factor one which is the general evaluation of "whether or not they are good, efficient, necessary and so forth," (Startsman and Robinson, 1972, p. 224). Factor three yielded the second most positive scores. This factor refers to the potential threat to employment. Factor four, use of computers to help hospitals solve problems provided the third most positive score for the nurse educator. Factor 2 had the least positive findings in relation to "willingness to use or accept the use of computers" (Startsman and Robinson, 1972, p. 224).

The high mean score (3.72) on Factor one and low mean score (1.88) on Factor two are interesting results. Factor one questions are reflective of an objective evaluation of computers. In Factor two, the responses on three of the five questions brought the mean score down drastically. Two questions are "I" statements reflecting personal use and the third relates to computer use in an office to solve problems. Thus, the three questions in factor two which bring the mean score down all relate to personal use by "an" office as opposed to objectively evaluating computers. This may mean that for nurse educators more positive attitudes exist when personal use is not involved.

Table 10

Means Scores of Individual Statements and Factors on the Attitude Scale for Hypothesis I and II

Factors	Mean
I. General Evaluation of Computers	
Computers are highly efficient machines.	3.55
Computers have created a tremendous breakthrough in the scientific field.	3.51
If it were not for computers, we would probably be ten years behind our present technological pace.	3.05
* Computers should be used only for menial repetitive tasks which require little thinking.	3.23
* Computers should be used in purely scientific situations only.	3.39
* Machines like computers contribute to the decaying of morals because they make things too easy.	3.52
Factor I Mean Score	3.72

* On the scale higher scores on these statements indicate disagreement thus showing a positive attitude.

II. Willingness to Use or Accept the Use of Computers	
When errors become numerous in an office, it helps to install a computer.	1.69
I would rather have a computer solve a problem for me than a mathematician.	1.87
The computer can store or remember an unlimited amount of information.	2.40
I would not mind having the computer determine the jobs I do.	1.03
The people who speak out against computers are the ones who know very little about them.	2.45
Factor II Mean Score	1.88

Table 10 (continued)

Means Scores of Individual Statements and Factors on the Attitude Scale for Hypotheses I and II

Factors	Mean
III. Potential threat to employment	
*Computers are bad because they take peoples jobs away.	3.38
*When a computer is installed in business some people generally lose their jobs.	2.36
*Computers have contributed to the shortage of employment.	3.11
Factor III Mean Score	2.95

* On the scale higher scores on these statements indicate disagreement thus showing a positive attitude.

IV. Computers possible benefits to the problems of hospitals	
The modern hospital is badly in need of a revolution by computers	2.56
Computers could help slow the rising rate of hospital costs.	2.52
Factor IV Mean Score	2.52

The four factor means for the present study are compared with Startsman and Robinson's (1972), Melhorn, Legler and Clark's (1979), and Ronald's (1985) studies. The purpose was to look for any pattern in relation to the factors. As can be seen in Table 11 all four studies show the highest mean scores for Factor I which indicates that the health professionals studied had a more positive attitude towards computers when discussing computers in general. In each study, the lowest mean score was in Factor II, the

willingness to use of accept the use of computers. This result might indicate that personal use is regarded more negatively. Factors III and IV vary in order but the mean scores tend to be close in each study, which indicates that nurse educators do not see computers as a risk to their jobs and they believe computers to be useful to help hospitals solve problems.

Table 11

Attitude Scale Factor Means Scores for Present Study and Three Prior Studies

Factor	Startsman & Robinson (1972)	Melhorn Legler, Clark (1979)	Ronald (1985)	Present Study
I	3.02	3.10	3.23	3.72
II	2.15	1.85	2.10	1.88
III	2.42	2.58	2.77	2.95
IV	2.46	2.26	2.60	2.25

The distribution of positive and negative attitudes was created by using the mean score for health professionals (40.96) on the Attitude Scale. The Chi-square test was used to determine statistical significance. Since ninety educators completed all items on the scale the anticipated distribution by chance would be a 50:50 split with forty-five holding negative attitudes and forty-five holding positive attitudes. Positive attitudes predominated over negative attitudes with a 2:1 ratio. Sixty nursing educators had a score equal to or greater than 40.67, and

thirty had a score equal to or lower than 40.96. This is contrary to the expectation that a greater percentage of negative attitudes would exist. As can be seen on Table 12, the 50:50 split did not occur in this study and in fact positive attitudes predominated.

Table 12

Positive and Negative Group Attitude Distribution: Research Sample and Sample Occurring by Chance (Chi-Square)

Sample	Positive Attitude	Negative Attitude	Total
Research	60 (67%)	30 (33%)	90
Chance	45 (50%)	45 (50%)	90

$X^2 = 10.00$ DF = 1
Onetailed level of significance .001

Hypothesis I, the distribution of nursing educators with a positive attitude towards computers is greater than or equal to 50 percent, cannot be rejected. Statistically, the Chi-Square's level of significance was .001 with 67 percent of nursing educators having scores equal to or greater than 40.97. The anticipated outcome for rejecting null hypothesis I was that a significant majority of nursing educators would hold a negative attitude. The evidence points to the idea that a majority of nursing educators do possess positive attitudes towards computers.

This evidence contradicts several studies indicating that nurses hold negative attitudes (Melhorn, Legler & Clark, 1979; Reznikoff, Holland & Stroebel, 1967; Startsman

& Robinson, 1972; Thies, 1975). One explanation may be that attitudes towards computers are becoming more positive over the past five to ten years. These earlier studies from 1967 thru 1979, found that nurses have negative attitude towards computers. While more recent studies (Ball, Snelbeeker & Schechter, 1985; Merrow, 1984; Ronald, 1982) found that positive attitudes were present. It is possible that the recent increased exposure to computers in all areas of society has created a global shift in attitudes towards a positive evaluation of computers.

Six one-way analyses of variances were done on the demographic data to determine if any of these independent variables were significantly related to the dependent variable scores on the attitude scale. The variables were; terminal degree, rank, formal-instruction, self-instruction, use of computers and level of comfort with computers. Terminal degree was a reflection of highest level of structured formal education. Rank indicated the title given to the educator. Hours of formal instruction, self-instruction, and use of computers were variables seen as related to knowledge about computers. Level of comfort with computers was seen as another measure of attitude. One-way ANOVA's were done comparing each variable to the Attitude Scale score.

No significant relationship was found between terminal degree, rank, hours of formal-instruction, hours of

self-instruction, and hours of computer use to attitude scores. Although hours of self-instruction (p. = .0857) and hours use of computers (p = .0729) approach the .05 level of significance, (see Tables 13, 14, 15, 16, and 17 for the respective one way ANOVA's) indicating statistical significance.

Table 13

ONE-WAY ANOVA: Terminal Degree by Attitude Score (N = 90)

Source	D.F.	Sum of Squares	Mean Square	F Ratio	F Prob.
Between Group	4	90.49	42.25	1.137	.3256
Within Group	85	3462.79	39.80		
Total	89	3553.29			

Table 14

ONE-WAY ANOVA: Rank by Attitude Score (N = 88)

Source	D.F.	Sum of Squares	Mean Square	F Ratio	F Prob.
Between Group	4	37.71	9.4282	.226	.9234
Within Group	83	3468.78	41.79		
Total	87	3506.50			

Table 15
ONE-WAY ANOVA: Hours of Self Instruction by Attitude Score
(N = 90)

Source	D.F.	Sum of Squares	Mean Square	F Ratio	F Prob.
Between Group	4	321.87	80.46	2.117	.0857
Within Group	85	3231.41	38.01		
Total	89	3553.28			

Table 16
ONE-WAY ANOVA: Hours of Formal Instruction by Attitude Score
(N = 90)

Source	D.F.	Sum of Squares	Mean Square	F Ratio	F Prob.
Between Group	4	278.73	69.68	1.809	.1346
Within Group	85	3274.55	38.52		
Total	89	3553.28			

Table 17
ONE-WAY ANOVA: Hours of Use by Attitude Score
(N = 89)

Source	D.F.	Sum of Squares	Mean Square	F Ratio	F Prob.
Between Group	4	340.22	85.05	2.27	.0729
Within Group	85	3207.65	38.18		
Total	88	3547.88			

As can be anticipated a significant relationship exists between self-reported level of comfort with using computers and attitude scores ($p = .0254$), (see Table 18). This result is expected because one's self-reported level of comfort with an object tends to be harmonious with having positive attitudes toward the object. A self reported comfort level may be seen as another, simpler indicator of whether or not a nursing educator has a positive or negative attitude. Thus, a yes or now response to the question "Do you consider yourself to be comfortable using the computer?" is a good predictor of a positive or negative attitude.

Table 18
ONE-WAY ANOVA: Level of Comfort With Computers by Attitude Score (N = 84)

Source	D.F.	Sum of Squares	Mean Square	F Ratio	F Prob.
Between Group	1	205.38	205.38	5.181	.0254*
Within Group	82	3250.28	39.63		
Total	83	3455.66			

In the context of the literature review it is surprising to find that increased knowledge level in terms of hours of self-instruction, formal-instruction and use of computers is not significantly related to positive attitude

scores. The literature indicated that increased knowledge about computers favored a more positive attitude. The nonsignificant relationship of terminal degree and rank to attitude score is not surprising because knowledge about and exposure to computers was not taught in most nursing programs, and it is not a criteria for assigning rank (or even hiring).

Correlation between Attitude Score and Current Use Instrument for Hypothesis II

Nursing educators' scores on the attitude scale and scores on the current behavior use scale were examined for a correlation to test hypothesis II "No correlation exists between nursing educators scores on an 'Attitude Scale' and their scores on a "Current Use Instrument." The Pearson Correlation Moment Coefficient was the test for significance. Since the Current Use Instrument was designed for this study the reliability of this instrument was first tested for reliability and validity.

Reliability and Validity of Current Use Instrument

Face, content, and construct validity for the Current Use Instrument was previously discussed in Chapter III. Summarizing, a literature review, personal experience, a modification from another researchers tools, and appearance were used as the means to assess validity.

Reliability was examined by two statistical tests: The Spearman Correlation Coefficient for paired variables, and Crombach's alpha for internal consistency. The Spearman Correlation coefficient was used because it explored the association between paired variables. The null hypothesis of this test is that no association exists between the two variables. When an association between the two variables is probable the probability of the observed correlation coefficient is less than .05 ($p < .05$). Then the null is rejected and an association is assumed to exist. When $p > .05$ the null hypothesis of no association cannot be rejected. The information obtained from these tests identifies those self reported computer use behaviors that are correlated.

Using the Spearman Correlation coefficient the ten behaviors were paired with each other. This resulted in forty-five correlations. Table 19 shows the level of significance of the Spearman Correlation Coefficient of Current Use Instrument variable pairs. Twelve pairs are significant at $p < .05$, twenty-three are significant at $p = .001$. The correlation coefficients in value greater than ten pairs yielded p values greater than .05 indicating that no association between the two variables existed and that the null hypothesis cannot be rejected. These ten pairs for which no association exists are:

(1) Test scoring analysis with curriculum planning

(2) Test scoring analysis with games.

(3) Research/statistics with games.

(4) Clinical practice with games.

(5) Teaching students/nurses with games.

(6) Design evaluate software with games.

(7) Curriculum planning with games

(8) Word processing with games.

(9) Personal business with games.

(10) Personal business with design/evaluate software.

It appears that games has no correlation in eight of nine possible variable pairs. It is significant in relation to self-instruction. This finding is consistent with literature which indicates that computer games are a useful way for people to instruct themselves.

The null can be rejected in twelve pairs at the $p \leq .05$ level of significance. These twelve pairs are:

(1) Test scoring analysis with Clinical Practice.

(2) Test scoring analysis with Personal Business.

(3) Test scoring analysis with Design/evaluate software.

(4) Research/statistics with Clinical Practice.

(5) Research/statistics with self-instruction.

(6) Research/statistics with Design/evaluate software.

(7) Clinical practice with self-instruction.

(8) Clinical practice with Word processing.

(9) Clinical practice with Personal Business

(10) Clinical practice with Design/evaluate software.

(11) Self instruction with Games.

(12) Self instruction with Design/evaluate software.

This .05 level indicates that a significant relation exists in these pairs.

The null can be rejected in twenty-two pairs at the .001 level of significance. These pairs have a highly significant relationship. These twenty-three pairs are:

(1) Test scoring analysis with research/statistics.

(2) Test scoring analysis with Teaching students/nurses.

(3) Test scoring analysis with self-instruction.

(4) Test scoring analysis with Word processing.

(5) Research/statistics with teaching students/nurses.

(6) Research/statistics with Curriculum Planning.

(7) Research/statistics with Word Processing.

(8) Research/statistics with Personal Business.

(9) Clinical practice with Teaching Students/nurses.

(10) Clinical practice with Curriculum planning.

(11) Teaching students/nurses with Curriculum planning.

(12) Teaching students/nurses with Self instruction.

(13) Teaching students/nurses with Word Processing.

(14) Teaching students/nurses with Personal Business.

(15) Teaching students/nurses with Design/evaluate software.

(16) Curriculum planning with self-instruction.

(17) Curriculum planning with Word Processing.

(18) Curriculum planning with Personal Business.

(19) Curriculum planning with Design/evaluate software.

(20) Self instruction with Word Processing.

(21) Self instruction with Personal Business.

(22) Word Processing with Personal Business.

(23) Word Processing with Design/evaluate software.

When examining the correlation coefficients in table 19, two pairs stand out at opposite ends of the continium. Research and statistics (category 2) and games (category 9) have the only negative pair correlation (-.003.) Thus, the use of computers for these two reasons have an inverse relationship. A strong direct correlation (.700) exists in the pair word processing (category 7) and personal business (category 8).

Table 19

Spearman Correlation Coefficient of Current Use Instrument Variable Pairs*

	1	2	3	4	5	6	7	8	9	10
1		.496 .001	.227 .030	.340 .001	.174 .098	.383 .001	.391 .001	.272 .009	.116 .271	.263 .012
2			.307 .004	.385 .001	.344 .001	.277 .008	.595 .001	.376 .001	-.003 .976	.253 .017
3				.491 .001	.426 .001	.261 .012	.331 .002	.237 .023	.153 .144	.238 .023
4					.648 .001	.478 .001	.592 .001	.449 .001	.087 .408	.452 .001
5						.366 .001	.468 .001	.392 .001	.010 .924	.401 .001
6							.471 .001	.462 .001	.288 .006	.237 .024
7								.700 .001	.095 .368	.347 .001
8									.159 .129	.192 .069
9										.023 .830
10										

Categories

1. Test scoring/analysis
2. Research and statistics
3. Clinical practice
4. Teaching students/nurses
5. Curriculum planning
6. Self-instruction
7. Word Processing
8. Personal Business
9. Games
10. Design/evaluate software.

* In each box the top number is the correlation coefficient, and the bottom number is the level of significance.

Table 20

Crombach's Alpha Reliability Analysis for Current Use Instrument (N = 89)

Item	Scale Mean If Item Deleted	Scale Variance If Item Deleted	Corrected-Item Total	Alpha If Item Deleted
Test scoring analysis	7.505	38.161	.479	.811
Research and statistics	7.629	37.735	.557	.801
Clinical Practice	8.539	43.910	.332	.821
Teaching students/nurses	8.269	37.858	.666	.790
Curriculum planning	8.539	41.524	.492	.808
Self instruction	7.921	38.277	.580	.798
Word processing	7.247	32.870	.759	.773
Personal business	7.488	37.011	.602	.795
Games	8.595	45.925	.158	.832
Design/evaluate software	8.561	42.998	.366	.819

Alpha = .822

The Crombach's alpha test for the Current Use Instrument was used to assess internal consistency. The test compares the total scores with scores when each question is deleted. The following data were presented in relation to the deletion of each item, scale mean, scale variance, corrected item-total correlation and alpha. A final Alpha is given for the entire instrument indicating if the variation in the measurement is attributable to variation in the true score. Table 20 shows the statistical results for the Crombach's Alpha Reliability analysis for the Current Use Instrument.

The alpha for the Current Use Instrument is .82 indicating that 82% of the variation in the measurements is attributable to variation in the true score. It then follows that 18 percent of the variation is attributable to error. It is interesting to note that when the ten items were examined for inner-correlations, reported game use behaviors stood out as not being related to the rest of the instrument (P = .158). "Games" tend to decrease the instruments reliability. When games are eliminated the alpha level improves to .83. The instrument has 77 percent variation with an error of 23 percent when word processing was omitted. Thus, one might assume that word processing is a significant item to keep on the scale in context of reliability because the alpha level figures went from .82 percent to .77 percent. The overall rating of 82 percent is an acceptable indicator that the instrument appears to be internally reliable.

Current Use Instrument Results

The subjects responses on the Current Use Scale ranged from zero to twenty-seven points, based on a potential range of scores from zero to forty. The mean score was 8.98, the mode 9.0, and the standard deviation was 6.92, indicating that for a variety of activities nurse educators on the average are not using computers often.

The frequency of responses in relation to individual items can be found in Table 21. As can be seen the "not at all" category has the largest percentage of respondents for each of the ten items. The "not at all" use percentages range from 32.6 percent for word processing to 75.8 for design or evaluate software. It appears that nurse educators use computers primarily for (1) word processing, (2) test scoring and analysis, and (3) research and statistics. This finding is consistant with the literature review and personal observations.

Correlated Scores for Attitude and Use of Computers

Each nursing educator received a score on the Attitude Scale, and a score on the Current Use Instrument. The two paired scores were then correlated testing for significance using the Pearson Product Moment Correlation Coefficient. As can be seen by Table 22 the correlation coefficient was found to be $r = .2044$. This indicates that a slightly positive relationship exists between the two scores; Attitude Scale Scores increase as Current Use Instruments Scores increase. The level of significance is $p = .061$.

Table 21

Frequency of Response to Current Use Instruments Scale Items (N=89)

ITEM	PERCENT RESPONSE IN EACH CATEGORY						
	Not at All	Rarely	Occasion-ally	Freq-uently	Daily	No Response	Total
Test Scoring and Analysis	37.9	8.4	12.6	36.9	0.0	3.2	100
Research and Statistics	37.9	9.5	24.2	22.1	1.1	4.2	100
Clinical Practice	68.4	16.8	8.4	4.2	0.0	2.1	100
Teaching Students and Nurses	63.2	9.5	13.7	10.5	1.1	2.1	100
Curriculum Planning	71.6	11.6	7.4	6.3	1.1	2.1	100
Self-instruction	46.3	12.6	22.1	15.8	0	3.2	100
Word Processing	32.6	10.5	15.8	25.3	13.7	2.1	100
Personal Business	54.7	11.6	15.8	12.6	4.2	1.1	100
Games	72.6	16.8	6.3	2.1	0.0	2.1	100
Design or Evaluate Software	75.8	8.4	9.5	3.2	1.1	2.1	100

Table 22

Correlation of Attitude Scale Scores and Current Use Instrument Scores for Hypothesis II
(Pearson Product Moment Correlation) (N = 85)

	Current Use Instrument Score
Attitude Scale Score	r = .2044 p = .061

Hypothesis II which states that no relationship exists between the scores cannot be rejected at the .05 level of significance. The analysis failed to find significant results in favor of the experimental hypothesis even though the level of significance found (P = .061) does approach .05.

This finding supports Fishbein and Ajzen's (1975) theory. Attitudes predispose individual's to respond in a specific way. However, the relationship between held attitudes and behavior is not a predictive one. The individual's intentions to perform the actions are the best behavior predictor. Intentions being the persons attitude toward the behavior, and subjective norms concerning that behavior. Thus, it is not surprising to find the level of significance at p = .061., close to but not significant results.

Hypothesis III Demographic Data

Thirty nursing educators at one NLN accredited undergraduate Baccalaureate nursing program were the subjects used in testing Hypothesis III which states "A specific inservice educational program designed to meet educator's self-identified learning needs for becoming computer literate will not cause a greater percentage of nursing educators to have a positive attitude towards computers." This constituted 71 percent of the total

faculty (N = 42). As discussed three were on sabbatical, two on sick leave, five refused to participate because of the time commitment and two refused for unknown reasons. Educators on sabbatical and sick leave were unavailable. Thus thirty out of thirty-seven available faculty participated (81%) in this study.

Twenty-nine participants were primarily teachers, and one participant was the chairperson who taught undergraduate courses secondary to administrative responsibilities. Highest earned degrees were: twenty-two Masters in Nursing (73.4%); two Non-nursing Masters (6.66%) and six Doctorates (20%).

The frequencies and percents of responses by categories of age and rank are found in Tables 23 and 24 respectively. The age distribution shows that 77 percent were between the ages of thirty and fifty-nine peaking at the forty to forty-nine year old group. This is in contrast to Hypotheses I and II samples with an age distribution of 87.2 percent between the ages of thirty and fifty-nine peaking at the thirty to thirty-nine year old group. Sample results for Hypothesis III also has more 50-69 year olds (33%) than Hypothesis I and II sample (10.4%). Rank distribution was highest with Instructors (53%), Assistants (27%) and Associate Professors (27%). Hypotheses I and II sample ranges were Instructors (27.4%), Assistants (34.7%) and

Associates (21.1%). The high number of instructors in Hypothesis III is partially attributable to part-time faculty being given this rank indefinitely in a non-tenure track position. It appears that Hypothesis III faculty tend to be older in age then the sample for Hypotheses I and II but held lower ranking positions.

The knowledge level about computers was assessed by looking at numbers of hours in formal-instruction, self-instruction and use of computers. Formal instruction responses peaked at 43 percent indicating no hours, 23 percent had 6-15 hours and 20 percent had over 30 hours. The greatest frequency for self-instruction was 33 percent with 1-5 hours, 27 percent reported no hours. Hours of use of computers had the largest response, 30 percent, in over 30 hours of use category, 20 percent reported none, and 20 percent reported 1-5 hours of use of computers. Table 25 presents the total distribution of responses.

Table 23

Age Distribution of Subjects for Hypothesis III

Age	Frequency	Percent
20-29	1	3
30-39	5	17
40-49	14	47
50-59	4	13
60-69	6	20
Total	30	100%

Table 24

Rank Distribution of Subjects for Hypothesis III

Rank	Frequency	Percent
Lecturer	0	0
Instructor	16	53
Assistant	8	27
Associate	3	10
Full	3	10
Total	30	100%

Table 25

Distribution of Knowledge About Computer in Context of Hours for Hypothesis III

Hours	Formal Instruction Frequency (%)	Self Instruction Frequency (%)	Use Frequency (%)
None	13 (43%)	8 (27%)	6 (20%)
1-5	2 (7%)	10 (33%)	6 (20%)
6-15	7 (23%)	3 (10%)	3 (10%)
16-30	2 (7%)	4 (13%)	5 (17%)
Over 30	6 (20%)	5 (15%)	10 (33%)
Total	30 (100%)	30 (100%)	30 (100%)

The last demographic data was the self-reported level of comfort using computers was answered by the question "Do you consider yourself comfortable using a computer?" Of the total goup (N=30), twelve (40%) reported being comfortable

and eighteen (60%) stated they were not comfortable using computers. This percentage parallels the Hypothesis I and II sample's responses where 41.1 percent indicated comfort and 52.6 percent were not comfortable.

Needs Assessment Questionnaire Results

The Needs Assessment Questionnaire was given to the fourteen members of the experimental group. Thirteen of the members completed all items on both the desired and current knowledge scales. The fourteenth member indicated on five different questions that her current knowledge was greater than the level of knowledge which she would like to have. She also did not respond to five out of the thirty-two individual scales. Thus, this questionnaire was omitted from the needs assessment data.

To determine the groups learning needs, three tables are generated. First the means and standard deviations of current knowledge are computed on each of the sixteen items. Then the desired results on each item are analyzed with means and standard deviations. Finally, the learning needs are obtained by subtracting the current knowledge mean score from the desired knowledge mean score on each item respectively. The difference is the learning need.

The self reported current knowledge ranked mean scores are found in Table 26. The mean scores ranged from 1.308 to a low of .615. This indicated that the self reported

current knowledge ranged from moderately low to very low. The highest reported level of knowledge (1.308) was in how to use a terminal, yet this was still a rather low level of knowledge. The standard deviation of 1.109 indicated that there may have been a great variation among respondents. The highest standard deviation existed in relation to the reported level of current knowledge in use of computers for statistics and research.

The desired level of knowledge ranked mean scores are found in Table 27. Mean scores were in the high to very high range indicating a strong interest to learn about computers. The highest standard deviation was .913 indicating less variation among responses. The use of computers to teach students, curriculum planning and quality nursing education were of greatest interest to educators. The next two interest areas were effects on the role of the educator and how to use a terminal. Thus, this group of nursing educators had a strong desire to learn how to use computers in relation to their role as nursing educators.

The learning needs mean scores are found in Table 28. These scores are obtained by subtracting the current knowledge score from the desired knowledge score. The prioritized learning needs are identified by the nursing educators item means with the highest identified learning need listed first. The means ranged from 1.615 to 2.923

with relatively high standard deviations (.961 to 1.405). The first four highest learning need items on this scale form a natural cluster and were concerned directly with the application of computers to education. The two items with the lowest self identified learning needs were in relation to the roles of nurses and nursing administrators. This suggests that the nursing educators had a greater expressed need to learn about the use of computers in relation to their roles as educators than in other areas of nursing or in technical aspects.

These results are similar to Ronald's (1982) needs assessment findings from 159 nurse educators within the continental United States. The four priority learning needs were use of computers in curriculum planning (mean = 2.36), quality of nursing education (2.32), use of computers to teach students (mean = 2.23) and effect of computers on cost of nursing education (mean = 2.22). In both Ronald's and this study, the same four areas were identified as the top four priority learning needs for nursing educators although the order varied.

On the Needs Assessment questionnaire, respondents were given an opportunity to identify other areas of interest which had not been included on the questionnaire. One educator responded by saying: "aid in storing data about students (high school rank, STATS, other STATS that may be retrieved to compile a profile." No other written comments were given.

This prioritized list of items from the learning needs scale was used to plan the content for the inservice program for the fourteen experimental group members. The teaching style used for the inservice program followed the principles of adult education as discussed in Chapter Two. The basic assumption being that the adult learner is involved in identifying their own learning needs and actively participates in learning, (see Appendix L for specifics on the inservice program including learning objectives, time schedule and content).

Table 26

Mean and Standard Deviations of Nursing Educators' Self Reported CURRENT Level of Knowledge of Computers Ranked by Mean Scores (N=13)

Statements	Mean	SD
How to use a terminal	1.308	1.109
Role of the Educator	1.077	.954
Quality of Health Care	1.000	1.000
Role of the Nurse	1.000	1.080
How a Computer Functions	.923	.954
Curriculum Planning	.923	.954
Statistics and Research	.846	1.144
Help Nurses Care for Patients	.769	1.013
Teach Students	.769	1.926
Cost of Health Care	.769	1.013
Privacy Considerations	.692	1.090
Role of Nurse in Development of Computer Applications	.692	.947
Quality of Nursing Education	.692	.947
Cost of Nursing Education	.615	.870
Write an Original Program	.615	.961
Assist Nursing Administrators	.615	.961

Rating Categories
0 = Very low
1 = Low
2 = Moderate
3 = High
4 = very High

Table 27

Mean and Standard Deviations of Nursing Educators' Desired Level of Knowledge of Computers Ranked by Mean Scores (N=13)

Statements	Mean	SD
Teach Students	3.692	.630
Curriculum Planning	3.538	.776
Quality of Nursing Education	3.538	.776
Role of the Educator	3.462	.776
How to use a Terminal	3.462	.776
Statistics and Research	3.385	.768
Cost of Nursing Education	3.308	.751
Help Nurses Care for Patients	3.231	.725
Role of Nurse in Development of Computer Applications	3.154	.689
Quality of Health Care	3.154	.689
How a Computer Functions	3.077	.760
Role of the Nurse	3.000	.707
Cost of Health Care	3.000	.816
Write an Original Program	3.000	.913
Privacy Considerations	2.846	.801
Assist Nursing Administrators	2.231	.725

Rating Categories
0 = Very low
1 = Low
2 = Moderate
3 = High
4 = very High

Table 28

Mean and Standard Deviations of Nursing Educators' LEARNING Needs of Computers Ranked by Mean Scores (N=13)

Statements	MEAN	SD
Use of Computers to Teach Students	2.923	1.188
Quality of Nursing Education	2.846	1.345
Cost of Nursing Education	2.692	1.251
Curriculum Planning	2.615	1.261
Statistics and Research	2.538	1.391
Role of Nurse in Development of Computer Applications	2.462	1.266
Help Nurses Care for Patients	2.462	1.198
Role of the Educator	2.385	1.121
Write an Original Program	2.385	1.325
Cost of Health Care	2.231	1.166
How a Computer Functions	2.154	1.405
Privacy Considerations	2.154	.987
Quality of Health Care	2.154	1.144
How to use a Terminal	2.154	1.405
Role of the Nurse	2.000	1.000
Assist Nursing Administrators	1.615	.961

Rating Categories
0 = Very low
1 = Low
2 = Moderate
3 = High
4 = very High

Hypothesis III Control Group and Experimental Group Results

Hypothesis III "A specific inservice program designed to meed educator's self-identified learning needs for becoming computer literate will not cause a greater percentage of nursing educators to have a positive attitude towards computers" was tested by group scores on the Attitude Scale. The experimental group attended a six hour inservice program over a three week period. The control group received no treatment.

The Needs Assessment questionnaire was given to the experimental group and at the same time the control group received the "pre-test" Attitude Scale and Demographic Data form. Inservice instruction began the following week for the experimental groups. Each participating nursing educator was consistently urged not to discuss the study. At the end of the inservice period, both groups received the Attitude Questionnaire to complete. Thus three sets of attitude scores were obtained; the control group's pretest, the control group's post test, and the experimental groups post test. Statistically, three unpaired T tests were performed to test for significance. The three comparisons were: control pre- and post-test; control pre- and

experimental post-test; and control and experiment post-test scores. Tables 29-31 present the T tests for the three comparisons.

Table 29

T Test Comparison of Control Pre and Post Test Attitude Scores

Groups	No. of Cases	Mean	SD	F Value	2-Tail Probability
Pre-test Control	15	42.13	5.55	1.17	.77
Post-test Control	15	43.07	6.02		

Table 30

T Test Comparison of Control Pre-Test and Experimental Post-Test Attitude Scores

Groups	No. of Cases	Mean	SD	F Value	2-Tail Probability
Pre-test Control	15	42.13	5.55	1.15	.80
Post-test Experi-mental	14	44.07	5.95		

Table 31

T Test Comparison of Experimental and Control Post Test Attitude Scores

Groups	No. of Cases	Mean	SD	F Value	2-Tail Probability
Post-test Experimental	14	44.07	5.95	1.02	.98
Post-test Control	15	43.07	6.02		

As can be seen by Table 29 the level of significance was p = .77) for the pre- and post-control group comparison. This indicates that no significant change occurred due to time, environmental influences or taking the pre-test.

Table 30, the control pre- and experimental post-test, also indicates no significant difference with p = .80. Since the population was randomly assigned to the control and experimental group it is assumed that the control pre-test mean score is statistically representative of the population's mean pre-test score. Thus, the control pre-test mean score is an estimate of the experimental groups' pre-test mean score.

No significant change occurred in the experimental groups attitude score due to the inservice program. Following this rationale, Table 31 shows that no significant difference existed between the two groups post-test scores (p = .98). This further verifies that the no significant gain occurred due to the inservice program.

Hypothesis III which stated that the inservice program will not cause nursing educators to have positive attitudes cannot be rejected. Any gain which occurred among nursing educators is not reflected in a change in the scores on the Attitude Scale. This result is surprising in context of the literature reports indicating that increased knowledge about computers correlates with more positive attitudes. Five postulations for these results were: positive attitudes already existed, the short program length, some learning needs remained unidentified, affective learning needed more emphasis, and the Attitude scale was insensitive to changes.

Summary of the Results

In this chapter the research findings were reported and analyzed. Each of the null hypotheses was tested. All three hypotheses cannot be rejected.

The data gathered for Hypothesis I, which examined the existing attitudes towards computers, indicated that 67 percent of nursing educators had positive attitudes. However, the Null Hypothesis that the distribution of nursing educators with a positive attitude towards computers is greater than or equal to 50 percent was not rejected. Nursing educators had the most positive attitudes on a factor called "a general evaluation of computers as efficient." They held least positive attitudes in

relationship to a factor labeled as "willingness to use computers."

One way analysis of variance (ANOVA) on Attitude Scores and five independent variables did not produce a significant result. These variables were terminal degree; rank; hours of self instruction, formal instruction and use; and self reported current use behaviors were all not significant at alpha .05. Self reported comfort level, as another measure of attitude was significantly related to scores on the Attitude Scale ($p = .0254$).

Hypothesis II explored the correlation of Attitude Scale scores to self-reported scores on the Current Use Instrument. A slightly positive correlation was found ($r = .2044$). These results indicated that null hypothesis that no correlation exists between nursing educators scores on an "Attitude Scale" and their scores on a "Current Computer Use" instrument. The null hypothesis could not be rejected.

Hypothesis III was on experimental design determining if participation at an inservice program fostered postitive attitudes. A needs assessment tool was used to gather information on nursing educators' learning needs. The results showed that nursing educators do not report possessing as much knowledge about computers as they would like to have. They felt that their greatest need was to

learn about the use of computers in the context of their roles as educators.

The experimental inservice program designed to increase nurse educators' level of knowledge about computers, and thus promote more positive attitudes towards computers did not produce a statistically significant increase on the Attitude Scale. The three group comparisons; control pre- and post- ($p = .77$), control pre- and experimental post- ($p = .78$), and experimental post- and control post ($p = .98$) were all not significant at $p = .05$. Hypothesis III that a specific inservice education program designed to meet educator's self-identified learning needs for becoming computer literate will not cause a greater percentage of nursing educators to have a positive attitude towards computers cannot be rejected.

What follows in Chapter V is a summary of the study, implications for nursing education and recommendations for future research.

C H A P T E R V

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

This Chapter contains a summary of the study, a review of the major findings and their implications. The Chapter concludes with recommendations for nurse educators, and for future research.

Summary of the Study

The primary purpose of this study was to investigate nursing educators' attitudes towards computers. Attention was focused on identifying whether positive or negative attitudes predominated, and if a correlation exists between attitudes and behaviors. In addition, an experimental design examined the relationship between attitude change and an inservice program designed to increase nurse educator's knowledge about computer use.

A total of 125 nurse educators participated in this study. They represented all fifteen NLN (National League for Nursing) accredited Baccalaureate nursing programs in Massachusetts. Fourteen of the fifteen schools and their one hundred and ten randomly selected nurse educators provided the pool for studying attitudes and behaviors. The remaining school and its thirty participating nurse educators were the population for the inservice experimental

design, which randomly split these educators into a control group (no inservice) and an experimental group (six hours inservice).

Data collection was accomplished in two ways. First, identification of existing attitudes and behaviors was accomplished through a mailed survey. Three instruments were mailed: including the Startsman-Robinson Attitude Scale to measure attitudes towards computers, the Current Use Instrument to identify the extent to which respondents use computers, and a demographic questionnaire for compiling background information. Second, in order to determine the relationship between attitude changes and an inservice program the attitude scale was given to the control group as a pre- and post-test and to the inservice group as a post-test. Demographic data were collected via the demographic questionnaire. A Needs Assessment Questionnaire developed by Ronald (1982) was used for the inservice group prior to the six hour program to prioritize their learning needs.

The null hypotheses chosen investigated three areas: the proportion of nursing educators with positive and negative attitude scores, the correlation between attitude scores and reported behaviors, and the relationship to participation in an inservice program with attitude score changes. Testing the null hypotheses at the .05 alpha level of significance revealed several findings.

Major Findings and Implications

In this section of the Chapter the major findings and implications of the study are reviewed. These results are stated in relation to each null hypothesis.

Null Hypothesis I

The distribution of nursing educators with a positive attitude towards computers is greater than or equal to 50 percent.

Null Hypothesis I was not rejected. The findings did not indicate that statistically significant numbers of nursing educators hold negative attitudes towards computers. However, the evidence points to the idea that nursing educators do posses positive attitudes towards computers. Sixty-six percent (N=90) had an Attitude Scale score equal to or above 40.67, which was the mean score of a multidisciplinary group of health professionals studied by Startsman and Robinson (1972), and Melhorn, Legler and Clark (1979).

The nursing educators mean score on the attitude scale was 43.69, which indicates that moderately positive attitudes towards computers exist. This mean score was exactly the same as Ronald's (1982) study of a national sample of nurse educators (N = 159). The results of the two studies indicate that nursing educators as a group have positive attitudes towards computers.

In addition, both studies had similar mean scores on the Attitude Scale Factors. The four factors are labeled as follows: computers are efficient and necessary (I), willingness to accept and use computers (II), potential threat to employment (III), and benefits to solve problems of hospitals (IV). Nurse educators positively viewed computers as highly efficient and important machines (Factor I). However, they had the most negative attitudes in relation to personally using a computer (Factor II). The mean score on potential threat to employment (Factor III) was scored most positive and benefits to hospital to solve problems was third most positive (Factor IV). The factor analysis results indicates that nursing educators positively viewed computers from an objective and general evaluation stance.

Five one-way analyses of variance performed indicated that there were no significant differences on Attitude Scale scores between different groups based on terminal degree, rank, hours of formal instruction in computers, hours of self instruction in computers and hours of use of computers. A sixth one way analysis of variance indicated that a significant difference does exist between the attitude scale score and a yes - no response to the question. "Do you consider yourself to be comfortable using a computer?"

The implications from these results are interesting. Prior studies on nurses found that a negative attitude toward computers exists. This study and Ronald's (1982) indicates that nurse educators as a group hold positive attitudes. These data should alert people that nursing educators do view computers with a positive attitude. However, the factor analysis from both studies indicates that negative attitudes may arise in relation to personal use. Thus, the personal-use issue needs to be investigated as an area of concern for nurse educators.

It is interesting to note that no significant relationship exists between the attitude scale scores and nursing educators' hours using the computer for self-instruction, formal-instruction and use. Prior studies, as discussed in Chapter Two, indicated that a correlation exists between attitudes and hours exposed to the computer, whether it be by use or classes (Ball, Snelbecker, Schechter, 1985; Klonoff & Clark, 1975; Melhorn, Legler & Clark, 1979; Rosenberg, Resnikoff, Stroebel & Ericson, 1967). The present study raises a question about the strength of this correlation as an indicator of attitude. Increased hours in instruction, and use do not mean a positive attitude will arise.

These results are supported by Fishbein and Ajzen's (1975) theory on attitudes and behaviors. Attitudes are

learned through past and present events. This acquired knowledge results in numerous beliefs being held about an object, in this instance computers. The actual hours on line, so to speak, may be only one of several learning experiences. As discussed previously, each educator's learning experience was evaluated only in context of current hours of use. Thus, it is not suprising to find an insignificant correlation between these hours and attitudes. In prior studies, the cognition component, i.e. knowledge level, was seen as a predictor of attitude. The affective labeling of an object, i.e the computer, as good/bad also needs to be explored in relation to attitudes. The conation, i.e. intent to perform some behavior, and overt behavior are both pre-disposed by affect and cognition. Thus, the question becomes one of looking at both the knowledge level and degree of comfort of nurse educators. Program planners and investigators need to evaluate the comfort and knowledge level of nurse educators in relation to computers.

Null Hypothesis II

No correlation exists between nursing educators' scores on an "Attitude Scale" and their scores on a "Computer Use Instrument."

Null Hypothesis II was not rejected. The findings did not indicate that a statistically significant correlation

exists between scores on the Attitude Scale and the Current Use Instrument.

Fishbein and Ajzen (1975) discuss the concept that attitudes predispose but do not predict behaviors. One's overt behavior may be different from what one would anticipate based on existing attitudes. The correlation of nursing educators' attitudes to self-reported behaviors was not significant at R = .2044 although the results did approach the level of significance (p = .061) they were not significant at p = .05. Thus other factors may be influencing overt behaviors, one of these factors is labeled conation by Fishbein and Ajzen. The measurement of conation, i.e. societal norms, personal values etc., were not measured in this study and may need to be investigated in future studies.

The implications from these results reinforce not assuming that a positive attitude towards an object are positively correlated to self-reported behaviors. Although a relationship between attitude and behavior exists, the measurement of an attitude is not predictive of behavior because other variables exist. In this study the other factors involved in relation to nursing educators computer literate behaviors were not investigated.

An additional implication is for instrument modification. The game reported use of computers is not correlated with other uses of computers and may best be

omitted since its absence improves the current use instrument's reliability. It has been implied in the literature that the use of games may be a less stressful way of increasing computer comfort; therefore, games may be included under self-instruction. More extensive testing of this instrument should be done to improve validity and reliability.

Null Hypothesis III

A specific inservice education program designed to meet nurse educators' self-identified learning needs for becoming computer literate will not cause nursing educators to have a more positive attitude towards computer scores.

Null Hypothesis III was not rejected. The findings did not indicate that the inservice program caused a change in nursing educators' attitudes. Five major rationales for these results were postulated: the attitudes were already positive before the inservice began, the amount of time in hours and weeks for the inservice program was too short, the needs assessment did not address content needs, affective learning was ignored, and the Attitude scale was sensitive to a change in the experimental groups beliefs.

The mean score on the Attitude Scale for the control pretest group was 42.133 (N=15). This is a slightly positive score. The inservice program was designed assuming that negative attitudes existed. Thus, the presentation was

planned assuming that approaching the group with a positive attitude towards computers and with general introductory material would improve attitudes. The inservice may have produced no significant change because general knowledge and positive attitudes already existed.

Another postulated reason for no significant differences may be due to the length of the inservice (six hours) instruction over a four week period. The literature review indicated that researchers were finding attitude shifts after two to six hours of inservice in a one day time period. However the attitude measurements were not used consistently for these studies and the difference between the results in this study and others may be reflective of the instrument used. Significant attitude changes may take a longer time to develop than participating in a six-hour inservice over three weeks.

The Needs Assessment Questionnaire helped define the content areas. The sixteen item assessment resulted in prioritizing general items like teaching students, quality of nursing education, cost of nursing education, and curriculum planning. These and the other areas were taught on an introductory level. It is not known if the knowledge level increased because this was not measured. However, one may assume that learning introductory content based on the Needs Assessment Questionnaire alone does not result in a

significant change in attitudes for nurse educators at the participating institution.

The other major postulation may be that the level of comfort in the use of computers for each nurse educator was not a focal point of the inservice. Perhaps more of the learning should focus on individual comfort as opposed to the knowledge deficit and attitudes. The inservice program would then discuss feelings, beliefs, and good/bad evaluations of computers by the nurse educators. Lastly, the attitude scale used may not be sensitive to nursing educators attitude changes. This scale is documented as a reliable and valid instrument for measuring attitudes of health professionals towards computers. As such, it was used as one way to measure nursing educator's attitudes in relation to other health professionals. However, it may be that this instrument is not sensitive to changes in nursing educators, which may exist as a result of attendance at the six hour inservice program.

The obvious implication is that a duplicate inservice program is not recommended for all nursing educators if a change in attitudes is a goal. Those holding negative attitudes may be identified and an inservice program designed to help them increase their comfort level. The hours and length of the program need to be considered in context of promoting an attitude change. The Needs Assessment is a useful and reliable tool but it cannot be

the sole indicator of content if an attitude change is the goal.

When planning a program where a separation of nurse educators with negative attitudes from positive attitudes is not possible, one might assume that positive attitudes exist among a majority of the participants. In this case the program goals would not be focused on promoting an attitude change. The Needs Assessment is useful here; however, supplemental information still needs to be obtained from the learners perhaps by open ended questions.

One last implication based on data obtained from both sample populations relates to the Attitude Scale. Unsolicited comments on the scale were received from 11.2 percent of the population (N=125). All comments indicated that the statements were too vague. This raises the question about whether this Attitude Scale accurately measures all nursing educators' specific concerns about computers in 1986. This scale was useful for Hypothesis I when determining if nursing educators had positive or negative attitudes in relation to other health professionals. It also was useful for comparing attitude scale scores to current use scores. However, this instrument may not be sensitive to attitude changes among nurse educators attending an inservice. In the future, when choosing an attitude scale for nursing educators equal consideration should be given to tools which

may be developed specifically for nurses and nurse educators.

Recommendations for the Education of Nurse Educators

Education of Current Nurse Educators

The primary recommendation is for current nursing educators to receive on-the-job training to promote positive-use attitudes and computer-literate behaviors. Since most educators have overall positive attitudes towards computers but are negative in relation to personal use, on-the-job facilitation of learning is indicated. This day-to-day on-going inservice could address personal use concerns by providing for the motivation that nurse educators may need to learn computer literate behaviors.

An orientation program, at the start of on the job training, could identify problems, present needed knowledge, discuss attitudes, and provide hands-on practice time. The structure of the inservice orientation program would be based on the nurse educators' stated individual concerns. One component for the orientation process would be for all nurse educators in the program to decide how the ongoing job training program would function.

Merrow's (1985) study on nursing service personnel and educators cited three significant factors for facilitating on-the-job learning. These factors are hands on experience, patience of self or the instructor, and a supportive envi-

ronment (p. 88). Each of these factors needs to be considered when planning the inservice program. Computers need to be readily available and accessible for hands on experiences. The facilitator needs to be knowledgeable and patient. The department needs to provide support by allowing their educators time and money to learn about computers.

The actual content learning needs could be identified through use of tools such as Ronald's Needs Assessment (1982), and other more open-ended questions. Four prioritized learning needs by nursing educators in this and Ronald's study were: teaching students, impact on the cost and quality of education, and curriculum planning. Each of these areas relate directly to the educators professional role as teachers. This finding supports the adult education principle that learners are most interested in learning about practical and relevant information. Thus, it is recommended that programs to develop computer literacy for nursing educators have content related to educational responsibilities.

The on-the-job inservice program could be augmented by the three other currently existing educational models discussed in Chapter Two; education by hardware and software vendors, continuing education, and baccalaureate curriculum. Vendor interested in teaching educators about their products and continuing education are methods which are useful for current nursing educators to engage in while working.

Baccalaureate and graduate curriculum changes are useful for the preparation of future nurse educators.

The affective learning needs could be identified by simply asking the participants "Do you consider yourself comfortable using a computer? yes ____ no ____ sometimes _____ Please explain in detail your 'sometimes' response." The information gathered would then provide a base for discussion of affective feelings towards computers or competence in using computers. The goal being one of increasing each participants' comfort level in the use of computers, by discussion and additional activities (i.e., actively using a terminal).

Education of Future Nurse Educators

The implications for undergraduate and graduate nursing education are towards immediate curriculum changes which allow for inclusion of content on computer usage. Basic introductory education is needed for all undergraduate students so that they may function in their roles as information specialists. Building upon this, graduate programs could then focus on developing graduate students into system specialists. As graduate students, future nurse educators need to learn about computer use within the context of their future roles.

The current expectation of many faculty in graduate programs is that using computers for research and

statistical analysis is sufficient learning. This type of learning is necessary but producing nurse educators who are personally comfortable using computers for teaching requires more then research and statistical analysis. Schools not already doing so need to add courses and/or integrate content on computer use for nurse educators. The learning needs to address both cognitive, affective and psychomotor (hands on) learning.

Recommendations for Future Research

Based on the results of this study specific recommendations for further research are made. It is believed that the recommended studies will extend the meaning and generalizability of the present investigation.

1. Those nursing educators with positive attitudes and who are not computer literate need to be assessed for ways to help them move from a positive attitude towards competence in computer use.
2. Those nursing educators with negative attitudes need to be studied for ways to help them become more comfortable with computers.
3. To assist current nursing educators become computer literate in their jobs, studies on how on-the-job professional development could be implemented would be beneficial.
4. The needs assessment questionnaire focuses on a knowledge base. It could be modified to include

educator identified learning needs on how to become computer literate.

5. The current use instrument should be refined, with further testing for validity and reliability.
6. Studies using other attitude scales to identify nurse educators' attitudes could be conducted. Including a study comparing the Startsman and Robinson's Attitude Scale to other attitude scales.
7. A study on the intentions to perform computer use behaviors, and actual behaviors would be an informative for why more educators are not using computers.
8. Undergraduate and graduate schools of nursing need to be surveyed to find out how the computer use learning needs of present and future nurse educators are currently being met in the existing curriculums.
9. Nursing educators need to be surveyed to arrive at a mutually agreed upon definition of computer literacy.

Summary

The present study has been an exploration of nurse educators' attitudes toward computers, their current use of computers, and education to promote positive attitudes. The data implies that nursing educators have generally positive attitudes but tend to be negative in relation to personal use. Further, the data did not show that there is a

relationship between the self-reported current use of computers behaviors and attitude scores. The six hour inservice program which was offered was not found to cause changes in attitude scores amoung nurse educators.

The findings of this study should diminish concerns over nurse educators having negative attitudes towards computers. The problem lies in helping nurse educators to use computers. The findings provides a guide to those planning programs to help current and future nurse educators become computer literate. Developing computer literate nurse educators is one way to ensure that future and present nurses remain current in a rapidly changing technological society.

APPENDIX A
Letter Requesting Faculty Names

ANDREA JANE WALLEN
¥Home_Address¥

February 6, 1986

¥Addresse¥

Dear ¥Salutation¥:

As a nursing educator and doctoral candidate in the Curriculum Studies Center at the University of Massachusetts at Amherst, I am conducting a dissertation research project focusing on nursing educators knowledge about computers.

I am requesting a list of your current nursing faculty, whose primary responsibility is teaching Baccalaureate students. Upon receipt of names from a State wide pool, individuals will be randomly selected and asked to participate in my study.

I appreciate your taking time out of a busy schedule to mail me a roster of your current undergraduate faculty.

Sincerely,

Andrea Jane Wallen
Assistant Professor
Fitchburg State College

APPENDIX B
Cover Letter to Faculty
ANDREA JANE WALLEN
¥Home_Address¥

¥Date¥

¥Addressee¥

Dear ¥Salutation¥:

As a nursing educator and doctoral student in the School of Education at the University of Massachusetts at Amherst, I am conducting a dissertation research project focusing on nursing educator's knowledge about computers.

Currently computers are being used with increasing frequency in nursing education. Many nursing programs have a computer system while others are considering installing one. I am exploring how computers are impacting nursing educators. I believe the findings of this study will identify common learning needs of nursing educators in relation to using computers for teaching and curriculum development.

I received your name from your department chairperson and at this time I am requesting your assistance to complete the enclosed two questionnaires. They will take only 10-15 minutes to complete. Your thoughtful responses to these questionnaires are critical to the accuracy of this study. The questionnaires are anonymous. However, the envelope has been coded. Upon receipt of your response your questionnaires and envelope will be immediately separated. The questionnaire will be anonymously placed with other responses. The envelope will be used to identify who has responded so that a follow up mailing can be sent to non-respondents.

Please return the questionnaires in the enclosed, self-addressed, stamped envelope no later than (date). If you have any questions or comments please write or contact me by phone (¥Tel_No¥).

Thank you for taking time out of an already busy schedule to assist in this study. Your participation is appreciated.

Sincerely,

Andrea Jane Wallen
Assistant Professor
Fitchburg State College

APPENDIX C

Repeat Cover Letter to Faculty

ANDREA JANE WALLEN

¥Home_Address¥

April 4, 1986

¥Addressee¥

Dear ¥Salutation¥:

Recently I asked you co complete two questionnaires for my dissertation on nursing educators knowledge about computers. As a faculty member I realize that responding to questionnaires tends to be a low priority task. However, your responses are critical to the accuracy of this study. Completing the questionnaires will only take 10 - 15 minutes of your time. The two questionnaires and a self-addressed, stamped envelope are enclosed.

Thank you for your consideration and participation.

Sincerely,

Andrea Jane Wallen
Assistant Professor
Fitchburg State College

APPENDIX D

Attitude Scale

QUESTIONNAIRE ONE

Instructions: The purpose of the following scale is to describe your perceptions of the computer. There are no right or wrong answers. Information about your feelings is an important component of a curriculum plan for a faculty development program about computers.

Please read the following statements carefully. Using the code below, circle the number which best describes your feeling about the statement.

CODE: 0 Strongly disagree 2 Undecided 4 Strongly Agree
1 Disagree 3 Agree

1.	Computers are highly efficient machines.	0	1	2	3	4
2.	Computers have created a tremendous breakthrough in the scientific field.	0	1	2	3	4
* 3.	Computers are bad because they take peoples jobs away.	0	1	2	3	4
4.	When errors become numerous in an office, it helps to install a computer.	0	1	2	3	4
5.	The modern hospital is badly in need of a revolution by computers.	0	1	2	3	4
6.	If it were not for computers, we would probably be ten years behind our present technological pace.	0	1	2	3	4
* 7.	Computers should be used only for menial repetitive tasks which require little thinking.	0	1	2	3	4
* 8.	When a computer is installed in business some people generally lose their jobs.	0	1	2	3	4
9.	I would rather have a computer solve a problem for me than a mathematician.	0	1	2	3	4
10.	Computers could help slow the rising rate of hospital costs.	0	1	2	3	4
* 11.	Computers should be used in purely scientific situations only.	0	1	2	3	4
12.	The computer can store or "remember" an unlimited amount of information.	0	1	2	3	4

13. I would not mind having the computer determine the jobs I do. 0 1 2 3 4

14. The people who speak out against computers are the ones who know very little about them. 0 1 2 3 4

* 15. Machines like computers contribute to the decaying of morals because they make things too easy. 0 1 2 3 4

* 16. Computers have contributed to the shortage of employment. 0 1 2 3 4

* High score indicates disagreement

APPENDIX E
Demographic Data

Instructions: Please check the most appropriate answer.

1. Position: Faculty____: Administrator_____: Both ____

2. Primary teaching responsibility:

   Undergraduate _____ Graduate _____

3. Highest earned degree:

   Masters in Nursing _____ (Please specify date)

   Masters in Non nursing _____ (Please specify field and date)

   Doctorate _____ (Please specify date)

4. Age: _____ years (Please specify)

5. Rank: Lecturer _____ Instructor _____

   Assistant _____ Associate _____ Full _____

6. Approximately how many hours of formal instruction have you had about computers? (e.g. Classes or conferences.

   None _____ 1-5 _____ 6-15 _____ 16-30 _____ over 30 ___

7. Approximately how many hours of self-instruction have you had about computers?

   None _____ 1-5 _____ 6-15 _____ 16-30 _____ over 30 ___

8. Approximately how many hours have you spent using a computer?

   None _____ 1-5 _____ 6-15 _____ 16-30 _____ over 30 ___

9. Do you consider yourself to be comfortable using a computer? Yes _____ No _____

10. Comments:

APPENDIX F
Current Use Instrument
QUESTIONNAIRE TWO

Instructions Using the scale below, please circle the appropriate number indicating the amount of time you currently use computers:

	Not at all	Rarely	Occasionally	Frequently	Daily
Test Scoring/ Analysis	0	1	2	3	4
Research and Statistics	0	1	2	3	4
Clinical Practice	0	1	2	3	4
Teaching Students/ Nurses	0	1	2	3	4
Curriculum Planning	0	1	2	3	4
Self Instruction	0	1	2	3	4
Word Processing	0	1	2	3	4
Personal Business	0	1	2	3	4
Games	0	1	2	3	4
Design/ evaluate software	0	1	2	3	4

Additional Comments:

* Note: Modified from "Computer Applications in Nursing" by B. Heller, C. Romano, S. Damrosch and P. Parks, Computers in Nursing, 1985, 3 14-21. Copyright 1985. Reprinted by permission.

* This information was not on the mailed out Instrument during the study.

APPENDIX G
Cover Letter to Hypothesis III Faculty
ANDREA JANE WALLEN
¥Home_Address¥

January 21, 1986

¥Addressee¥

Dear ¥Salutation¥

Currently computers are being used with increasing frequency in nursing education. As you well know our nursing department is requesting twenty microcomputers for faculty and student use.

During my Sabbatical I am conducting a dissertation research project focusing on nursing educators knowledge about computers. At this time I am requesting the assistance of the entire nursing faculty at Fitchburg State College to complete a significant portion of my study.

During February and March I plan to randomly divide the faculty into two groups. "Group A" faculty will be requested to complete two questionnaires. "Group B" faculty will be requested to complete two questionnaires and participate in a six hour inservice education program. This program will run over a three week period during February and March. The program offering has been submitted to Massachusetts Nurses Association for approval for contact hours.

I plan on attending the February 5th faculty meeting to answer any questions. At this time I am looking for a "willingness-to-participate consensus."

I would appreciate your completing the attached sheet and placing it in my mail box as soon as possible.

Sincerely,

Andrea Jane Wallen

APPENDIX H
Participation Consent Form

TO: Andrea Wallen

I am ☐ am not ☐ willing to participate in your dissertation study.

Comments:

_____
Signature

APPENDIX I
"Group A" Cover Letter

ANDREA J. WALLEN
¥Home_Address¥

February 10, 1986

¥Addressee¥
Dear ¥Salutation¥

Thank you for agreeing to participate in my study. I have randomly divided the faculty into two groups. Each group will receive questionnaires to fill out. I am requesting that you not discuss the questionnaires with other members of the nursing department. Your cooperation is essential to the accuracy of the data. I plan to share all information with you once the data is gathered (mid-April).

You have been randomly assigned to Group A, the group to fill out three questionnaires. Enclosed you will find two questionnaires which will take only 10-15 minutes to complete. Please return them by February 15th. Confidentiality and anonymity will be maintained. You will receive one more brief questionnaire on March 14th.

As I stated in the February 5th faculty meeting, I will be happy to offer the inservice program to you after my data has been gathered. If you have any questions please feel free to phone me at home (¥Tel_No¥). Thank you again for your cooperation.

Sincerely,

Andrea Wallen

APPENDIX J
"Group B" Cover Letter

ANDREA J. WALLEN
¥Home_Address¥

February 10, 1986

¥Addressee¥
Dear ¥Salutation¥

Thank you for agreeing to participate in my study. I have randomly divided the faculty into two groups. Each group will receive questionnaires to fill out. I am requesting that you not discuss the questionnaires with other members of the nursing department. Your cooperation is essential to the accuracy of the data. I plan to share all information with you once the data is gathered (mid-April).

You have been randomly assigned to group B, the inservice group. The six hour presentation entitled "Computers in Nursing Education" has been approved for six contact hours by the Massachusetts Nurses Association. I plan to offer the program in one to two hour blocks of time beginning February 24th and ending by March 13th. As I stated in the February 5th faculty meeting the inservice will be offered several times each week so that everyone is able to participate. I have enclosed a time schedule for you to complete so that I can accommodate your schedule.

Enclosed you will also find a "Needs Assessment Questionnaire" which will take 5-10 minutes to complete. This will give me an indication of the groups learning needs. Confidentiality and anonymity will be maintained. Again please do not discuss this questionnaire. I would appreciate your returning the time schedule and questionnaire by February 15th so I can give you the times on Monday, February 17th.

If you have any questions please feel free to phone me at home, (¥Tel_No¥). Thank you again for your cooperation.

Sincerely,

Andrea Wallen

APPENDIX K

Needs Assessment Questionnaire

Instructions: The purpose of the second scale is to identify your educational needs with respect to computers. Each statement identifies one area of study which could be included in a computer course for nurses.

Each statement should be rated in two different ways using two sets of numbers. The first set of numbers describes your present level of knowledge with respect to the statement. The second set describes the level of knowledge which you would like to have. (If you have as much knowledge as you would like to have, the same number should be circled in each column.)

Please circle one number under Current Knowledge and one number under Desired Knowledge which best describe your feelings. Use the code below:

CODE 0 Very Low 2 Moderate 4 Very High
1 Low 3 High

	Current Knowledge	Desired Knowledge
1. How a computer functions. (i.e. its anatomy and physiology)	0 1 2 3 4	0 1 2 3 4
2. Privacy considerations in a computerized information system.	0 1 2 3 4	0 1 2 3 4
3. Role of the nurse in the development of computer applications in Nursing.	0 1 2 3 4	0 1 2 3 4
4. Ways in which computers can be used to:		
a. help nurses care for patients (e.g. develop nursing care plans, physiological monitoring)	0 1 2 3 4	0 1 2 3 4
b. assist nursing administrators (e.g. nurse staffing based on patient profiles)	0 1 2 3 4	0 1 2 3 4
c. teach students (e.g. simulated clinical decision-making)	0 1 2 3 4	0 1 2 3 4
d. help in curriculum planning (data bank of instructional objectives, content, methods resources and evaluation tools)	0 1 2 3 4	0 1 2 3 4
e. aid in statistical analysis and nursing research	0 1 2 3 4	0 1 2 3 4
f. other (specify)	0 1 2 3 4	0 1 2 3 4

APPENDIX K (continued)
Needs Assessment Questionnaire (continued)

CODE: 0 Very Low
1 Low
2 Moderate
3 High
4 Very High

	Current Knowledge	Desired Knowledge
5. Effect of the computer on:		
a. role of the nurse	0 1 2 3 4	0 1 2 3 4
b. role of the educator	0 1 2 3 4	0 1 2 3 4
c. the quality of health care	0 1 2 3 4	0 1 2 3 4
d. the cost of health care	0 1 2 3 4	0 1 2 3 4
e. the quality of nursing education	0 1 2 3 4	0 1 2 3 4
f. the cost of nursing education	0 1 2 3 4	0 1 2 3 4
g. other (specify)	0 1 2 3 4	0 1 2 3 4
6. How to write an original computer program	0 1 2 3 4	0 1 2 3 4
7. How to use a computer terminal including "hands-on" experience	0 1 2 3 4	0 1 2 3 4
8. Other (please list below)		
_____	0 1 2 3 4	0 1 2 3 4
_____	0 1 2 3 4	0 1 2 3 4

* Note: From "Attitudes and learning needs of nursing educators with respect to computers: implications for curriculum planning" by J. S. Ronald, Dissertation Abstracts International, 43(1), 2879-A, Copyright 1982. Reprinted by permission.

* This information was not on the questionnaire during the study.

APPENDIX L

Inservice Program Design

Title: Computers in Nursing Education

Faculty: Andrea Jane Wallen

CEU: "This offering has been approved for 6 contract hours by the Massachusetts Nurses Association which is accredited by the Eastern Regional Accrediting Committee of the American Nurses' Association"

Teaching Style: The principles of adult education will be the primary teaching methodology. The instructor will act as a facilitator of learning by helping learners to increase their knowledge about computers. Informed discussions and active participation by both learner and facilitator will be the format.

Computers in Nursing Education

Presented by: Andrea Jane Wallen

Spring 1986

Objectives:

Identify how computers are used in nursing education.

Identify basic concepts about how a computer functions.

Explain how to access a terminal to use software.

Describe complexities of writing software program

Describe your perceptions of the effects of computers on the quality of nursing education.

Explain how you think your teaching roles may change if computers are being used at your program.

Explain what you would need to do to become a "computer literate" nursing educator.

Identify ways your students could be helped to become "computer literate".

Needs Assessment Questionnaire Results

Priority	Statement
1	Teach student
2	Quality of Nursing Education
3	Cost of Nursing Education
4	Curriculum Planning
5	Statistics and research
6	Role of nurse in development of computer applications.
7	Help nurses care for patients
8	Role of the educator
9	Write an original program
10	Cost of health care
11	Computer functions
12	Privacy considerations
13	Quality health care
14	Use on terminal
15	Role of the nurse
16	Assist nursing administrators

Week I

Hours	Objectives
2	Identify how computers are used in nursing practice. Identify how computers are used in nursing education.

Needs Assessment Priority	Content Outline
	I. Introduction
	II. Nursing care of patients
7/13/15	A. Roles of nurse (documentation, plan care, monitoring, departmental communications, etc.)
10	B. Cost of Health Care (time=money)
16	C. Nurse administrative role (very brief)
12	D. Privacy considerations
	III. Statistical analysis and research
	A. Types statistical packages
	B. Data base
	C. Editing
	IV. Nursing education
1	A. How used by nursing programs
1	B. Computer assisted instruction
1	C. Computer managed instruction
2	D. Quality nursing education
3	E. Cost of nursing education

Week II

Hours	Objectives	*Needs Assessment
2	Identify base concepts about how a computer functions. Explain how to access a terminal to use software. Explain complexities of writing software	

*Needs Assessment Priority	Content Outline
11	I. Describe how a computer functions. A. Types of computers B. Functioning of hardware C. Software
8	II. Evaluation of software
5/9	III. How people write computer programs
14	IV. Practice how to use a terminal A. Access B. Discuss CAI C. Evaluate program previewed

Week III

Hours	Objectives	*Needs
Assessment		
2	Describe your perceptions of the effects of computers on the quality of nursing education. Explain how you think your teaching roles may change if computers are being used at your program. Explain what you would need to do to become a computer literate nursing educator Identify ways your students could be helped to become computer literate.	

Needs* Assessment Priority	Content Outline
4	I. Curriculum planning
	A. How computers are used in nursing programs for management (e.g. database, scheduling clinical, etc.)
12	II. Students
	A. Confidentiality issues with data on computer.
1	B. Expectations of graduates
1	C. How students learn about computers
8	III. Roles computer literacy for nurse educators
5/6	A. Roles current and future development
	B. Discuss how they can become more computer literate.
	IV. Closure - summary
	V. Questionnaires and evaluations

* Please see need assessment priority list to identify learning need.

APPENDIX M

Subjects' Comments About Their Use of Computers

I. Subjects from Hypothesis I and II

A. These respondents do NOT consider themselves to be comfortable using a computer.

Comment #1: My language for my PhD is Basic Computer for which I must pass a proficiency Exam. I, therefor, will be taking additional courses etc. in computers so I will be comfortable.

Comment #2: Due to changes in systems and program packages if one does not keep up-to-date in use of computers it is easy to become outdated and uncomfortable with the language of computers.

Comment #3: Having just completed a second Masters Degree, I am now going to concentrate in computers.

Comment #4: So far the software we have evaluated have not met our needs and several programs have been confusing to follow - therefore although we have access to computers at the college we have not been able to use them in our course as yet.

Comment #5: Would like to use them more - need to be able to buy one - it is hard to use on campus with any degree of expertise.

Test scoring and analysis is used in this department but I have not done it myself.

Clinical areas have computers in nurse stations students learn to use them while in my rotation.

Comment #6: Faculty have written grant and have received approval for computerized lab for student/faculty use.

Comment #7: Time has been my major problem in using the computer and self instructing myself. I desperately need to utilize it for word processing. I attended AJN Software Evaluation Conference in Chicago - very helpful in gaining beginning understanding.

Comment #8: Am planning to use word processing from there, who knows?!

In a prior position as nurse administrator of a home health agency, helped decide on data needed; also became reasonably proficient in understanding and using output data. Have no skills in "xx" approach, however.

Comment #9: During the help-session I attended I found that the program had been set up so that one tiny error invalidated one hour of work. This did not impress me. I have since been told that the program could be set up differently.

I was slightly encouraged by watching someone use a word processor. I think I could learn that.

Comment #10: I have been away from computers for 5 years - am not comfortable yet with using them again.

Comment #11: I'm in the process of learning from my husband who is expert. I realize I need to know how to utilize the computer for more efficient work.

Comment #12: I am becoming more comfortable. Can see the value of them. Need more practice as I believe that is the best way to learn.

Word processors have become very popular and at least here are advocated (although not available) for every faculty member. My only concern is that I want the secretary to do much of the work I would use the processor for. In that sense it would not be helpful to me as it takes a lot of time.

B. These respondents consider themselves comfortable using a computer.

Comment #1: Every time I use the computer I learn something. My use has been restricted to word processing.

Comment #2: I have been exposed to computer technology and resent the implication of fear of using the machine. Recently, I had a faculty development program in which the faculty learned about and participated in using an instructive computer from Actronics. One of the first concepts promulgated by the nurse lecturer was this element of fear. I rather resent it. Computers had made life easier in the University regarding grading, item analysis and research... I do not envision myself as the kind of person who could sit in front of a C.R.T. and derive satisfaction from just working with a machine. I am fascinated by the concept of A & I and anticipate its use in education.

My only concern with technology is that it changes and is upgraded at the blink of an eye. In investing in a piece of very expensive equipment, it is outdated at the time of purchase.

Comment #3: Opened a new world. So far I have used the processing program only. I am more productive and my writing has improved.

Comment #4: I'm familiar with 2 main programs... Our school has purchased a brand of computer that most xx publishers have no software for. We're supposed to be receiving apple/or IBM's so hopefully we'll have programs for students/curriculum/test banks etc. available in the future.

Comment #5: Although at times I have my frustration!

Comment #6: Primarily using word processing to date but have begun with Lotus Spread Sheet and some programming and instructional learning disc.

Comment #7: Have a Kampo II - am still learning.

Comment #8: Yes but it depends on the program.

Comment #9: Until its something new then I'm not until I m,aster it!

Comment #10: I have written an Injury data analysis program - do statistical programming (SAS) - test grading & analysis - have a "calendar" program that prints academic year - use TRS-80 equipment use word processing for research and classes - Have developed a "test bank" to print out test questions.

C. These subjects did not check off "yes" or "no" in response to their comfort level.

Comment #1: I am not afraid if that is what you mean.

Comment #2: I have used computers for programmed instruction on the undergraduate level - I did not like it - I felt it was too slow sometimes, too fast others. It was being used to replace something traditional not being used as offering something unique.

I felt that (as a graduate student) computers were magic - I used it to analyze research date.

Finally - I think that hospitals need to incorporate computers for records, drugs, lab work, movement of people and supplies, etc. - We waste too much time and effort

shuffling papers when communication and analysis (large parts of running a hospital) lend themselves to computers.

Comment #3: Depends for what?

Comment #4: Semi-comfortable.

Comment #5: ?

II. Subjects from Hypothesis III - Control Group

A. These respondents do NOT consider themselves to be comfortable using a computer

Comment #1: Would very much like to learn more in this area - am taking a general intro course to computers right now.

Comment #2: Fear of unknown - I am petrified of them yet I know I should learn how to use them. I would really like to understand the computer.
Comment #3: I need to update my skills - however right now my studies do not involve the use of a computer. I would use more if I had more time.

Comment #4: It has been a hit-or-miss type of computer self-education - mainly word processing with a little bit of basic.

Comment #5: I would guess I have computer phobia. I break out in a sweat when working with them.

B. These respondents consider themselves comfortable using a computer

Comment #1: For certain usages, not at all for others.

Comment #2: Word processor

III. Subjects from Hypothesis III - Experimental Group

A. These respondents do NOT consider themselves to be comfortable using a computer

Comment #1: In some areas - word processing comfortable - not comfortable with all aspects and uses of computer.

Comment #2: I need more time in formal instruction. Self instruction I can try to do that and I need more time using a computer.

B. <u>These respondents consider themselves comfortable using a computer</u>.

Comment #1: Need more practice.

APPENDIX N

Subjects' Comments About the Attitude Scale

When respondents in this study were completing the Attitude Scale handwritten comments appeared on the scale. At the completion of the study 14 out of 125 (11.2%) respondents wrote comments. All comments indicated that the statements were too vague. Respondents asked for clarification or else presented their own qualifiers to the statement. One person completed only 9 of the 16 items and concluded by saying "Comments on page 1 (Attitude Scale) are too simplistic too score." The following individual item numbers received individual comments: 1 (2 comments), 2 (2 comments), 3 (1 comment), 4 (5 comments), 5 (2 comments), 6 (2 comments), 7 (1 comment), 8 (2 comments), 9 (5 comments), 10 (2 comments), 11 (2 comments), 12 (3 comments), 13 (4 comments), and 14 (2 comments).

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