Diffusion of a Management Innovation in the Nursing Division of a Veterans Administration Hospital

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Loyola University Chicago

1989

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DEDICATION

To my best friend and husband, Anthony J. Lio, for all his love, support, encouragement, understanding, and computer expertise.

To my Mom and Dad for their continued support and encouragement in all that I do.
ACKNOWLEDGMENTS

My appreciation is extended to my research advisor, Sheila Haas, R.N., Ph.D. and to my committee member, Diana Hackbarth, R.N., Ph.D.

The assistance of Constance Reid, R.N., M.S. is gratefully recognized in the statistical data analysis of this study.

The emotional and managerial support given by Catherine O'Brien, R.N., M.S. is clearly appreciated.
VITA

The author, Tammy Fay Lio, was born January 31, 1962, in Chicago, Illinois. Her elementary education was obtained at Portage Park Grammar School in Chicago, Illinois. Her secondary education was completed in 1980 at the Carl Schurz High School, Chicago, Illinois.

In September, 1980, Mrs. Lio entered Loyola University of Chicago, receiving the degree of Bachelor of Science in Nursing in May, 1984. She was a recipient of a Veterans Administration Health Professional Scholarship.

In July, 1984, Mrs. Lio started her employment at Edward J. Hines Veterans Administration Hospital. During her employment at Hines, she has been on the Nursing Service Evaluation committee, a recipient of the Outstanding Facilitator award, member of Hinesight editorial board, and a member of Nurse Professional Standards Boards. Mrs. Lio has been a member of the American Nurses Association and Midwest Nursing Research Society.

In January, 1986, Mrs. Lio started her graduate studies in nursing administration. In April, 1988, she was one of the founding members of the Graduate Student Nurse Association and elected the Vice-President. In August, 1988, Mrs. Lio was a recipient of a United States Health and Human Sources Graduate Traineeship at Loyola University of Chicago. She will be inducted into Sigma Theta Tau in April 1989.

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CHAPTER I

INTRODUCTION

Computer technology has revolutionized health care. Patient information is now stored on hard discs instead of bulging medical files. Retrieving laboratory and radiology reports can be done quickly by manipulating a few computer keys. Computers have accelerated the pace of society. Health care managers must keep up with our fast moving society; demands for information, especially management information.

The computer is seen as an essential tool for the manager. Nurse managers are now expected to be proficient in utilizing the computer. The manager can be more productive when time is spent on managing rather than on paperwork and computers have the potential to decrease time spent on paperwork.

The purpose of this thesis is to determine if Rogers (1973) Classical Diffusion Model explains the particular phenomena encountered in the adoption of a new innovation. The innovation in this study is the implementation of a computerized scheduling system, Automated Nurse Staffing Office System (ANSOS), in a large veteran's hospital. The population is the nurse managers who are expected to use the
ANSOS system in a large Veterans Administration (VA) medical center. This is an exploratory descriptive study of the impact of this innovation within the Clinical Nurse Administrator (CNA) group. The CNA in the Veteran's Administration Hospital is equivalent to a Head Nurse.

The research question in this study is: What is the impact of a new innovation such as computerized scheduling in terms of the perceived need for the innovation, understanding of the innovation, acceptability of the innovation, perceived participation in the innovation, timing of the innovation and the communication of the innovation on the population of the CNA's in one hospital?

There has been little research regarding the implementation of new technology in nursing administration. New technology is not only seen at the patient's bedside but also in nursing management. The nurse manager group is vital in managing the nursing staff, as well as, implementing the goals and objectives of the institution. If the goal or objective of the institution is to implement an innovation, it is part of the nurse manager's role to do so. How the nurse manager participates in change affects her nursing staff and the institutional outcomes and ultimately patient care.

The VA is the largest health care provider in the United States. Given this status, one may think that the VA is inundated with new technology and therefore deals readily with change. However, this is not the situation. One
senior VA nurse administrator has stated that the VA is slow to respond to change. At the present time, the VA is playing catch-up in participating in change, especially those changes that relate to management technology. Change takes a long time to occur within the VA system because of the multi-level bureaucracy. Directives come from Central Office located in Washington, D.C. From there, the idea or plan is distributed to the focal VA facilities. An innovation is eventually implemented within the focal VA facility. It appears that no major change can occur without the Central Office being involved. The communication process is long, involved and tedious because of the complex bureaucratic and social system in the VA. It involves many levels, individuals and groups.

Rogers (1973) Classical Diffusion Model serves as the theoretical framework for this descriptive study. Rogers (1973) has identified four key elements in diffusion of change: an innovation, its communication via channels, a period of time, and members of the social system.

An innovation according to Rogers (1973) is "an idea, practice, or object perceived as new by the individual" (p.76). It does not matter if the innovation is not new as measured by time or when it was first used. It is the perceived newness of the innovation for the individual that determines his response to it.

Rogers (1973) defines social system as a set of interrelated units, engaged in reaching a shared goal, that
can be distinguished from their environment as a single entity. Examples of this are the head nurses in a hospital, graduate students in a particular university, or all the residents within the city.

The innovation-decision process is the mental process through which an individual passes from first knowledge of an innovation to a decision to adopt or reject and to confirm this decision (Rogers, 1973). The usual sequence of this process is knowledge, persuasion, decision and confirmation.

The following are characteristics of an innovation. These characteristics contribute to the rates of adoption of the innovation (Rogers, 1973):

1. Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes.
2. Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of the receivers.
3. Complexity is the degree to which an innovation is perceived as relatively difficult to understand and use.
4. Trialability is the degree to which an innovation may be experimented with on a limited basis.
5. Observability is the degree to which the results of an innovation are visible to others. (p. 77)

The communication channel is the means by which a message travels from a source to a receiver (Rogers, 1973). The two communication channels Rogers identifies are mass-media and interpersonal communication. The time dimension consists of the innovation-decision process, the
innovativeness of the individual and the rate of adoption (Rogers, 1973).

In the diffusion model, a change infiltrates a social system through various communication channels and over a period of time. Rogers (1973) believes that the individuals who make up that particular social system will fall into five adopter categories, depending on the way they "adopt a new innovation".

Innovativeness, as defined by Rogers (1973), means the degree to which an individual is relatively earlier in adopting new ideas than other members of his social system. Rogers hypothesizes five adopter categories which are the classifications of the members of a social system on the basis of innovativeness. These adopter categories are: 1) innovators, 2) early adopters, 3) early majority, 4) late majority, and 5) laggards. The rate of adoption consists of the time needed by the members of a social system to adopt an innovation. Figure 1 graphically depicts Rogers (1973) Classical Diffusion Model. It was developed by the investigator to help people understand his model.
A model depicting Rogers theory to explain how innovation diffuses through an organization.
It is hypothesized that Rogers (1973) Diffusion Model can be used to explain the process of introducing an innovation in the VA system. When the VA decides a change or innovation is necessary, the characteristics of the innovation need to be carefully examined. These characteristics are factors that influence the decision as to whether the innovation is feasible, appropriate or workable within the system. Once this has been determined, the VA could choose a communication channel or combination of channels, to transmit their message. The communication channel chosen should not be what is considered easiest to use but that which will augment the acceptability of the innovation.

The time element is very important, as it can help or hinder the innovation. If timing is considered too fast or too slow, the innovation could fail. The proponents of the innovation must have a grasp of what would be the best time for introduction and implementation. The intended target group or the social system, should be identified at the beginning of the innovation process. The communication channels and timing of the innovation should be adjusted to the group for which the innovation is intended.

The innovation that is the focus of this descriptive study is computerized scheduling. A questionnaire has been designed by the investigator, which assesses the communication channels utilized for disseminating the innovation as well as the time frame of the innovation (Appendix A).

Assumptions of this study are:
1. The CNA's have little knowledge of computerized scheduling.

2. The innovation or change has been planned.

3. The interview tool developed for the study will generate data to answer the research question.

4. The CNA's answers will be honest.

5. The interview tool has content and construct validity.

Limitations of this study are:

1. All the CNA's within the institution are eligible for participation. However the study is voluntary and some may choose not to participate which may limit the study.

2. This is a pilot study using a newly developed interview instrument.

Communication of a planned change in a large organization is a huge undertaking. Rogers (1973) Classical Diffusion Model is relevant because it proposes to explain the phenomena encountered in the adoption of an innovation. Results of this study may aid in development of strategies needed in approaching planned change or an innovation in the future.

There are no published tools grounded in Rogers theory (1973). Therefore, a tool has been developed. Questions on this instrument have been formulated to collect data on the elements of Rogers model. The tool has been evaluated for content validity by two Loyola faculty members who are content experts. The psychometric soundness of the tool was also evaluated by a third Loyola faculty member who is a
psychometric expert. The interview method was chosen because the instrument was being piloted and the study group was small. With interviews, in-depth answers were elicited to certain questions where the range of potential answers were great.
CHAPTER II

REVIEW OF THE LITERATURE

Diffusion research became visible after the publication of Ryan and Gross's (1943) study of the diffusion of hybrid seed corn among Iowa corn farmers. Data were gathered by means of personal interviews with 259 farmers from two Iowa communities. The respondents from the study were asked to recall when they adopted the hybrid seed, the communication channels from which they first learned about the innovation and how they were persuaded to use it. The characteristics of the early adopters and the late adopters were determined. The results of this study suggested that the innovators were better educated, better oriented to their social system, and were of higher socioeconomic status than the late adopters. The typical Iowa farmer first heard of the hybrid seed from salesmen, but neighbors were most frequently the communication channel that helped persuade the farmer to use the seed. The innovation-decision process from awareness - knowledge to final adoption averaged nine years, indicating that considerable time was required for adoption to occur (Rogers, 1973, 1976).

Ryan and Gross's (1943) study of hybrid seed started the modern-day diffusion research. This study approached communication and change in an entirely new way. Rogers
(1976) describes the direction set forth by the Ryan and Gross (1943) study:

1. The "S" shape of the rate of adoption of an innovation over time.

2. The characteristics of the various adopter categories.

3. The relative importance of different communication channels/sources at various stages in the innovation and innovation - decision process. Rogers (1976) (p.46)

Diffusion research has also been done in medical sociology with the diffusion of new drugs being the focus (Coleman, Katz & Menzel, 1957; Katz & Menzel, 1954; Winick, 1961). In education, the adaptability of schools to change and innovation was studied by Ross (1958) and Lin, Leu, Rogers, and Schwartz (1966). In mass communications, diffusion of news events have been studied by Greenberg and Parker (1965) and Deutschmann and Danielson (1960). Little convergence between the innovation diffusion tradition and organizational change research has been attempted (Lin, Leu, Rogers, & Schwartz, 1966).

In the 1960's, diffusion research initiated the rise of "KAP" studies. KAP studies are sample surveys of knowledge (K), attitudes (A), and practice (P), that occur in adoption of a family planning innovations (Rogers, 1976). The KAP surveys studied family planning programs in developing countries, especially in Asia.
The intellectual contribution of these KAP surveys to scientific understanding of human behavior change has been dismal (Rogers, 1976). This is attributed to the fact that human behavior change is much more complex than the model originally assumed. However, the KAP studies were useful in showing that most parents in developing countries want fewer children than they actually have and the majority desire a government family planning program (Rogers, 1976).

The family planning diffusion studies done in India (1968) were disappointing. Family planning innovations deal with beliefs that are held very closely to the individual and are taboo topics, at least among villagers and urban poor in less developed countries. These studies contribute information that assisted in modifications in the Classical Diffusion Model. The family planning studies promoted field experimental research designs. With the rise of field experiments, in place of a one-time survey design, methodological difficulties regarding the long-term aspects of communication of new ideas have been overcome.

Interpersonal and mass media channels are the two communication channels that Rogers (1973) identified. Rogers (1972) developed characteristics of communication and compared those characteristics to interpersonal and mass media channels. Table 1 summarizes the data on communication characteristics contrasting the interpersonal and mass media channels.
TABLE 1
CHARACTERISTICS OF COMMUNICATION

<table>
<thead>
<tr>
<th>Communication Channel</th>
<th>Interpersonal Channel</th>
<th>Mass Media Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. direction of message flow</td>
<td>two-way</td>
<td>one-way</td>
</tr>
<tr>
<td>2. speed to a large audience</td>
<td>slow</td>
<td>rapid</td>
</tr>
<tr>
<td>3. message accuracy to a large audience</td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>4. ability to overcome the selectivity processes (of selective exposure, perception and retention)</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>5. amount of feedback</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>6. possible kinds of effects</td>
<td>attitude change</td>
<td>increased knowledge</td>
</tr>
</tbody>
</table>

Rogers (1972) (p.127)

From this information, it appears that interpersonal channels are more likely to persuade than mass media channels. A common finding of diffusion research studies in the United States is that mass media is the most important channel in creating knowledge of an innovation, but interpersonal channels are more important in persuading individuals to be favorable toward a new idea (Rogers, 1972.)

Researchers have identified characteristics of early and late adopters. Early adopters have more education, higher socioeconomic status, are more cosmopolitan, feel they are adequately informed and use a greater variety of information sources (Lin, Leu, Rogers & Schwartz, 1966;
Rogers, Joyce, Leu & Mortimore, 1966; Brown, 1981). Late adopters, on the other hand, use fewer sources. They rely, in particular, upon social interaction and adopt primarily as the result of favorable information from one or more existing adopters (Brown, 1981).

The nursing literature has also examined change. The majority of these articles are testimonials of how change has been experienced or implemented. Most of these articles are not theory based. Concepts of facilitating change or the process of change have been written without a theory identified (Ellis, 1983; Haffer, 1986; Huffman, 1983). The theme of taking control of change appears frequently in the literature but also without a theory base (Ahmed, 1981; Daniels, 1986; Ingram, 1986; Letellier, 1976; McNamara, 1986).

The Rogers (1973) theory of diffusion has not been utilized in nursing research; therefore studies such as this are needed in nursing. Change phenomena occurring in nursing is a untapped area in which the diffusion theory could be applied.

More research needs to be done on diffusion of change because in nursing administration, diffusion research is relatively rare, as is the use of Rogers (1973) theory to explain or predict how organizational change should be managed. The only unpublished study using Rogers (1973) Classical Diffusion Model in nursing administration was done by Dr. D. Hackbarth in 1977. She looked at introducing
planned change in a complex organization. The innovation was a patient classification system. The communication channels used were formal inservices, group sessions and word-of-mouth. The results described the innovative and laggard groups that Rogers identified.

The setting of the study is quite important. As was stated earlier, the VA has been slow to respond to change. If the characteristics of the innovators and early adopters of the CNA group are identified, the VA may be able to utilize this knowledge when introducing other planned changes. The purpose of this study is to determine if Rogers (1973) Classical Diffusion Model explains the particular phenomena encountered in the adoption of an innovation.
CHAPTER III

METHODOLOGY

In order to determine if the diffusion model explains the phenomena encountered with the adoption of an innovation, each member of the Clinical Nurse Administrator (CNA) group was interviewed prior to the implementation of computerized scheduling using a questionnaire developed by the investigator.

A. Setting

The setting of the study was a large Veteran's Administration hospital of 950 beds located in the Midwest. The institution lies within a major metropolitan area. This institution provides health care to the veteran population.

B. Study Group

The study group consisted of all the Clinical Nurse Administrators within the institution. The actual number of CNAs was 39. The criteria for inclusion in this study was to be a CNA and give consent to participate. The achieved sample included all the CNA's, N=39.

C. Instrument
The instrument was designed especially for this study. The instrument sought to tap all of the elements of Rogers (1973) Classical Diffusion Model. Content experts were called upon to analyze the questionnaire. Recommendations were made and incorporated into the present tool. The tool contains items which address innovation, communication channels, time, social system, relative advantage, compatibility, complexity, trialability and observability. These components have been defined earlier. There are 52 questions in the questionnaire. Questions include but are not limited to experience with computers, learning of the computer scheduler, methods of communication regarding computerized scheduling and acceptance of computerized scheduling. The respondents answered open-ended questions as well as items seeking a "yes" or "no" answer and items requiring respondents to rate themselves on 5 and 7 point scales. Questions designed to describe demographic characteristics of the study group were also included.

Construct validity is important when developing new instruments. The questionnaire was designed to include all elements representing Rogers theory (1973), thus enhancing construct validity. The tool developed by Lin, Leu, Rogers, & Schwartz (1966) was also reviewed in developing the tool used in this study. The initial use of this tool was done on this study group of 39 CNA's. Therefore, this study is also a pilot study of a new instrument grounded in Rogers (1973) Diffusion Model.
The interview method was used. CNA's were also given an opportunity to provide written responses. Reliability was enhanced as the same introduction about the study and tool was given to each CNA. There was high agreement in coding between the principal investigator and the secondary coders of the open ended responses.

D. Research Procedure

The proposed study was discussed with the Chief Nurse of the VA hospital and she was enthusiastic and willing to facilitate the research. Access to the setting was accomplished after the proposal was approved by the University Institutional Review Board and the Institution's Internal Review Board for the Protection of Human Subjects. The CNA group were introduced to the study by the investigator who announced it at the CNA service-wide management meetings. The investigator explained the purpose of the study, the need for the study, why the CNA group was chosen, how the study would be carried out, and the time needed for each interview. CNA's were also told that there was a consent to participate, their participation is voluntary and the interviews were confidential and would be kept anonymous. The investigator scheduled the individual interviews by contacting each CNA. The interview process followed the questionnaire format and was administered in a face-to-face interview. The interviews were tape recorded in order to capture all the data. The questions involving
rating scales were written on 5 X 8 cards so each CNA could actually read the question and write on the scale. The interviews took approximately 30-45 minutes.
CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to determine if Rogers (1973) Classical Diffusion Model explains the particular phenomena encountered in the adoption of an innovation, specifically implementation of a computerized scheduling system.

A. Instrument

A newly developed instrument grounded in Rogers (1973) Classical Diffusion Model was developed and tested using Cronbach's Alpha. The tool is divided into four subscales. The first subscale is the adopter categories. These include items which rate rapidity of CNA adoption of computerized scheduling, comparison of adoption time with peers, and self-rating of adoption of change. The inter-item reliability of adopter categories is an Alpha of .77.

The second subscale is the characteristics of the innovation. These characteristics included difficulty of implementation, benefits of computerized scheduling, opinion of computerized scheduling working in the institution, and if computerized scheduling is better or worse than what is already in place. Other characteristics used in this subscale are perceived advantages and disadvantages of
computerized scheduling, problems anticipated and perceptions concerning if suggestions regarding computerized scheduling would be evaluated and considered. The inter-item reliability of characteristics of an innovation is an Alpha of .32. If disadvantages of computerized scheduling was dropped as an item of the characteristics of an innovation subscale, Cronbach's Alpha would increase to .45. Disadvantages is contrary with the characteristics of an innovation. In future uses, the item of disadvantages could be grouped in another subscale.

The third subscale tested is knowledge of computer scheduling. Items included reading about computerized scheduling, the amount read, experience with computer scheduling and the level of understanding of computerized scheduling. The inter-item reliability of this subscale is an Alpha of .68.

The fourth subscale tested is knowledge of computers. These items included experience with computers and how the computer will assist the CNAs in their managerial role. The inter-item reliability of this subscale is an Alpha of .08. This is may be due to the low response rate of the kinds of computer experience the CNA's had, with the average response stated of "order entry" and "data retrieval".

In summary, the two most significant Alpha's are the adopter categories and knowledge of computer scheduling. Considering the magnitudes of the two Alpha's on these subscales, the investigator feels comfortable using these
subscales in her data analysis.

B. Population

The population of interest included every Clinical Nurse Administrator (CNA) employed by the organization at the time of data collection (N=39). A description of the study group's characteristics by sex, age and marital status are presented in Table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>38</td>
<td>97%</td>
</tr>
<tr>
<td>Male</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29-34</td>
<td>10</td>
<td>26%</td>
</tr>
<tr>
<td>35-40</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>41-46</td>
<td>8</td>
<td>21%</td>
</tr>
<tr>
<td>47-52</td>
<td>6</td>
<td>16%</td>
</tr>
<tr>
<td>53-58</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>59-64</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>65-67</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never Married</td>
<td>6</td>
<td>16%</td>
</tr>
<tr>
<td>Married</td>
<td>24</td>
<td>63%</td>
</tr>
<tr>
<td>Divorced</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>Widowed</td>
<td>2</td>
<td>5%</td>
</tr>
</tbody>
</table>

As can be seen in Table 2, 38 or 97% of the study group were female. Since the nursing profession is still dominated by women, this result is not surprising. One respondent declined to answer year of birth. Sixty one percent of the study group were married at the time of
the survey.

Professional characteristics of the study group included initial nursing program, highest nursing degree, and plans for future education. Table 3 summarizes the educational preparation of the CNA's in the study group.

TABLE 3

INITIAL NURSING PROGRAM, HIGHEST NURSING DEGREE AND PLANS FOR FUTURE EDUCATION EXPRESSED IN FREQUENCY AND PERCENTAGES
N=39

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial nursing program</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>11</td>
<td>28%</td>
</tr>
<tr>
<td>ADN</td>
<td>8</td>
<td>21%</td>
</tr>
<tr>
<td>BSN</td>
<td>20</td>
<td>51%</td>
</tr>
<tr>
<td><strong>Highest nursing degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>8</td>
<td>20%</td>
</tr>
<tr>
<td>BSN</td>
<td>17</td>
<td>44%</td>
</tr>
<tr>
<td>BSN and some graduate studies</td>
<td>10</td>
<td>26%</td>
</tr>
<tr>
<td>MS</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>MS and some graduate studies</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Plans for future education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No plans</td>
<td>10</td>
<td>26%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>16</td>
<td>41%</td>
</tr>
<tr>
<td>Definite plans</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>Already enrolled</td>
<td>8</td>
<td>21%</td>
</tr>
</tbody>
</table>

The majority of the study group (69%) held a BSN or a BSN with additional graduate studies. Thirty three percent have definite plans to attend graduate school or are already enrolled.
Table 4 delineates the experience levels of the Clinical Nurse Administrators.

**TABLE 4**

YEARS OF NURSING EXPERIENCE AND EXPERIENCE AS A CLINICAL NURSE ADMINISTRATOR EXPRESSED IN FREQUENCY AND PERCENTAGES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years in present hospital</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>6-10</td>
<td>16</td>
<td>41%</td>
</tr>
<tr>
<td>11-15</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>16-20</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>21-25</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>26-30</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>31-37</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Years as CNA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>26</td>
<td>66%</td>
</tr>
<tr>
<td>6-10</td>
<td>6</td>
<td>15%</td>
</tr>
<tr>
<td>11-15</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>16-20</td>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>21-25</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>26-30</td>
<td>1</td>
<td>3%</td>
</tr>
</tbody>
</table>

The majority of the respondents (41%) have worked in their present hospital 6-10 years with the longest tenure being 37 years. Sixty six percent of the respondents were Clinical Nurse Administrators only 1 to 5 years. Of these, 58% had been CNA's one year or less. This illustrates a high turnover in this first-line management position and the relative inexperience of many nurses holding management positions in the organization.
C. Data analysis

The responses elicited from the 39 CNA's during interviews using the study questionnaire were analyzed. Questionnaire items were designed to tap perception of the parameters of Rogers (1973) Diffusion Model. Specifically, items were developed to identify perceptions of the perceived need, understanding, acceptability, perceived participation, timing, and the communication channels of the proposed innovation. All interviews were conducted by the researcher using the questionnaire. Interviews were tape recorded and transcribed.

Open-ended questions were evaluated for themes generated in the responses. Reoccurring words, phrases, or thoughts were noted. The investigator used a Q-sort methodology to categorize the themes into groups. Q-sort is a method used to sort words, phrases, or statements into piles according to specified criteria (Polit & Hungler, 1987). This methodology is designed to get maximum data from in-depth answers and to identify various themes. A Q-sort was done to analyze the qualitative data. The open-ended questions were evaluated for themes generated in the responses. Reoccurring words, phrases, or thoughts were noted. Q-sort groupings of responses for each question were analyzed by two content experts and agreement was achieved on all response groupings.

The first qualitative question on the questionnaire asked how will the computer assist in your managerial role.
The majority of the group could identify 1 or 2 advantages in computer assistance. They are listed below in descending order with the most frequent response first:

1. Record keeping  N=18
2. Other: communication, secretarial work can be done  N=11
3. Computerized scheduling  N=8
4. Time saving  N=5
5. Setting standards  N=3
6. Tracking/trending  N=4

A few disadvantages to the computer were also identified.

1. Computer usually down, no assistance  N=4
2. Need to know importance of computerized scheduling  N=1

Another qualitative question asked what methods were used for scheduling. The study group stated a variety of scheduling methods. These methods included staff's request's for particular days off, block scheduling which is a cyclical schedule that reoccurs every fourth to sixth week, and self scheduling in which staff may schedule themselves for the entire scheduling period, usually a month. Also included in scheduling methods used by the CNA's was a rotational method to the evening and night tours of duty, every second or third weekend off, and using an on-call schedule. Responses below are listed in descending order with the most frequent responses first:

1. Requests  N=17
2. Block scheduling  N=15
3. Every other weekend off  N=10
4. Self scheduling  N=9
5. Rotations  N=7
6. Other: every third weekend off, on-call  N=4
7. No method used  N=2

By far, "requests" and "block scheduling" are the methods
most commonly used for scheduling. A CNA said that, "whatever the staff want, they usually get." Therefore, the schedule is employee driven and not driven by the needs of the unit. How computerized scheduling would fit into this type of scheduling will become more evident later in this study where staff concerns are discussed.

The CNA's were asked how long it took them to prepare a schedule. The average time it took to create a month's schedule was 3.3 hours per month. The shortest time reported to create a month's schedule was 10 minutes in the outpatient units where there are set Monday through Friday schedules. The longest time reported was 15 to 16 hours to create a month's schedule in the Intensive Care units.

The CNA's were asked if they had read about computerized scheduling. Sixty six percent of the group had read something about computerized scheduling. Of that group, 38.5% had read the ANSOS material given near the beginning of 1988. When asked if they (CNAs) had discussed computerized scheduling with their peers, 64% of the CNAs stated they had to some extent. Some stated they are rarely talked about computerized scheduling anymore because they had known about it for approximately a year and they were not any closer to implementing it than they were a year ago.

CNA's were asked if problems and suggestions that are encountered in working with computerized scheduling would be evaluated and taken into consideration. Ninety percent believed that they would be considered. Sixty nine percent
believe that computerized scheduling will be implemented whether it works or not.

The study group was asked when the benefits of computerized scheduling would be realized. They stated that the benefits of computerized scheduling may be seen in 7-12 months after implementation. The mean of this item was 4.97. The CNA group also stated that computerized scheduling will be the same, i.e. not better or worse, than what is currently in use which is the CNA manually putting together a schedule.

When asked what advantages they saw in this new computer scheduler system, 59% were able to list 1 or 2 advantages. Twenty percent could list 3 or 4 advantages and 18% could find no advantages to the new computer scheduler system. Altogether, respondents stated 56 advantages. Advantages stated, in order of frequency, were:

1. Time saver  N=19 (34%)
2. Staffing allocation  N=10 (18%)
3. Fairness  N=9 (16%)
4. Data available  N=7 (13%)
5. No benefits  N=6 (11%)
6. Other: budgeting, save paper and space, organization  N=5 (9%)

Question 27 asked what disadvantages would they see to this new computer scheduler system. Fifty six percent of the group were able to identify one disadvantage. Two to three disadvantages were identified by 38% of the group. Altogether respondents listed 47 disadvantages. In order of frequency, the disadvantages stated were:
1. Humanistic aspect lost  N=15 (32%)
2. Rescheduling changes  N=7 (15%)
3. Time spent  N=7 (15%)
4. Computer being down  N=7 (15%)
5. Poor schedules produced  N=6 (13%)
6. Hard to change to new system  N=4 (9%)
7. None  N=1 (2%)

The CNA's were asked what they thought the staff's concerns were regarding computerized scheduling. Concerns identified included staff not being able to receive their request, the schedule itself would be poor, the staff might not like who they would be working with, and that the staff had "no concerns". Another concern was the number of rotations to the off tours. One CNA stated that her staff wanted to know why the computer scheduler needed specific information; i.e. has ICU experience, etc. because the staff are afraid of being reassigned to other units. Another CNA stated that her staff thought the computerized scheduling system was a CNA problem to work out, not the staff's.

Respondents may have identified more than one staff concern (N=42). Concerns are listed below:

1. None  N=21 (50%)
2. Requests  N=12 (29%)
3. Schedule itself  N=3 (7%)
4. Staff working with others  N=2 (5%)
5. Rotations  N=1 (2%)
6. A CNA problem  N=1 (2%)
7. Why need specific information  N=1 (2%)
8. Other: doubt it will work, don't care  N=2 (5%)

The CNA's were asked what they would do to encourage the staff to accept computerized scheduling. Because any one respondent may have identified more than one course of encouragement, the total number of responses were 50. The
responses stated in order of frequency were:

1. Talk to and inform the staff  N=24 (48%)
2. Other: time to adjust, staff participate in change, listen  N=8 (16%)
3. Be positive  N=7 (14%)
4. CNA needs instructions first  N=4 (8%)
5. Educate the staff  N=3 (6%)
6. Explain this can be changed  N=2 (4%)
7. No problems at this time  N=1 (2%)
8. State use as trial basis  N=1 (2%)

The CNA's were asked what could nursing administration do to help them learn and/or adjust to computerized scheduling. Responses include having the past pilot units talk to the CNA group, possibly have a trial basis to use the scheduler, and that dissemination of information be organized. Again, any one respondent may have identified more than one learning method, therefore, the total number of responses equaled 47. The overwhelming response was "training". The responses stated in order of frequency were:

1. Training  N=22 (47%)
2. Other: study units talk, convenience, contract  N=9 (19%)
3. Computer availability  N=5 (11%)
4. Give information  N=4 (9%)
5. Organization  N=3 (6%)
6. Orientation  N=2 (4%)
7. Support  N=2 (4%)

The questionnaire also contained likert-type scale items. There were 7 and 5 point scales with 1 being the lowest or negative and 5 or 7 (depending on which scale) was the highest or positive. Means, medians, modes and standard deviations were used for ordinal data. Percentages were used for nominal data.
The research question is: What is the impact of an innovation such as computerized scheduling in terms of the perceived need for the innovation, understanding of the innovation, acceptability of the innovation, perceived participation in the innovation, timing of the innovation and the communication of the innovation to the population of the CNA's in one hospital? The research question was first examined by exploring each component of the Classical Diffusion Model.

The responses to the question on the perceived need for computerized scheduling was assessed on a 7 point likert scale ranging from "not needed at all" to "needed very much", with "4" being neutral (see Table 5). The responses clustered most heavily around "neither needed nor not needed". The mean for this item is 3.92, median 4, mode 5 and the standard deviation is 1.95. This data indicated that about half of the respondents saw little need for the innovation and half perceived a need.

TABLE 5

PERCEIVED NEED FOR COMPUTERIZED SCHEDULING EXPRESSED IN FREQUENCY AND PERCENTAGES N=39

<table>
<thead>
<tr>
<th>Scale</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- not needed at all</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>4- neither needed nor not needed</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>7- needed very much</td>
<td>3</td>
<td>8%</td>
</tr>
</tbody>
</table>
The level of understanding of computerized scheduling was assessed. Data demonstrated that the average response was "some understanding" (see Table 6). These data must be viewed in light of the fact that CNA's answered this question regardless of whether or not they had experienced communication and/or training in computerized scheduling. Some CNA's stated that they had previous knowledge of computerized scheduling. The mean for this item is 3.58, the median and mode is 4, and the standard deviation is 1.79. It is interesting to note that 13 CNA's (33%) indicated they has little or no understanding of computerized scheduling.

TABLE 6

LEVEL OF UNDERSTANDING OF COMPUTERIZED SCHEDULING EXPRESSED IN FREQUENCY AND PERCENTAGES N=39

<table>
<thead>
<tr>
<th>Scale</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- no understanding</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>15%</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>4- some understanding</td>
<td>14</td>
<td>36%</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>7- full understanding</td>
<td>3</td>
<td>8%</td>
</tr>
</tbody>
</table>

The acceptability of computerized scheduling was determined by use of a scale of perceived difficulty (see Table 7). The scale ranged from 1- "extremely difficult" to 7- "not too difficult" with 4- "difficult" being the midpoint. Almost two thirds of the CNA group (64%) perceived the computerized scheduling system to be in the
"difficult" to "not too difficult" range, indicating that acceptability was not perceived as problematic. The mean on this item is 4.28, the median 4, the mode 5, and the standard deviation is 1.95.

TABLE 7
DIFFICULTY OF IMPLEMENTATION OF COMPUTERIZED SCHEDULING EXPRESSED IN FREQUENCY AND PERCENTAGES
N=39

<table>
<thead>
<tr>
<th>Scale</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- extremely difficult</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>18%</td>
</tr>
<tr>
<td>4- difficult</td>
<td>6</td>
<td>15%</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>23%</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>7- not too difficult</td>
<td>8</td>
<td>20%</td>
</tr>
</tbody>
</table>

The perceived participation in computerized scheduling was identified via 3 items on the questionnaire; involvement in planning phase, importance in being involved in planning phase and communication methods used to be kept informed on the implementation of computerized scheduling. Ninety five percent of the CNA group stated that they were not involved in the planning phase of this new innovation. However, 66% of the CNA group stated it is important to be involved in the planning phase and gave reasons why (see Figure 2). The remainder of the CNA group, 34%, stated it is "not important" to be involved in the planning phase and also gave reasons (see Figure 3).
FIGURE 2
REASONS IMPORTANT TO BE INVOLVED IN PLANNING PHASE

FIGURE 3
REASONS NOT TO BE INVOLVED IN PLANNING PHASE
Methods of communication used to inform the CNA's of the implementation of computerized scheduling are illustrated in Table 8. Please note that any one respondent may have responded more than once to this item.

**TABLE 8**

COMMUNICATION METHODS USED EXPRESSED IN FREQUENCY AND PERCENTAGES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memos</td>
<td>17</td>
<td>44%</td>
</tr>
<tr>
<td>Person to person</td>
<td>26</td>
<td>67%</td>
</tr>
<tr>
<td>Computerized messages</td>
<td>18</td>
<td>46%</td>
</tr>
<tr>
<td>Meetings</td>
<td>21</td>
<td>54%</td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td>8%</td>
</tr>
</tbody>
</table>

As seen in Table 8, meetings and person to person communication were the communication channels most frequently used in keeping the CNA's informed about the implementation of computerized scheduling. As Rogers (1972) stated, interpersonal channels are more important in persuading individuals to be favorable to a new idea.

The timing of computerized scheduling was identified by an item that asked when the CNA's first heard that computerized scheduling was to be put into place in their institution (see Table 9). The mean response on this item was 12.37 months, the median and mode was 12, and the standard deviation was 6.48.
TABLE 9

FIRST LEARN OF COMPUTER SCHEDULING
EXPRESSED IN FREQUENCY AND PERCENTAGES
N=39

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6 months</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>7-12 months</td>
<td>24</td>
<td>65%</td>
</tr>
<tr>
<td>13-24 months</td>
<td>7</td>
<td>19%</td>
</tr>
<tr>
<td>25-36 months</td>
<td>1</td>
<td>3%</td>
</tr>
</tbody>
</table>

Two respondents could not answer the question concerning time because "they had no idea". Thirty eight percent of the CNAs who did respond stated that they first heard that computerized scheduling was to be implemented 12 months previous to the study. No data was obtained to determine the actual time between the announcement of computerized scheduling and its actual implementation because computerized scheduling has not been implemented thus far at this institution.

The communication of the innovation was assessed by items that asked for information regarding the methods of communication used to keep CNA's informed about computerized scheduling, whether the CNA's received training regarding computerized scheduling, methods used to train and how helpful the methods used to train were perceived to be.

Of the CNA group, 59% had not received any training regarding computerized scheduling. Of those who did receive training regarding computerized scheduling, the types of methods used and frequency of use is delineated in Table 10. Again, any one respondent may have been exposed to one or
more training methods, so the frequency exceeds 39.

### TABLE 10

<table>
<thead>
<tr>
<th>Method</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memos</td>
<td>7</td>
<td>44%</td>
</tr>
<tr>
<td>Booklets</td>
<td>11</td>
<td>69%</td>
</tr>
<tr>
<td>Hands on experience</td>
<td>10</td>
<td>63%</td>
</tr>
<tr>
<td>Group training sessions</td>
<td>13</td>
<td>81%</td>
</tr>
<tr>
<td>One-on-one sessions</td>
<td>10</td>
<td>63%</td>
</tr>
</tbody>
</table>

Of those that received training (N=16), group training sessions and booklets were the methods used most often.

One item in the interview schedule assessed how helpful the methods used in training were to the CNAs. This data is presented in Figure 4. Only those CNA's that received training are included in Figure 4.

### FIGURE 4

**FREQUENCY POLYGON OF HOW HELPFUL THE TRAINING METHODS WERE USING MEANS FOR EACH METHOD  N=16**
Again, hands on experience, group sessions and one-on-one sessions were most helpful in training the CNA's about computerized scheduling.

The scale used to evaluate each training method was 1-"no help", 4-"neither helpful nor nor helpful", and 7-"very helpful". These data suggest that memos and booklets were neither helpful nor not helpful. Hands on experience, group training sessions and one-on-one sessions were perceived helpful in varying degrees. This illustrates that the CNA group preferred learning from another person instead of reading about computerized scheduling. They found actual experience with the computers most helpful of all. These data suggest that interpersonal communication methods are most helpful in persuading individuals to accept an innovation.

In summary, the research question asked what was the impact of an innovation, such as computerized scheduling, in terms of perceived need, understanding, acceptability, perceived participation, timing, and communication of the innovation.

On average, the CNA group had no definite perceived need for computerized scheduling. They had some understanding of computerized scheduling and felt that it would be somewhat difficult to implement. Almost none of the CNA's, 95%, were involved in the planning phase. However, a majority of the group stated that it was important to be involved in the planning phase. The most common
communication channels used to keep the group informed about computerized scheduling were person to person and meetings. This is consistent with Rogers (1973) diffusion model which postulates interpersonal channels are more important in persuading individuals to be favorable toward a new idea. The group first heard about computerized scheduling on average of 12 months prior to the study. Over half of the group did not receive training regarding computerized scheduling despite the fact that the administration of the organization have been trying to implement this innovation for the past year. Those that did receive training found hands on experience, group training sessions, and one-on-one sessions helpful in varying degrees. In summary, it appeared that computerized scheduling may not yet have had a strong positive impact on the CNA group due to their non-involvement in planning and variability on ongoing information flow regarding computerized scheduling.

Rogers hypothesizes five adopter categories which are the classifications of the members of a social system on the basis of innovativeness. The rate of adoption consists of the time needed by the members of a social system to adopt an innovation.

Based on Rogers (1973) theory, each individual CNA was asked to rate themselves regarding perceptions of their response in adopting change. The following were their choices:

1. I am not interested in change, prefer status quo.
2. I am slow to adopt change.
3. I accept change within a normal time frame.
4. I am an early adopter of the change.
5. I am an innovator of change.

Figure 5 graphically depicts the responses to this question.

**FIGURE 5**

**FREQUENCY POLYGON OF RESPONSES TO ADOPTER CATEGORIES**

N=39

The investigator found it interesting that none of the CNA's rated themselves in categories 1 or 2, "not interested" or "slow adopt to change". All considered themselves to be innovative, early adopters, or in the early majority.

The following are population characteristics of the 3
adopter categories selected by the CNAs. In the following tables, I=innovators, E=early adopters, and N=early majority.

Table 11 illustrates the adopter categories designated by respondents age cohorts. Table 12 illustrates the adopter categories designated by experience in present hospital cohorts. Table 13 illustrates the adopter categories designated by cohorts with years of experience as a CNA. These demographic characteristics help describe the study group in their self-rated categories.

TABLE 11
FREQUENCY OF AGE COHORTS IN SELECTED ADOPTER CATEGORIES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
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<tr>
<td>29-34</td>
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<tr>
<td>35-40</td>
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<td>47-52</td>
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<td>53-58</td>
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<td>59-64</td>
<td>1</td>
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<tr>
<td>65-67</td>
<td>0</td>
</tr>
<tr>
<td>did not give age</td>
<td>1</td>
</tr>
</tbody>
</table>

Scale: I=innovators, E=early adopters, N=early majority
### TABLE 12

**FREQUENCY OF YEARS IN HOSPITAL EXPERIENCE COHORTS IN SELECTED ADOPTER CATEGORIES**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years in hospital</td>
<td>I</td>
</tr>
<tr>
<td>1-5</td>
<td>0</td>
</tr>
<tr>
<td>6-10</td>
<td>4</td>
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<tr>
<td>11-15</td>
<td>1</td>
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<tr>
<td>16-20</td>
<td>1</td>
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<tr>
<td>21-25</td>
<td>1</td>
</tr>
<tr>
<td>26-30</td>
<td>1</td>
</tr>
<tr>
<td>31-37</td>
<td>0</td>
</tr>
</tbody>
</table>

Scale: I=innovators, E=early adopters, N=early majority

### TABLE 13

**FREQUENCY OF YEARS AS CNA EXPERIENCE IN SELECTED ADOPTER CATEGORIES**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years as CNA</td>
<td>I</td>
</tr>
<tr>
<td>1-5</td>
<td>4</td>
</tr>
<tr>
<td>6-10</td>
<td>2</td>
</tr>
<tr>
<td>11-15</td>
<td>0</td>
</tr>
<tr>
<td>16-20</td>
<td>1</td>
</tr>
<tr>
<td>21-25</td>
<td>1</td>
</tr>
<tr>
<td>26-30</td>
<td>0</td>
</tr>
</tbody>
</table>

Scale: I=innovators, E=early adopters, N=early majority
In Table 13, for the CNA's in the 1-5 year group, the majority rated themselves as accepting change in a "normal time frame". No respondents under the age of 35 rated themselves as an innovator. Innovators were not found in the CNA group until age 35-40. The highest number of innovators in one age group in group 41-46. Thus in this study, older more experienced nurses were more likely to rate themselves as innovators.

Professional characteristics in relation to the 3 self-identified adopter categories are illustrated in Table 14.

### TABLE 14

**INITIAL NURSING PROGRAM AND HIGHEST NURSING DEGREE EXPRESSED IN THREE ADOPTER CATEGORIES**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td><strong>Initial nursing program</strong></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>7</td>
</tr>
<tr>
<td>ADN</td>
<td>1</td>
</tr>
<tr>
<td>BSN</td>
<td>0</td>
</tr>
<tr>
<td><strong>Highest nursing degree</strong></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>5</td>
</tr>
<tr>
<td>BSN</td>
<td>3</td>
</tr>
<tr>
<td>BSN and some graduate studies</td>
<td>0</td>
</tr>
<tr>
<td>MS</td>
<td>0</td>
</tr>
<tr>
<td>MS and some graduate studies</td>
<td>0</td>
</tr>
</tbody>
</table>

Scale: I=innovators, E=early adopters, N=early majority
Those who rated themselves as innovators had initial education in diploma and associate degree programs. In the item that dealt with the highest nursing degree attained, the innovators were primarily diploma prepared and 17% were baccalaureate prepared nurses. Use of the Pearson Product Moment correlation statistic revealed a correlation between the adopter categories and the initial nursing program and highest nursing degree of .54 and .31 respectively. Rogers (1973) model postulates that early adopters have more education. However, in this study, those with the most education were more likely to rate themselves as early adopters rather than as innovators. The first type of schooling available in nursing - diploma, was the predominant educational background of innovators. The response to this item raises several possibilities. People who self-rate themselves may perceive incorrectly, Rogers may have been incorrect when he suggested that increased education correlates with increased innovation. Also, willingness to adopt innovation could be a function of age and experience - diploma graduates are oldest and most experienced, regardless of current educational level. Another explanation is that the study group of 39 was too small to adequately assess the relationship between self-rated adopter of innovations and demographic characteristics.

Information sources of persons in the various adopter categories were also explored. The CNA group were asked if
they read anything about computerized scheduling and in what amount (see Table 15).

TABLE 15

READ MATERIAL AND AMOUNT OF MATERIAL READ REGARDING COMPUTERIZED SCHEDULING EXPRESSED IN THREE ADOPTER CATEGORIES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>Read</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Amount Read</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>Small Amount</td>
<td>2</td>
</tr>
<tr>
<td>Large Amount</td>
<td>0</td>
</tr>
<tr>
<td>ANSOS material</td>
<td>4</td>
</tr>
</tbody>
</table>

Scale: I-innovators, E-early adopters, N-early majority

Sixty six percent of the study group read something regarding computerized scheduling. The Pearson Product Moment correlation statistic between adopter categories and reading regarding computerized scheduling is .28. Correlation between adopter categories and amount read is also illustrated by a significant Pearson r of .25. This means that the amount read about computerized scheduling is directly related to the self-rated adopter categories of the CNA's.

The CNA group was also asked how rapidly they saw themselves as adopting computerized scheduling. The
correlation between the self-rated adopter categories and the rapidity of adopting computerized scheduling of .25, which is significant at the .05 level.

**TABLE 16**

**PEARSON PRODUCT MOMENT CORRELATION BETWEEN PERCEPTION OF RATING SELF ADOPTING CHANGE AND VARIOUS VARIABLES**

<table>
<thead>
<tr>
<th>Initial nursing program</th>
<th>.54***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest nursing degree</td>
<td>.31*</td>
</tr>
<tr>
<td>Read about computerized scheduling</td>
<td>.28*</td>
</tr>
<tr>
<td>Amount read about computerized scheduling</td>
<td>.25*</td>
</tr>
<tr>
<td>Rapidity of adopting computerized scheduling</td>
<td>.25*</td>
</tr>
</tbody>
</table>

**Significance**

.05*
.01**
.001***
.0001****

Pearson Product Moment Correlations were done on the item "rating self adopting change" and the study groups individual and professional characteristics. Correlations were also done between this item and methods used for communication and training, CNA's involvement in planning for the innovation, level of understanding, need for, and difficulty of implementation of computerized scheduling. All these results were none-significant.
CHAPTER V

SUMMARY

Determining if Rogers (1973) Classical Diffusion Model explains the particular phenomena encountered in the adoption of an innovation was the purpose of this study. This is an exploratory descriptive study of the impact of computerized scheduling within the Clinical Nurse Administrator group.

Rogers (1973) Classical Diffusion Model is based on four key elements: 1) innovation, 2) communication channels, 3) time and 4) social system. Characteristics of an innovation are relative advantage, compatibility, complexity, trialability and observability. Communication channels used could be interpersonal and/or mass media.

A total of 39 CNA's participated in this study. They were interviewed by the investigator using the newly developed tool grounded in Rogers (1973) Classical Diffusion Model, designed for this study. The data may be summarized as follows.

The CNA's almost always do the scheduling in an average length of time of 3.3 hours for a month's schedule. The CNA's first heard of computerized scheduling 12 months prior to the study.
The majority of CNA's have no experience with computerized scheduling and have not received training, although they have some level of understanding of computerized scheduling. The study group stated the need for this innovation is not great and implementation of this innovation would be difficult.

All CNA's rated themselves in one of the first three adopter categories - innovators, early adopters, and early majority. The majority of CNA's rated themselves as an early adopter of change. This rating is somewhat at odds with their view of the innovation of computerized scheduling previously described. The self-rated innovators of the group are older, more experienced and diploma prepared.

The study group cited many benefits and advantages to computerized scheduling. They also cited disadvantages as well. The CNA's were also asked what could nursing administration do to help them and they stated, overwhelming, "to have training".

In conclusion, Rogers (1973) Classical Diffusion Model appeared to explain the particular phenomena encountered in adopting an innovation. This study did describe the CNA group in the various adopter categories. These adopter categories illustrated how the CNA's felt about change. The characteristics of the innovators, as found in the study group, did not parallel Rogers (1973) Model. The reasons for this study's findings that are at odds with Rogers (1973) include, the possibility that Rogers is wrong, the
study group is too small, the effect of age and experience which may be more important than education among nurses, CNA self perception is incorrect or respondent bias towards the investigator.

The results of this study are not generalizable to other first-line managers. The sample size was small (N=39). Thirty nine interviews may not have been adequate to test Rogers (1973) Classical Diffusion Model. Another reason may be that the innovation is very specific, i.e. computerized scheduling; therefore these results are restricted to that particular innovation. Possible bias of the respondents to the investigator may be another limitation of this study. The investigator was employed as a staff nurse in this institution during the data collection and some members of the study group may have responded in a way they thought the investigator would like to hear. At the present time, the investigator has been promoted to a CNA position in this institution.

It is recommended for future research that:

1. Rogers (1973) Classical Diffusion Model be used as the theoretical framework in discussing the impact of an innovation, in nursing research.

2. Future studies use a larger sample.

3. Studies should be conducted in private sector institutions and then comparison of results should be made from this study and future studies.

Recommendations from this study to nursing administra-
tion are to:

1. Utilize the identified adopter categories when developing strategies for planned change or an innovation in the future.

2. Begin educating the CNA group using group and one-on-one sessions as well as hands on experience regarding computerized scheduling.

3. Listen to the CNA group regarding the effects of implementation of computerized scheduling.

4. Utilize written material in creating knowledge of an innovation and/or planned change.


APPENDIX
APPENDIX

1. How do you think the computer will be able to assist you in your managerial role?

2. What kinds of experience do you have actually working with computers?
   -word processing
   -data retrieval
   -order entry
   -other

3. To what extent do you do the scheduling for your staff?
   -always
   -frequently
   -sometimes
   -never

4. What method do you use for scheduling?

5. On the average, how long does it take you to prepare a schedule?

6. Have you read any material regarding computerized scheduling?

7. How much material have you read regarding computerized scheduling?

8. Have you ever worked with a computerized scheduling system?

9. To what extent have you discussed computerized scheduling with you colleagues?

10. When did you first learn that this computer scheduler was to be put into place?

11. How long a time was it between the time you first that computerized scheduling was going to be implemented to its actual implementation?

12. Were you involved in the planning phase of this new innovation?
    -Yes - To what extent?        No
    - In what way?

13. Is it important to you to be involved in the planning phase?
    Yes - Why?        No - Why?
14. What methods have been used to keep you informed about the implementation of the computerized scheduler? Check all that apply
   - Memos
   - Person to person
   - Computerized messages
   - Meetings
   - Other, please describe

15. Have you received any training in the use of the computerized scheduler? Yes No

16. What methods have been used to train you regarding the computer scheduler? Check all that apply
   - Memos
   - Booklets
   - Hands on experience
   - Training sessions (group)
   - One-on-one sessions
   - Other, please describe

17. How helpful did you find the training methods?
   1-No help
   4-Neither helpful nor not helpful
   7-Very helpful
   - Memos
   - Booklets
   - Hands on experience
   - Training sessions (group)
   - One-on-one sessions
   - Other, please describe

18. As a result of the training methods what level of understanding do you have on computerized scheduling?
   1-No understanding
   4-Some understanding
   7-Full understanding

19. On a scale from 1-7, how much is a computerized scheduler needed on your unit?
   1-Not needed at all
   4-Neither needed nor not needed
   7-Needed very much

20. On a scale from 1-7, how difficult do you think computerized scheduling will be for you to implement on your unit?
   1-Not too difficult
   4-Difficult
   7-Extremely difficult
21. Do you think any problems you have from working with the computerized scheduler will be evaluated and take into consideration as the innovation is implemented?

22. Do you think any suggestions you have from working with the computerized scheduler will be evaluated and take into consideration as the innovation is implemented?

23. Do you think that computerized scheduling will be implemented whether it works or not, in your opinion?

24. How rapidly do you think the benefits of computerized scheduling will be observable?
   - 1-6 months
   - 7-12 months
   - 1-2 years
   - 3-5 years
   - over 5 years

25. How much better or worse will the computerized scheduler be than what is currently in use?
   - 3-worse
   - 0-same
   - +3-better

26. What advantages, if any, do you see to this new computer scheduler system?

27. What disadvantages, if any, do you see to this new computer scheduler system?

28. How rapidly do you see yourself adopting the computerized scheduling system?
   - 1-Very slowly
   - 3-Average
   - 5-As quickly as possible

29. How d you think your adoption time with the computer scheduler will compare with your CNA peers?
   - 1-Much more slowly
   - 3-Average
   - 5-Much more quickly

30. How would you rate yourself regarding adopting change?
   (Rate your typical response to adoption of a change)
   1. I am not interested in change, prefer status quo
   2. I am slow to adopt change
   3. I accept change within a normal time frame
   4. I am an early adopter of change
   5. I am an innovator of change

31. How do you plan to incorporate the computerized scheduling system into your routine?
32. Has your staff been informed about the computer scheduler?

33. How have they been informed?

34. What are your staff's concerns regarding computerized scheduling?

35. How well do you think the staff will accept the computer scheduler?
   1-Poorly
   4-Neither poorly nor well
   7-Very well

36. Do you prefer or not prefer the computerized scheduling system? Yes - Why? No - Why?

37. What do you plan to do on your unit to help/encourage staff to accept computerized scheduling?

38. What could nursing administration do to help you better learn/adjust to the new computerized scheduling?
The thesis submitted by Tammy F. Lio has been read and approved by the following committee:

Dr. Sheila Haas, R.N.
Associate Professor, Nursing, Loyola

Dr. Diana Hackbarth, R.N.
Associate Professor, Nursing, Loyola

The final copies have been examined by the director of the thesis and the signature appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Science in Nursing.

4-20-89
Date

irector's Signature