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TELEMEDICINE AS A SUPPLEMENTARY INFORMATION SOURCE FOR PHYSICIANS, NURSES AND MANAGERS

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ABSTRACT

TELEMEDICINE AS A SUPPLEMENTARY INFORMATION SOURCE
FOR PHYSICIANS, NURSES AND MANAGERS

By

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As the financial and political environment changes in health care, the need for continuing medical education is becoming more apparent. While the technology presently exists to deliver healthcare information simultaneously to participants all over the world, the technology will not flourish simply because it exists. Little has been done to study those attitudinal factors which affect the decision-making process of health care professionals.

Users from the 125 member hospitals of the Michigan Hospital Information Network were surveyed to find those attitudinal factors associated with telemedicine in general, speaker and program traits which are perceived to be important, and user input about their present health care network. Attitudinal factors were then correlated and regression equations formed to predict the two dependent variables of satisfaction and behavioral acceptance.

The two best predictor factors for satisfaction were found to be utility and users interest, both in the individual program and telemedicine in general. The best predictors for behavioral acceptance were found to be program quality, sociability and the speaker's knowledge & ability to teach the subject matter.

To my mother and sisters who never doubted me and to my wife Linda for the countless number of hours she spent with me on this project and all of those that lead to it. I could not have completed it without any of them.

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CHAPTER I

Introduction

Overview

Technological innovations are commonplace in the approaching information age. The word approaching looms large in this sense because we have yet to work out many logistical problems which impede progress towards universal information availability. Two industries that are perhaps unequaled in new product innovation are telecommunications and medicine. It would only seem natural then that the two should incorporate their resources to embark on a new field. This field is commonly known as telemedicine. While telemedicine, in it's present form, got started in 1969 with the Logan Airport/Massachusetts General Hospital link using a black-and-white broadband television system, telemedicine can be traced back to 1906 with the development of the electrocardiogram (Conrath, et al., pp. 24-25). This paper however, will deal with the application of telemedicine in the state of Michigan which began it's programming in July of 1984 under the direction of the Michigan Hospital Association.

Use of Telemedicine

The uses of telemedicine range from long-distance diagnosis to how to maintain floor maintenance (Healthcare Information Network, 1987). For purposes of this study however, the scope will be limited to the analysis of information directed toward physicians, nurses and hospital managers-administrators because they receive the bulk of programming from the Healthcare Information Network, a

national health care information network headquartered in Princeton, New Jersey, and because these three groups are of primary interest to the network.

The Problem

The concentration of hospitals will in all likelihood increase as urbanization continues. This, along with increasing advancements in the medical profession, compound the problem of dispensing medical information to personnel around the country and especially in outlying areas where travel to training seminars is long and difficult.

Teleconferencing, electronically mediated communication among three or more people in two or more separate locations, has been deemed most appropriate to deliver this vital information. This alternative form of information delivery is capable of delivering a wide range of programming via satellite at a relativly inexpensive per viewer cost. Teleconferencing has been deemed a communication wonder by researchers like Johansen, Vallee, and Spangler (Neumann, 1985), but alters the preexisting communication patterns of an organization utilizing the technology. Certain perques like travel and the ability to interact with fellow healthcare professionals may be lost, or certainly diminished, by use of telemedicine. The problem exists as to how a technology should be utilized in an organizational structure with such historically unpermissive norms as the healthcare field.

Many researchers, including Victor Ferkiss, feel that it is their job to keep us from being the technology-driven society that we seem to have become. French sociologist, Jacques Ellul, asks, do we analyze a new communications technology with the same cost-benefit fervor that we do other technological advancements? (Dizard, 1982) Researchers speaking specifically on teleconferencing point out:

> In itself, the installation of an appropriate teleconferencing technology does not necessarily guarantee effective use.
>
> (Olgren and Parker, 1983, p. 61)

Another researcher warns:

> It is a serious mistake to assume that teleconferencing will be used just because it is available. There is a good deal of evidence to the contrary.
>
> (Elton, 1982, p. 53)

This assumption of use was realized by programmers and executives of the Michigan Hospital Association, a private state-wide health care network, in May 1986. Although member hospitals numbered 125, rising costs and lack of programming resources forced MHA into thoughts of a merger with another network. Merger proceedings started one month later, in June 1986 and the Healthcare Information Network took over the teleconferencing portion of the MHA's information duties (Hulteen, 1987). Since then, users have enjoyed an increase in the number of available programs from the national network located in Princeton, New Jersey while still being able to watch the more popular programs produced out of the Lansing bureau. Increasing pressures, both internal and external, are mounting to step-up efforts to make continuing education mandatory for several healthcare professions, mainly physicians and nurses. In Michigan, and several other states, it is currently mandatory for physicians to amass continuing medical education units (CMEs) and that state's board of

nursing is proposing legislation to make similar rules for it's nurses. While this controversy may be considered a separate issue, there may be need for a teletraining system to be implemented on a grander scale. This necessitated the need to study the acceptance of telemedicine and it's impact on the healthcare community.

Research variables

The two variables that are most important to this study are behavioral acceptance and satisfaction. Behavioral acceptance is defined as the use of an innovation or technology which is sponsored by an organization. Satisfaction is defined as how a user feels about an innovation or technology after utilizing it.

The predictor variables used in this study were divided into two catagories. One catagory included personal variables such as: age, sex, job type, experience and marital status. The other catagory included attitudinal factors such as compatability, credibility, sociability, program quality, ability to provide feedback and speaker quality. Compatability is defined as whether the use of a new technology is consistant with currently held beliefs and practices among individuals within an organization. Credibility is defined as how users feel a technology ranks with the available alternatives. Sociability is defined as how sensitive, flexible and personal a technology is to it's users.

Research model

The predictor model used for this study was developed in 1980 by Fishbein & Ajzen. The model was a refinement of their "theory of reasoned action" approach. The theory is based on the assumptions that humans will make use of information available to them in a systematic and rational manner. People

The predictor model used for this study was developed in 1980 by Fishbein & Ajzen. The model was a refinement of their "theory of reasoned action" approach. The theory is based on the assumptions that humans will make use of information available to them in a systematic and rational manner. People will consider the implications of their actions before they engage in a given behavior. These considerations are formed by attitudes, beliefs, and those feelings that a user's behavior would be consistant with those of their fellow workers. Fishbein & Ajzen believe that behavior can be explained by a series of steps beginning with external variables such as demographic information, then their beliefs and attitudes about performing the behavior, their Intentions to perform the behavior and finally performing the actual behavior.

Research questions

#1. Is there any significant relationship between individual variables such as age, organization tenure, job type, sex and marital status, and users' satisfaction of telemedicine?

#2. Is there any significant relationship between individual variables such as age, organization tenure, job type, sex, and marital status, and the behavioral acceptance of telemedicine?

#3. Is there any significant correlation between attitudinal variables such as credibility, sociability, ease of use, and production quality, and the behavioral acceptance of telemedicine?

#4. Is there any significant correlation between attitudinal variables such as credibility, sociability, ease of use, and production quality, and users' satisfaction of telemedicine?

#5. What individual and attitudinal factors will best predict behavioral acceptance of telemedicine?

#6. What individual and attitudinal factors will best predict users satifaction of telemedicine?

It is important to clarify that satisfaction does not necessarily lead to behavioral acceptance. In most cases satisfaction will lead to further behavior. Satisfaction may lead to acceptance but a user may be satisfied and still not accept telemedicine as a supplementary information source. Respondents may be satisfied by indicating good or excellent quality to a measure, but may still disagree that telemedicine is a viable alternative to face-to-face education.

Procedures

After discussion with network managers, it was decided upon that the user groups which will best serve this project are physicians, nurses and hospital administrators/managers. It was felt by Healthcare Information Network President, David Levine, that these three groups comprise the majority of the Michigan Hospital Information Network users. Three questionnaires were sent to each of the 125 member hospitals of the MHIN., to be completed by one respondent from each of the user groups at each hospital throughout Michigan, for a total of 375 questionnaires dispersed. The questionnaires were sent out by the Lansing bureau of HIN to the teleconferencing coordinators at each member hospital with instructions on how to select a random sample. This was done to uphold a contractual agreement that no one ever be given or sold a list of the member hospitals. Three weeks after the questionnaires were sent out, a follow-up letter was sent to

the coordinators as a reminder to prompt them to return the questionnaires. In an effort to enhance the return rate of the surveys, a final follow-up phone call was made to each member hospital.

The final count on the returns was 136. Of these, 15 were not filled out, with the explanation that physicians at those hospitals did not view any of the programs and 121 were returned completed for a return rate of 34%.

Overview of findings

Personal and attitudinal factors towards behavioral acceptance and satisfaction do not differ significantly between the three target groups.

Only one personal variable, experience, was a significant predictor of behavioral acceptance and satisfaction.

There are significant correlations between the attitudinal factors of delivery, utility, interest, and satisfaction while sociability is significantly correlated with behavioral acceptance.

There is a statistically significant relationship between attitudinal factors such as program quality, speaker quality, and behavioral acceptance.

Implementation

The findings of this study point out areas of interest to the users which should be evaluated by network managers and programmers. While satisfaction does not necessitate acceptance, the factors which increase user satisfaction could do no worse than to create a more favorable experience by those users who may not be able to get this information via an alternative source. While program suggestions which were made by users are an easy way to implement the aim of user concentration, it is necessary to examine the factors which

user concentration, it is necessary to examine the factors which affect users attitudes. The findings of this project enable programmers to get a better understanding of which production factors need additional attention, how personal variables affect behavioral acceptance and which attitudinal factors should be addressed by possible changes in the aim and delivery of healthcare information. The changes in aim and delivery of information may prove to be the best way to enhance behavioral acceptance of telemedicine. Programmers and managers will be able to utilize information which details how users receive the network and it's programming. Programmers can now concentrate on several factors which will lead to a more personal and compatable acceptance by users. Managers will now be able to eliminate some of the guesswork in determining who their users really are. This should lead to the elimination of programming geared to a non-existant audience and lead to additional programming time for those audiences who really need it.

These findings will allow managers to better meet the need for the types of programming created by the changing political environment. Regulating agencies in Michigan such as the board of nursing and the American Medical Association, are helping to draft legislation for mandatory continuing education. This study gives the decision makers the viewpoints of the users who have opinions and suggestions on how to meet these growing needs

CHAPTER II

THEORETICAL RATIONALE

Overview

Much has been done to study the use of mediated communication as an alternative to face-to-face instruction. Most of the studies have dealt with mediated messages as the sole training device and not as a supplement to conferences, trade shows or other face-to-face alternatives. While this is useful to some professions, the healthcare field is being inundated with new technologies, techniques, drugs, treatments, modern patient methods and changes in law and policy. It is difficult for most, and impossible for some healthcare professionals, to get the most up-to-date information possible. There is no one delivery system that will answer all the concerns necessary. Likewise, the study of continuing education for these healthcare professions has no one theoretical base.

The main theoretical base for this chapter is derived from:

-Behavioral acceptance models developed by Fisbein & Ajzen. These models serve to explain the theoretical linking of beliefs to behavoirs and the determining factors which affect the formation of attitudes and beliefs.

-Attitudinal research by McGuire which suggests that the receiver go through a five step process if persuasion is to succeed

-Diffusion and adoption research by Rogers who

outlines five characteristics of innovation. Each characteristic must be consistent with preexisting norms to provide any relative advantages.

-Research by Chu and Schramm who generalize about research done on the effectiveness of television as a learning source.

-Olgren & Parker et al., whose research leads to suggestions on how teleconferencing instructors can enhance learning and retention of participating students.

Dependent variables

The dependent variables in this study are:

Behavioral acceptance - Usage of telemedicine as a supplementary information source.

Satisfaction - Subjective evaluative response towards an telemedicine based on previous experiences with telemedicine use.

Independent research variables

Individual variables such as demographic information should play a very small roll in explaining either acceptance or satisfaction but may lead to a better understanding of user motivation.

Age - Although not expected to account for much variance, age may still be an important variable in this organizational framework.

Job type - A level of organizational status which should provide a better explanatory rationale for differences in predispositions which affect behavioral acceptance.

Organizational tenure - Another variable which should be influential in the formation of attitudes which are formed and affect relationships between dependent and independent variables.

Attitudinal variables, which have been shown to be significant in earlier research, are formed by beliefs which are derived by many factors.

> The totality of a person's beliefs serves as the information base that ultimately determine his attitudes, intentions and behavior.
>
> (Fishbein & Ajzen, 1975 p. 14)

It is important to determine those factors which affect attitude formation for predicting further steps in the behavioral acceptance model. These factors are:

Program quality - Perceived importance of technical quality as well as the style, length and quality of the speaker.

Ability and importance of being able to provide feedback - Subjective response to the users capacity to provide their opinions and attitudes towards programming practices and specific teleconferences.

Other attitudinal variables include:

Compatability - An attitudinal measure of how consistant a technology is with an organization's preexisting set of values within a corporate culture.

Credibility - An attitudinal measure of a technology's perceived ranking with its alternatives and the perceived believability of that technology.

Sociability - The degree of personalization, sensitivity and socializing afforded users when utilizing a technology.

Ease of Use - The degree of complexity, convenience, comfort and flexibility that respondents perceive in a technology.

Determining these attitudinal factors and the relationship of other variables mentioned should lead to a greater understanding to what ultimately leads to behavioral acceptance of telemedicine. By analyzing how this acceptance process differs from group to group, whether age, tenure, or job type, will allow managers and programmers to alter methods or practices to help reach target audiences and aid in behavioral acceptance.

Behavioral acceptance

Early researchers assumed a more direct relationship between a person's attitudes and feelings and some measurable behavior. Attitude concepts have only recently been understood as being complex concepts to measure. Earlier research by Cartwright (1949), Smith (1947), and Katz & Stotland (1959), led to Rosenberg and Hovland's (1960) three-componant view of attitudes (Fishbein, 1980). It is this research which has led to current measurement of attitudes and the determination of the factors which are most important to a theoretical understanding of behavioral acceptance.

Administrators can only order new technological systems to be installed. They cannot make physicians, nurses, dieticians, housekeepers, hospital managers, anyone for that matter, accept a technology especially one which will alter preexisting communications models. This realization leads to the study of behavioral acceptance.

The behavioral acceptance models utilized for this study were developed by Fishbein & Ajzen during their studies of behavioral prediction which began in the late 1950s (Ajzen & Fishbein, 1980, p. 5). From their years of research dealing with the predicting of behavior in laboratory and applied settings, they have developed several behavioral theories and models. The "theory of reasoned action" is an approach that Fishbein and Ajzen introduced in 1967 (Fishbein, 1967). This theory is based on the assumption that humans will make use of information available to them in a systematic and rational manner. Fishbein & Ajzen argue that people consider the implications of their actions before they decide whether or not to engage in a given behavior. These considerations of implications are formed by attitudes, beliefs and normative components. They further theorize that people consciously weigh the positive and negative affects of their actions before engaging in that behavior (Fishbein & Ajzen, 1980). Simply stated: If the outcome from performing a behavior is perceived as receiving a positive outcome, the person should feel good about that behavior. Figure 2.1 is a model which represents the determining factors of a person's behavior. This model allows us to get a more comprehensive account of the causes of the underlying behavior (Fishbein, 1980, p. 7-9).

Figure 2.1 shows how behavior can be explained by a series of steps in a sequence which begins with a person's beliefs. Beliefs that certain outcomes will result from a particular behavior. Beliefs that a particular behavior should be ignored or acted upon in order to comply with preexisting norms. These beliefs lead to attitudes, intentions and eventually, to performing the behavior.

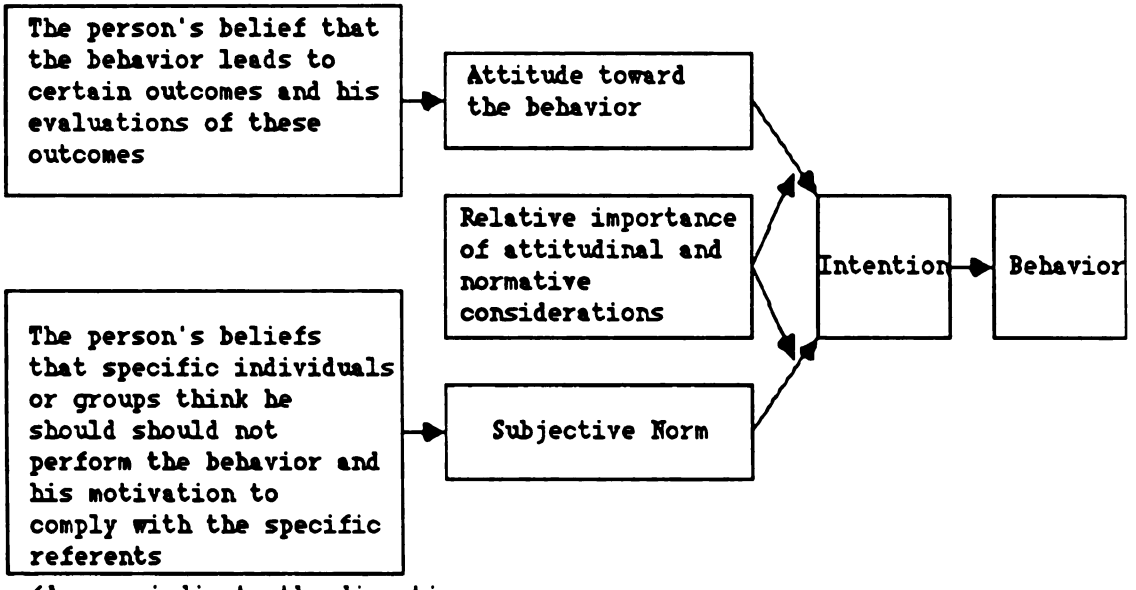


FIGURE 2.1

Factors Affecting Behavioral Acceptance

(Ajzen & Fishbein, 1980, p. 8)

One point that makes this model different from many others is the emphasis on the person's attitude toward a particular behavior rather than their preexisting attitudes and prejudices towards objects, people or institutions. This model does not however factor in external variables and explain their effects, though they may be indirect, on behavior. Fishbein & Ajzen believe that there is not necessarily any relation between any given external variable and behavior. They further theorize:

> Some external variables may bear a relation to the behavior under investigation while others may not, even when a relationship is discovered, it may change over time and from one population to another.
> (Fishbein & Ajzen, 1980, p. 9)

Further behavioral research by Fishbein & Ajzen which does include external variables in the explanation of acceptance has some theoretical roots in the early attitude measurement done by Thurstone. Thurstone applied psychometric methods to the problem of attitude measurement. Thurstone defined attitude as "the affect for or against a psychological object" (Thurstone, 1931). He devised a scale which measured attitudes towards opinion statements and assumed that differing degrees of favorableness or unfavorableness toward the attitude object could be evaluated and compared to other scores. In his scaling, the attitude score represents a person's evaluation of an object implied by a set of their beliefs, intentions, or actions. Thurstone stated the implications of this measure:

> It is quite conceivable that two men may have the same degree or intensity of affect favorable toward a psychological object and that their attitudes would be described in this sense as identical but that they arrive at their similar attitudes by entirely different routes.
> (Thurstone, 1931, p. 263)

This development made it clear that although a person's attitudes toward an object can affect behavior, there is no necessary direct relationship between attitude and any given behavior. Fishbein & Ajzen created another model which helps to describe the indirect effects of external variables on behavior, figure 2.2. These indirect influences are shown here to have some effect on a person's behavioral beliefs, outcome evaluations, normative beliefs, motivations to comply, or how strong the relative weights of the attitudinal and normative components are perceived to be

(Fishbein & Ajzen, 1980, p. 84-85). The relationships between the external variables are treated almost as supporting evidence in this theory of reasoned action. An example used by Fishbein & Ajzen includes this model to explain an observed relationship between education and smoking. It is assumed that there will be fewer smokers among higher educated individuals because of their knowledge of the health risks of smoking. Education may be a variable but it is highly unlikely that a direct relationship would exist between smoking and education.

These external variables should not be overlooked however in the molding of a person's beliefs. Beliefs play a major role in persuasive communication. If messages are to be

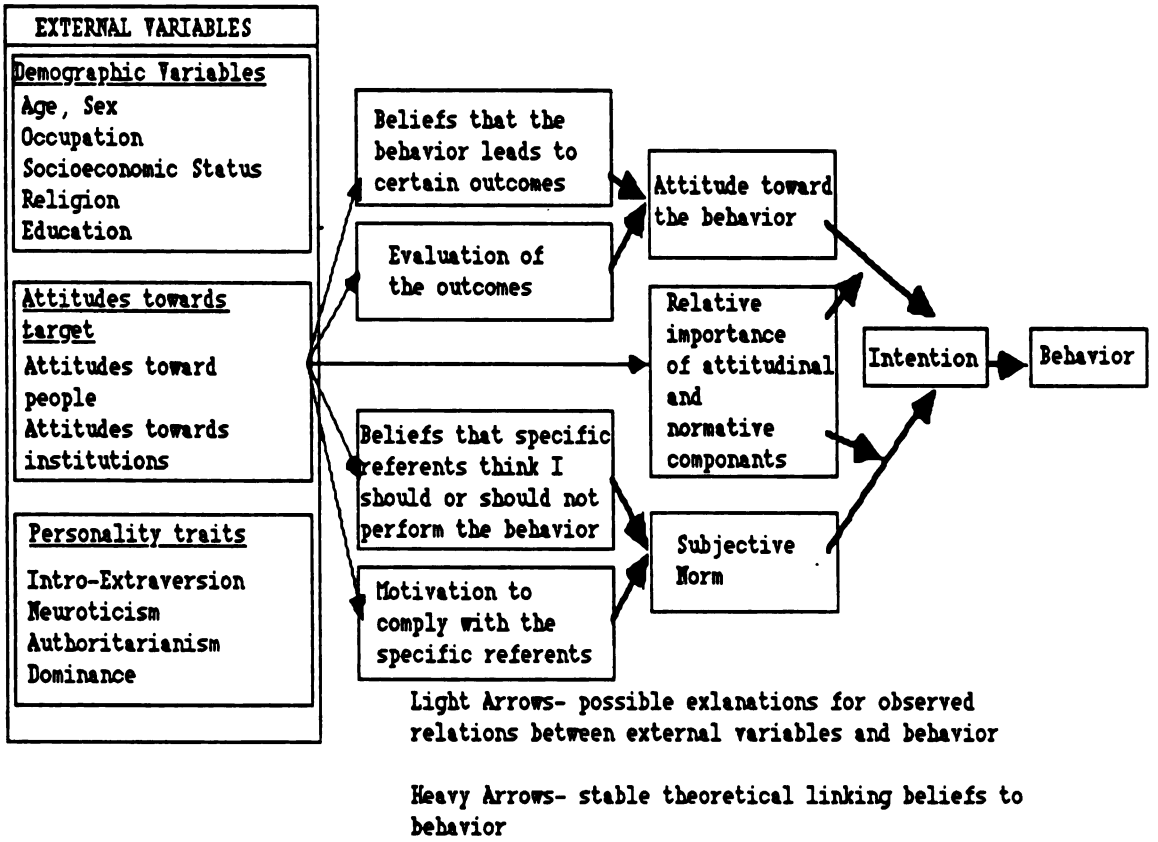


FIGURE 2.2

Role of External Variables in Predicting Behavior

(Ajzen & Fishbein, 1980, p. 9)

successful in the process of attitude change, it is necessary to measure how a person receives information and how messages are comprehended. Research by McGuire (1968, 1969) suggests that attitude change involves a series of five steps: attention, comprehension, yielding, retention, and action.

> The receiver must go through each of these steps if communication is to have an ultimate persuasive impact, and each depends on the occurrence of the preceding step. (McGuire, 1969, p. 173)

To fully understand how to utilize a persuasion model, it is necessary to apprehend the effects of these external variables on behavior. From figure 2.2 you can see how external variables like demographics, attitudes, and personality can be used for possible explanations to the evaluations and motivations that are in fact stable theoretical relations linking beliefs to behavior.

Until very recently, the nature of an individuals work and job type have been somewhat overlooked. Research by Steinman and Shulman (1978) theorized a link between contextual factors, such as work type, needs, group favorability, and group norms, and predispositions toward video-conferencing. Organizational teleconferencing research by Downs and Mohr (1979) contends that potential users of teleconferencing will choose to give the technology a fair trial in order to assess its costs and benefits accurately. Users predispositions towards teleconferencing were explored by Svenning (1982). Independent variables such as: Background, attitudes, communication requirements, perceived needs, organizational norms, work characteristics, perceived attributes, and expected impacts, were all included in the regression equation. Svenning and Ruchinskas (1981) explored the influence of job type in

predicting behavioral acceptance of teleconferencing. Job type was found to be a significant predictor of teleconferencing use in their study. These findings however, have not been explored and replicated in other studies to help explain behavioral acceptance among users.

Innovation and change has long been the answer to a change in perceived need (Brief, et al., 1976). Although it has been stated that findings of a job type linkage to predicting teleconferencing use (Rice, 1984, p. 235) were somewhat unexpected, the adoption of innovations answers the gaps between the expected and the actual that March and Simon talked about (1958). The study of needs and expectations of new technologies answering these needs has been studied in almost every study done on acceptance.

From this theoretical base, we can infer the theory of reasoned action to explain a rational thinking and reasoning process by potential users. Utilizing the second behavioral acceptance model developed by Fishbein & Ajzen, it is necessary to determine which external variables, beliefs, motivations and attitudes are important in predicting behavioral acceptance. Within this model are demographic, attitudinal and personality variables. This behavioral acceptance model also includes factors of compliance with normative and accepted practices. While no direct causal relationship can be inferred, understanding how these variables affect the formulation of attitudes will aid in the prediction of behavioral acceptance.

Based on the review of this literature, a hypothesis can be formed:

Research hypothesis #1

Only two personal variables, job type and organizational tenure, will explain significant variance in behavioral acceptance and satisfaction.

Diffusion and adoption

The theoretical framework for the study of the diffusion process was presented by Rogers in 1983. The five main characteristics of innovation he listed were; relative advantage, complexity, observability, trialability and compatibility (Rogers, 1983, pp. 210-240). All five of these innovation characteristics must be consistent with an organizations preexisting communications system for successful diffusion to take place. Teleconferencing has proven it's ability to provide many of the relative advantages over present training practices such as time and money saved from sending staff members to seminars. Too often, economics and the inability to replace large amounts of participating staff members, mean only a select few personnel travel to these training sessions. This makes the possibility of telemedicine training attractive and somewhat compatible. What has not been researched as often however is whether or not people in the medical field feel that the training they receive through teleconferencing is thorough enough and as equally beneficial to their medical practices as other forms of training they may receive. Legislation currently mandates that physicians participate in continuing medical education in order for them to continue practicing medicine. Physicians are among the first to admit however, that abuses exist in the current system of monitoring their continuing education efforts. It is common practice for physicians to get off a plane in some tropical paradise, sign in to receive the credit and spend the rest of the time working on a tan or lounging around a pool (Rothert, 1987). The luxury of being able to participate in this kind of abuse will naturally lead some physicians to say that teleconferencing is not compatible with their current continuing medical training practices.

As Acker summarizes in a paper entitled The Teleconference Trialability Lab: Fostering The Diffusion Process Through Organizational Learning, much of the current research on teleconferencing has focused on the relative advantages rather than exploring whether teleconferencing may change the culture of an organization. Cost effectiveness, increased participation and time saving may not be good enough reasons for adoption to take place.

> If the complexity of teleconferencing could be better explained, if system users could establish a low-risk background, and if teleconferencings' advantages could be made observable through concrete demonstration, the technology might be viewed as compatible with the culture of more organizations. (Acker, 1985, p. 211)

The key word here is compatibility. Compatibility, as defined by Rogers, is every organization possessing a set of values within a corporate culture. The members of an organization must decide whether the use of a new technology is consistent with currently held beliefs and practices and whether the relationships among individuals in the organizationtion will continue undisturbed. This analysis will take place before they will decide to accept or reject a new technology (Acker, 1985, p. 211).

Many users have been conditioned to concentrate on the technology itself rather than how to deal with the loss of interpersonal and other forms of communication no longer present without face-to-face interaction (Williams, 1978). Participants might alter their patterns of agreement and disagreement. People who would normally speak up might be too apprehensive because of the presence of the technology. Face-to-face interaction on the other hand, "Encourages the

intrusion of interpersonal feelings, which is of benefit to the person arguing his/her personal beliefs" (Williams, p. 126). Other researchers such as Chapanis and associates, have tested a wide range of media types against face-to-face communication. Almost without exception, the messages given through mediated form were shorter and involved less interaction among participants than did face-to-face (Chapanis et al., 1971,72,74,76). These shorter messages may be a result of the lack of time given participants during mediated communication. Shorter messages may also be caused by a fear of the technology and it's intrusion on interpersonal communication. If either of these suggestions are legitimate, psychological blockades may prevent even the most logical argument for a technology from being accepted. Barriers which are harbored and reinforced by disgruntled early users may be extremely difficult to surmount.

One of the biggest reasons for physicians reluctance in adopting teleconferencing may be the fear that they will lose one of their longest standing perques - travel. Doctors have long been given red carpet treatment at conventions and seminars where they build up their social contacts and can get away from the office (Ribble, 1985). When subjects were given the opportunity to give reasons for a teleconferencing system failure, of a system not yet developed, the top responses were:

-The hospitals were unwilling to pay for the service
-Doctors were unwilling to attend to "watch television"
-No one used it
-The faculty were unwilling to spend the time to produce top quality programs
-The loss of face-to-face contact was disappointing
(Ribble, 1985, pp. 317-18)

While the nature of this study is somewhat realistic, subjects were more likely to comment on a non-existing system because they did not fear any consequences to anyone, it is interesting to study these responses. The top four reasons given for failure of the system were all related to persuading people to accept the system. Social psychological research says that this resistance is rooted in fear which is the primary motivation of inhibitory behavior.

> The fear of losing tangible benefits through the acceptance of high tech communication without compensatory high touch privileges may be the most important inhibitory factor affecting teleconferencing.
>
> (Ribble, 1985, p. 317).

The fear that exists in most people is rooted in the apprehension of what change will bring us. Political and social pressure are often catalysts for change to avoid a degradation of services that often occurs when technology displaces the present work process (Cooley, 1981). The medical profession has fallen under such pressures and has been attempting to integrate a system of cooperation between machine and man for the betterment of the patient. This is evident in the areas of medical diagnosis, patient monitoring and laboratory automation that has already taken place (Child, et al., 1985). These changes, as well as many others in the healthcare field, have been consciously rejected by personnel because of their perceived rebellious nature against established medical practices (Child, et al., p. 422).

While these changes in treatment and decision making may be of greater consequence, the adoption of a new

supplementary training method is often greeted just as rudely, as innovators of teleconferencing systems have found out.

The role of initially adopting a teleconferencing system usually falls on the shoulders of hospital administrators. These administrators are often not prepared for the amount of dependence on others they will become and even less prepared to determine the effect that such a change will have on present communication practices and norms. Their dependence on technicians, external organizations, program coordinators, consultants and many others will increase greatly. These fears, along with those of budgetary, underutilization and others they already face, strike even more fear and reluctance into these administrators (Ribble, 1985).

Several hospital networks have arisen to take some of the fear and reluctance away. There are still too many complex issues and misinformation for many administrators to deal with. David Shively, Director of the Association of Hospital Television Networks, on the current state of teleconferencing:

> Until proponents stop telling administrators what the technology is and start emphasizing that it can have a positive impact on the bottom line, they will be rewarded with study indifference.
>
> (Shively, 1984, p. 23)

Administrator's fears of reliance on other factors should not keep a good learning source from being adopted. It is seriously doubtful whether such a source even could be kept out of a medical facility if in fact it were a universally accepted method of education.

Potential users of a new technology must evaluate a given technology to determine whether the innovation is consistant with preexisting norms before the diffusion and adoption can sucessfully take place. Five characteristics are utilized in the evaluation process, they are: relative advantage, complexity, observability, trialablity and compatibility. While many outside factors (such as political environment and fear of reliance on others) also affect the decision making process, before adoption can take place, all five characteristics must be consistant with widely shared norms.

Based on the review of this literature, a hypothesis can be formed:

Research hypothesis #2

Attitudinal factors, such as compatability, credibility, sociablity and ease of use will be significantly correlated with satisfaction and behavioral acceptance.

TV as a learning source

In summation of the instructional television literature presented by Chu and Schramm in their book Learning From Television: What the Research Says, they raise several generalizations worth further study. On the subject of whether students actually learn from television, research by Schramm (1962) indicates that overall, instructional television is more effective for primary and secondary students than for college students. Other studies have replicated this research and findings have generally indicated that there is little difference in overall scores of those students who received instruction through mediated sources verses those students who were taught face-to-face. Schramm indicates that although younger students are more open to newer forms of instruction, the older a student

gets, the less likely they are to accept less conventional forms of instruction. Schramm summarizes that the more complex the material gets, the more students feel the necessity for immediate feedback or the ability to ask questions (Schramm, p. 7). Research by (Monson, 1978; Olgren & Parker 1983; Bronstein, Gill, & Koneman, 1982) on television as a teaching tool, resulted in a list of suggestions for instructors to improve teaching behaviors in order to aid in facilitating a successful teleconferencing experience. These suggestions include:

-advanced organization and preparation of written materials for students
-providing students printed materials before each class
-previewing what is to be covered in each class
-repeating and summarizing main points throughout class
-speaking to individuals, using their names, not to the whole audience
-using various instructional techniques, e.g., question and answer periods, case studies, role playing
-providing a summary at the end of each session
-personalizing comments to sites or individual students
-utilizing questions to keep students involved
-pausing to ask students for feedback about the class

(Shaeffer & Roe, 1985)

It can be argued that many of these suggestions apply to face-to-face or any type of instruction. While many of these suggestions would be helpful in teaching under any circumstances, they are especially important in a teleconference situation.

A study done in 1984 by Haaland and Newby, utilizing the work of Murray (1979), examined perceived teaching behaviors by students in an audio teleconferencing course. Although audio - only was involved, the questionnaire that Haaland and Newby designed concentrated on 5 "dimensions associated with instructional behaviors." The five are: clarity, enthusiasm, organization, pacing, and student participation. The attempt in this study was to find out what facilitates effective teaching in the absence of visual stimuli. Haaland and Newby's comparison of both methods of interaction found that the instructional method "had no effect on the students overall ratings of the course and instructor" (Haaland and Newby, 1984).

This study was replicated with some modifications by Shaeffer and Roe in 1985 at the University of Wyoming. Video teleconferencing was added to the study which included audio and videotaped inserts along with class discussions. Results from the questionnaire distributed indicated that teleconferencing students gave higher ratings to the instructor than the on-campus students. The six main areas of study: overall impression, clarity, enthusiasm, organization, pacing and student participation, all yielded higher scores for the teleconferencing instructor than for their face-to-face counterpart (Shaeffer and Roe, 1985). While there may be several other reasons for the differences in the ratings given the instructors in the Shaeffer, Roe study, an attempt was made to shed some light on the necessity of a teleconferencing instructor to prepare their lessons somewhat differently than they would for a face-to-face lecture. It is possible that the instructor

may have been aware that they should be fostering more attention to the teleconferencing students. This emphasis on missing stimuli for the teleconferencing students may have somewhat bored the students receiving their lessons face-to-face. While only speculation, this is a possible explanation for some of the effects found in experiments which compare mediated and face-to-face communications.

Early research by Chu and Schramm lead to a further concentration on television as a teaching tool. Schramm indicated that instructional television is more effective for younger students than for college students. The more complex the material gets, the less likely people are going to accept a mediated form of delivery for the subject.

Later research summarized that there was basically no difference in the scores of individuals which participated in mediated teaching and their face-to-face counterparts. From this work came several suggestions on how to overcome the loss of face-to-face elements when teaching via mediated method. These suggestions included previewing and summarizing the material whenever possible, preparing written materials on the subject matter for students, pausing for questions and feedback and personalizing the message more than you would do in face-to-face communications. Some of the suggestions made would not be possible when more than one site is being utized but Olgren and Parker et al., propose to alter the instructors teaching methods to fit the situation.

This theoretical base was used to begin a study on behavioral acceptance of telemedicine by the three main user groups of a healthcare information network. The Michigan Hospital Association was one of only three such healthcare networks in the United States delivering information to hospital personnel.

Based on the review of this literature, a hypothesis can be formed:

Research hypothesis #3

Attitudinal factors such as program quality and speaker quality will be significantly correlated with satisfaction but not with behavioral acceptance.

Michigan Hospital Association

To fully understand the particular setting in which this study was to take place, several people were interviewed to get information on how the telemedicine system has evolved and how users attitudes and opinions are utilized to make any necessary changes.

The first of these interviews was with Ms. Marlene Hulteen, Director of member services for the Michigan Hospital Association. Ms. Hulteen pointed out that a feasibility study from the user standpoint was never done. The only early research that was done was a cost analysis by the accounting firm of Ernst and Whinney in 1982. From that research, 125 of the 206 hospitals surveyed were willing to invest in an MHA telemedicine system. The member services division of MHA Communications System, a wholly owned subsidiary of the MHA Mutual Insurance Company, acted as the program producers of the system. The inaugural program, a thirty minute bi-monthly intelligence report, was launched in July of 1984. In addition, member services was contracted to provide seven other hours of programming per month. The one person in charge of producing these programs had no television experience and no research to let them know the wants and needs of their target audience. After nearly a year of "floundering", needs assessments, interviews and other types of user information was gathered on the system and it's ability to support itself through pay-per-view programs the way the parent company had intended. It became very clear that users were willing to watch these programs but not if they had to pay to do so.

Users felt that since they were already paying a monthly fee for the service, they should not have to pay anything extra (Hulteen, 1987). These findings parallel those experiments and observations by owners and managers of cable television operations (Baldwin, 1983). Because of costs and the amount of programming needed to fill the schedule, MHA had to rely on other healthcare programmers like HIN, Aren, Vanderbilt and others. In or around May of 1986, competition had grown to a point where MHA had trouble competing with the other networks at their present rates. In their first year of operation, MHA's telemedicine system lost about $150 thousand. Their second year they cut their losses to about $75 thousand but the state of Michigan had become saturated with information vendors (Hulteen, 1987). In June 1986, the marketing and programming areas merged and fell under the care of Marlene Hulteen. In October-November of 1986, the investors looked for a buyer of their system. It seemed natural for the Healthcare Information Network, who already supplied some programming to MHA, to incorporate them into their preexisting national healthcare network. It was under this new structuring that the system could finally be used for it's intended purposes of educating people in remote areas, rural areas and ancillary personnel who never got out of the hospital to gain the necessary continuing education (Hulteen, 1987).

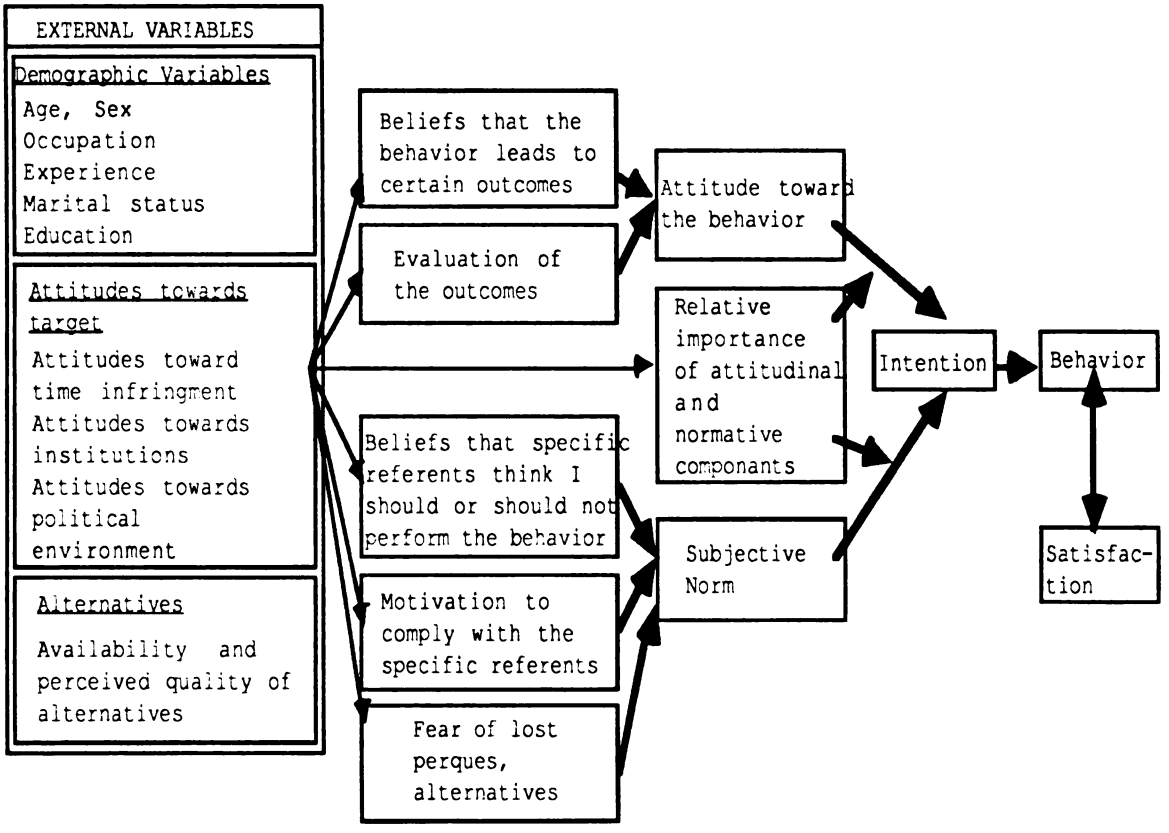
The central focus of the healthcare network has recently been undergoing a major shift according to HIN Vice President David Levine. Levine has stated that the network is no longer focusing the majority of their programming efforts on physicians but rather on other users who have fewer information alternatives to choose from. In the past, said Levine, sponsors of these networks were necessary to help offset rising costs. The early backers tended to be medical supply houses or drug manufacturers. These sponsors insisted on programs that appeal to a group with the power

to influence purchasing decisions of their products. Almost without exception, the target audiences were physicians. Now that the technology is becoming more affordable, an increasing number of smaller companies can afford to back programming for other healthcare personnel (Levine, 1987). As more user research is done however, HIN and other healthcare networks are finding that physicians are not the group that utilize the system. Doctors have opportunities to travel to conventions and gatherings whereas nurses and other personnel do not have many chances for continuing education. Since the merger of MHA and HIN, no one has done an in-depth study of users to find out if the increase in resources has benefitted the target groups. Several major programming decisions are going to be made in the fall and much of the information gained for similar academic research to predict behavioral acceptance can be utilized by Levine, heads of the Healthcare information Network and the Michigan Hospital Information Network, to aid them in these decisions (Levine, 1987).

New Model

Figure 2.3 represents a revised version of Fishbein & Ajzen's behavioral acceptance model. Several of the external variables have been modified for the study of behavioral acceptance within the structure of the Healthcare Informaion Network. Socioeconomic status and religion are no longer relevant in this study. Neither are the variables of personality as defined by Fishbein & Ajzen. Since the three target groups are in the healthcare profession, a certain type of "people-oriented" personality is assumed. Additions have been made to the external variables in the areas of attitudes towards target. People's attitude towards time infringement and the surrounding political environment are especially important in a field like healthcare. The

availability and quality of information of alternatives are also additions to the model. If potential users have an abundance of quality alternatives, this may greatly affect their behavioral acceptance decision. Another belief factor which is present in the new model is fear of lost perques and/or lost aternatives for funding. One could argue that this is already accounted for in the model under subjective norms but these fears or motivations are key in formulating subjective norms.



Light Arrows- possible exlanations for observed relations between external variables and behavior

Heavy Arrows- stable theoretical linking beliefs to behavior

FIGURE 2.3

Composite Model of Behavioral Acceptance

(Adapted from Ajzen & Fishbein, 1980)

Summary

Factors which are anticipated to be most important to behavioral acceptance of telemedicine include:

Perceived attributes
Expected consequences
Compatibility with current communication models
Perceived educational needs
Ease of user operation
Quality of content and subject matter
Program length
Production quality
Scheduling Convenience

These expected relationships between the independent and dependent variables are outlined below in the following summary table:

	Satisfaction	Behavioral acceptance
Personal variables		
Age	-	-
Sex	0	0
Marital status	+	0
Job type	+	++
Organizational tenure	-	-
	Satisfaction	**Behavioral acceptance**
Attitudinal variables		
Program quality	++	0
Speaker quality	++	+
Credibility	+	++
Sociability	++	+
Compatability	++	++

++= strong positive relationship
+ = positive relationship
- = negative relationship
0 = no expected relationship

These factors along with job status and other external variables such as experience, age, job type and availability of information alternatives, should be of great use in predicting behavioral acceptance. Telemedicine is defined for use in this study as the channel by which continuing medical information flows. The importance of the dissemination of medical information is not a question. What is however, is whether or not this new technology can answer the needs of the healthcare profession. The current political environment which this profession operates in forces them to withhold the bottom line - profit margins. Whether or not this technology can deliver economically is one major reason why this study is so important. Legislators and governing bodies like the board of nursing are attempting to make major job decisions before assuring the nursing profession that there is sufficient means in which to update their personnel. This study will point out possibilities to aid their cause and that it helps programmers and managers make more informed decisions. These decisions should at least be made with an understanding of the people that the decisions will affect.

CHAPTER III

Procedures and Methods

Overview

The following chapter will define the operationalization of the research variables for this study, describe the context in which the research questions were introduced, distinguish the variables, describe the research methodology, provide the rationale for the measurement tool and briefly state the statistical analysis procedures.

Data collection

The survey population was chosen randomly from each of the 125 member hospitals. Because of the aforementioned problem of confidentiality, teleconferencing coordinators at each hospital were sent a memorandom (found in appendix A) giving them instructions on the procedures of random selection. They were asked to distribute one of the questionnaires to a physician, one to a nurse, and one to a hospital administrator/manager. Then they were instructed to: make a list of all the physicians that have seen at least one M.H.A. or H.I.N. program or teleconference. From this list choose the fifth (5th) name and give them a questionnaire to complete. Make a similar list of all nurses that have seen at least one program or teleconference and choose the eighth (8th) name and give them a questionnaire to complete. Make a third list of all the administrators or managers that have seen at least one program or teleconference and choose the

third (3rd) name on the list and give them a questionnaire to fill out. Then they were told that if any of the three refused to complete the questionnaire, they were to go back to the list, start with the name immediately after the refused party and choose either the next 5th, 8th, or 3rd name (depending on whether they were choosing another physician, nurse, or manager).

Respondents

After discussion with network managers, it was decided upon that the user groups which will best serve this project are physicians, nurses and hospital administrators/managers. It was felt by Healthcare Information Network President, David Levine, that these three groups comprise the majority of the Michigan Hospital Information Network users. Three questionnaires were sent to each of the 125 member hospitals of the MHIN., to be completed by one respondent from each of the user groups at each hospital throughout Michigan, for a total of 375 questionnaires dispersed.

Survey instrument

The survey is 22 questions spanning ten pages, including cover letter and comments page, (found in Appendix B). The questionnaire is divided into several sections to increase flow and continuity. Section one deals with viewing habits and includes questions 1 through 6. Section two, questions 7-17, is aimed at gathering attitudinal information about telemedicine in general and more specifically the Heathcare Information Network. Section three includes questions 18-22 and inquires about the statistical data necessary for the study.

Response motivation

Because of the length of the questionnaire, 10 pages with the cover letter, several steps were taken to enhance the return rate. The teleconferencing coordinators were instructed to go back to the three respondants and collect the questionnaires in person. It was felt that personal urging from a familiar party would greatly enhance completion. If respondants were not finished, the coordinators were to give them a few more days but urge them to complete the questionnaire as soon as possible. Upon collection of the surveys, the coordinators were to return them in a self-addressed stamped envelope which was provided for them. Approximately three weeks after the questionnaires were sent out, a follow-up memorandom (found in appendix C) was sent out to all 125 hospitals to thank those who had already participated and to remind the others to comply as soon as possible. Approximately two weeks later, a personal call was made to each coordinator who had not included their return address (there were about 25 who did).

Response population

136 of the 375 questionnaires sent out were returned. 15 of the 136 were sent back with notes indicating that the coordinators felt that their input would not advance this research because they were relativly new members of the Hospital Information Network. Breakdown of the returns by jobtype indicates that 56 of the 121 questionnaires were completed by nurses (46.3%), 43 by hospital managers (35.5%) and 22 by physicians (18.2%). Further return breakdown indicates:

-86% of the respondents were married
-68% of the respondents were female

These statistics make any analysis of the variable marital status impossible and sex somewhat difficult. The final return rate was computed at 34%.

Research Methodology

The research methodology selected for this study involves correlation, factor analysis and regression. We are interested in testing the relationships of several variables, to determine the factors most important in user satisfaction and to determine the factors most important in the decision of healthcare personnel whether or not to perform the behavior of acceptance of telemedicine as a supplementary information source.

Operationalization of research variables

The dependent variables in this study are measured by:

Behavioral acceptance - Responses to direct questioning of the number of health care programs respondants viewed in the previous year.

Satisfaction - Measured by responses to 11 attitudinal statements about telemedicine. These responses were then factor analyzed to determine similarities, then reliabilities were run on these factors to determine the strength of the factors.

Independent research variables:

Job type - Defined in this study by selection of respondents as either a physician, nurse or hospital administrator/manager.

Organizational tenure - Measured by years of on-the-job experience.

Age - Interval measurement taken by direct questioning and although not expected to account for much variance, may still be an important variable in a health care setting.

Program quality - The audio and video quality of the network as well as program length, pace, topic and scheduling procedures, use of handouts and quality of speakers. Measured by asking respondents to rate several factors on a Likert style scale as poor-excellent or three points in between then factor analyzed to determine similar variable loadings.

Ability and importance of being able to provide feedback - The measure of the role of interactivity in teleconferencing and the ability for respondents to provide program input. Measured by asking repondents to rate factors relating to feedback on a five point Likert scale then factoring the variables to determine likely relationships.

Other attitudinal factors include:

Compatability - The ability of telemedicine to deliver information to personnel without being perceived as interfering with preexisting communications structures. Measured by responses to statements on a Likert scale about telemedicine and measuring attitudes to adjectives on a semantic differential scale.

Credibility - Measuring how respondents view telemedicine with other sources of information. Measured by asking respondents to rank the importance of telemedicine with other information sources as well as respondents attitudes on credibility on a semantic differential scale.

Sociability - The degree of personalization, sensitivity and socializing afforded users when using telemedicine. Measured by factor analysis of responses to attitudinal adjectives on a semantic differential scale.

Ease of Use - The degree of complexity, convenience, comfort and flexibility that respondents feel that there is in telemedicine. Measured by factor analysis of responses to attitudinal adjectives on a semantic differential scale.

Statistical Analysis Procedures

A factor analysis was done on the independant variables to reduce them to attitudinal factors about telemedicine, about the Healthcare Information Network and about speaker traits, for ease of analysis. The factors were them submitted to reliability tests to determine internal reliability. The 11 measures of the dependent variable, satisfaction, were subsequently reduced to three factors or indices of satisfaction. The attitudinal factors derived, were then renamed and computed by adding their scores and dividing the sum by the number of variables per factor.

A Pearson's correlation was then run on the attitudinal factors and the interval level personal variables of age and organizational tenure. In addition, these attitudinal

factors were correlated via Pearson's, with the 3 derived factors of satisfaction.

A chi-square or "goodness of fit" test was done on the remaining personal variables to test the scores with those which were expected from the sample.

An analysis of variance or "anova" was done on the personal variables to test for significant differences among group means.

Regression analyses were then done on the dependent variables to determine the variables most important in predicting satisfaction and behavioral acceptance.

CHAPTER IV

Results

Overview

This chapter will restate the research questions and present the results from the statistical analysis which will prove or disprove the hypotheses.

Review of the research hypotheses

#1 Only two personal variables, job type and organizational tenure, will explain significant variance in behavioral acceptance and satisfaction.

#2 Attitudinal factors, such as compatibility, credibility, sociability and ease of use will be significantly correlated with satisfaction and behavioral acceptance.

#3 Attitudinal factors, such as program quality and speaker quality will be significantly correlated with satisfaction but not with behavioral acceptance.

Results of Factor Loading

Variables were reduced by factor analysis to create factors which will serve as attitudinal factors, independent variables, as well as satisfaction factors and dependent variables.

The findings will be examined by how they relate to the research hypotheses. The first step of the analysis is to examine how each of the factors were formed. The factors were

divided into two main types, attitudinal and satisfaction.

Attitudinal factors

Table 4.1 shows the 15 variables used to measure attitudes about the Healthcare Information Network, which were reduced to 5 factors.

VARIABLE	DELIVERY	PROGOLTY	TPCSLCTN	USRINPUT	INTEREST
information quality	.66				
speaker quality	.86				
speaker ability	.81				
program learning	.81				
video quality		.85			
audio quality		.90			
topics			.74		
time per topic			.70		
timeliness of topic			.83		
broadcast time				.75	
provide feedback				.72	
ability to ask questions				.70	
interest in cont. ed.					.80
pace					.74
% of variance accounted for:	37.5	11.6	9.7	7.7	7.2

TABLE 4.1
Attitudes Towards HIN Factor Analysis

The first factor formed was the attitudinal factor of delivery. Delivery accounts for 37.5% of the 73% of the total variance accounted for and includes the variables of information quality, speaker quality, speaker ability and program learning. The second factor formed was program quality which includes the variables of video and audio quality. The factor includes only two variables but accounts

for 11.6% of the variance accounted for by the five factors. Topic selection was the third factor extracted and includes the variables topics, time per topic and timeliness of the topic. Topic selection accounts for 9.7% of the variance and includes three extremely similar variables. The final two factors formed were user input and user interest. User input includes the variables of broadcast time, ability to provide feedback and ability to ask questions. The latter two factors differ in that providing feedback is a way for users to give their input on future topics, speakers and ways to improve the network and ability to ask questions is an expression for the need for clarification. User interest includes the variables of users interest in continuing education and pace of the programs. While this loading seems somewhat odd on the surface, both variables are related to some level of interest. User input accounts for 7.7% and user interest 7.2% of the total variance accounted for by these five factors.

VARIABLE	UTILITY	PERCEPTIVE	SOCIABILITY
inexpensive	.70		
reliable	.58		
comfortable	.73		
easy	.75		
effective	.81		
convenient	.81		
simple	.64		
useful	.89		
personal		.86	
sensitive		.78	
sociable			.76
formal			.76
% of variance accounted for:	40.4	15.3	10.0

TABLE 4.2

Attitudinal Variable Factor Analysis

An additional 12 attitudinal variables were factor analyzed and loaded into 3 factors. These factors are related to users attitudes towards telemedicine. The factor loadings are shown in table 4.2.

Eight of the twelve attitudinal variables loaded on the first factor, utility. Utility accounts for 40.4% of the variance accounted for by the three new factors. Utility is composed of the variables inexpensive, reliable, comfortable, easy, effective, convenient, simple and useful. It is interesting to note that the variable inexpensive loaded with variables associated with ease of use. While on the surface these variables seem somewhat related, it appears that respondents feel that they are the same. The second attitudinal factor, perceptive, is made up of the variables of personal and sensitive. Perceptive accounts for 15.3% of the total variance accounted for. The third factor of sociability is composed of the variables sociable and formal. Sociability accounts for 10.0% of the 65.7% of the variance accounted for by the three factors. The factors perceptive and sociable loaded with some interesting results. It is normally expected that the variables of sociable and sensitive will load together. It is interesting to note that the health care professionals who responded feel that there is a significant difference between the two variables. The nature of the work they do may allow them to observe that telemedicine can be sensitive to the feelings of users and their problems and still not be sociable or vice versa.

Table 4.3 shows the 11 variables measuring speaker traits. The variables loaded into 5 factors which account for 50.5% of the total variance accounted for by the factors of speaker traits. The first speaker trait factor to load was expressiveness which is made up of the variables style and humor. Convenience was the second factor to load and includes the variables of pauses for questions, use of handouts and the viewers location. The third factor loading was teaching ability and includes the variables of speech clarity and

knowledge of the subject matter. Factor four, speaking aids, is made up of the variables of graphics and speaker pace. Respectability was the last speaker trait factor to load and includes the variables of prominence and setting (background and surrounding where the speaker is). A few of the respondents used the comments page of the questionnaire to make suggestions that the Healthcare Information Network consider paying more attention to speaker quality and many of the variables which loaded highly into these five factors.

VARIABLE	EXPRSVNS	CONVENCE	TEACHBTY	SPEKAIDS	RSPCTBTY
style	.88				
humor	.63				
pauses for questions		.85			
handouts		.52			
your location		.47			
speech clarity			.95		
knowledge			.42		
graphics				.77	
speaker pace				.28	
prominence					.65
setting					.35
% of variance accounted for:	16.9	12.8	8.8	7.5	4.5

TABLE 4.3
Speaker Trait Factor Analysis

Unlike any of the previous factor loadings, none of the five factors of speaker traits load as strong and clearly account for the majority of the variance. Expressiveness accounts for the most variance of the five factors, 16.9%, while respectability accounts for 4.5% of the total variance accounted for by the five factors. Four of the five factors related to speaker traits include only two variables.

In table 4.4 the 11 variables which were used to measure the dependent variable, satisfaction, loaded into 3 factors. The first factor to load was usefulness and includes the variables of the usefulness of the Healthcare Information Network, information gained through telemedicine being equal to information gained by face-to-face methods, respondents recommendation of telemedicine and the ability to replay programs at a later date being helpful. Usefulness accounts for 35.7% of the 61.2% of the variance accounted for by the three factors of satisfaction. All variables make sense and loaded very highly. Statistically, usefulness is one of the strongest factor loadings in terms of variance accounted for.

VARIABLE	USEFULNESS	ECONOMIC	IMMEDIACY
HIN useful	.80		
telemedicine equal to f-t-f	.78		
recommend telemedicine	.66		
replay helpful	.65		
decreased travel		.73	
resources spent elsewhere		.57	
not willing to watch tv		.70	
good source of information		-.57	
interact with colleagues			.80
learn more with live speaker			.81
attention to live speaker			.70
% of variance accounted for:	35.7	14.6	10.9

TABLE 4.4
Satisfaction Factor Analysis

The second factor extracted was economic, which accounts for 14.6% of the variance and includes the variables of decreased travel, resources spent on telemedicine better spent elsewhere, users willingness to attend meetings to watch television and telemedicine being a good source of

information. The statements were recoded for ease of analysis so all the results can be compared. The variable, good source of information, does not on the surface seem to fit with the rest of the included variables and was dropped from the factor after reliability tests were run. The final satisfaction factor, immediacy, is composed of the variables interaction with colleagues, respondents ability to learn more from a live speaker and that it is easier to pay more attention to a live speaker. Again the variables were recoded for ease of analysis. Immediacy accounts for 10.9% of the variance accounted for by the three factors of satisfaction. Immediacy deals with interactivity behaviors, which do fit together if you theorize that healthcare professionals feel the need to be in some amount of personal contact with others in their field and desire immediate reinforcement of their attitudes and knowledge gained.

The four sets of factors were then subjected to reliability tests to assess their internal reliability. Variables were deleted from the factors where an improved alpha level would be attained upon deletion of the variable. Table 4.5 is a summary of the included variables in the final scales.

ATTITUDINAL FACTORS

Factor	Variables included in the final scale
Delivery	Information quality, speaker quality, speaker ability and program learning
Program quality	Video quality and audio quality
Topic selection	Topics, time per topic and timeliness of topic
User input	Ability to ask questions and ability to provide feedback
Interest	Interest in continuing education and pace
Utility	Inexpensive, comfortable, easy, effective, convenient, useful and simple
Sociability	Formal and sociable

Expressiveness	Style and humor
Convenience	Pauses for questions, use of handouts and location
Teaching ability	Speech clarity and knowledge of subject matter
Speaking aids	Use of graphics and Speaker pace
Respectability	Prominence and setting

SATISFACTION FACTORS

Factor	Variables included in the final scale
Usefulness	Telemedicine is equal to face-to-face, recommend and HIN is useful
Economic	Decreased travel, resources spent elsewhere and no watch television
Immediacy	Attention to live speaker and interaction with colleagues

TABLE 4.5
Factor Loading Summary

Factor scores were created by adding the variables in each factor and dividing by the number of variables in that factor. A summary table for the factors including the mean, standard deviation and alpha levels appears in table 4.6.

The factor with the highest mean score is utility. Utility had a mean score of 5.498 out of 7 which indicates that respondents feel that ease of use is very important for telemedicine. Other factors which displayed high mean scores were teaching ability, expressiveness and speaking aids. Users also felt that the speakers ability to teach, the ability for the respondents to express their views on the subject matter, and the use of handouts and grahpics were also important to them to enhance the telemedicine experience. Three factors: respectability, speaking aids and interest displayed low alpha levels which indicates that the

VARIABLES	MEAN	S.D.	ALPHA
Delivery	3.517	.640	.876
Program quality	3.971	.737	.913
Topic selection	3.824	.584	.792
User input	3.213	.755	.664
Interest	3.659	.786	.490
Utility	5.498	.956	.880
perceptiveness	3.789	1.209	.674
Sociability	3.385	1.312	.512
Expressiveness	4.070	.586	.715
Convenience	3.612	.740	.636
Teachability	4.686	.419	.583
Speaking aids	4.017	.559	.441
Respectability	3.372	.726	.340
Usefulness	3.703	.659	.754
Economic	3.482	.815	.638
Immediacy	3.471	1.051	.750

TABLE 4.6
Summary Table for Factors

scales used to measure these factors may not be as strong as scales designed to measure other factors.

The results of the study will be examined individually by hypothesis.

Results

Hypothesis #1- Only two personal variables, job type and organizational tenure, will explain significant variance in behavioral acceptance and satisfaction.

The summary tables provided in table 4.7 indicates that there are only 3 significant relationships, at the .05 level, between the predictor and the criterion variables.

mean
s.d. Relationship Between Job type & Dependent Variables

Satisfaction	Physicians	Nurses	Managers
Usefulness	3.787	3.739	3.612
	.586	.687	.662
Economic	3.621	3.434	3.472
	.6024	.8526	.8675
Immediacy	3.227	3.455	3.616
	1.151	1.050	.999
Behav. Acceptance	1.772	2.232	2.348
	1.109	1.464	1.541

Experience & Dependent Variables

Satisfaction	5 or less	6-10	11-15	16-20	21-25	25+
Useful	3.722	3.551	3.787	3.712	3.796	3.592
	.422	.632	.706	.789	.617	.595
Economic	3.527	3.538	3.272	3.439	3.631	3.814
	.642	.772	.843	.945	.845	.603
Immediacy	3.791	3.769	3.227	3.59	3.263	3.222
	.940	.971	.893	1.385	.977	1.063
Behav. Accept	2.50	1.807	2.545	1.636	2.789	1.666*
	1.381	1.20	1.66	1.255	1.397	1.118

mean
s.d. Age & Dependent Variables

Satisfaction	25 & Under	26-34	35-44	45-54	55-64
Useful	3.00	3.919	3.616	3.548	3.94*
	.000	.520	.620	.791	.606
Economic	2.666	3.707	3.525	3.229	3.58*
	.000	.771	.6831	.848	1.09
Immediacy	4.0	3.56	3.525	3.25	3.5
	.000	.907	1.143	1.085	1.154
Behav. Acceptance	3.00	2.333	1.95	2.218	2.307
	.000	1.613	1.244	1.337	1.797

Sex & Dependent Variables

Satisfaction	Male	Female
Useful	3.622	3.729
	.570	.697
Economic	3.473	3.485
	.734	.854
Immediacy	3.250	3.572
	1.032	1.051
Behav. Acceptance	2.263	2.156
	1.519	1.410

mean
s.d.

Marital Status & Dependent Variables

Satisfaction	Single	Married	Divorced
Useful	3.393	3.746	3.466
	.573	.608	1.483
Economic	3.272	3.533	2.866
	.442	.816	1.215
Immediacy	3.727	3.466	3.0
	.467	1.103	.707
Behav. Acceptance	2.363	2.152	2.60
	1.747	1.412	1.516

*** = analysis of variance $p \leq .05$**

TABLE 4.7

Relationships between Predictor and Criterion Variables

Levels of behavioral acceptance do not differ by job type as expected but do by respondents' level of experience. Age is another personal variable that provides the other significant relationship with behavioral acceptance, in particular the older and younger age groups. The middle age groups do not show significantly different levels of behavioral acceptance. While job type was expected to sccount for significantly different levels of behavioral acceptance, the relationship between experience and behavioral acceptance was expected. Review of past research did not reveal any indication that either sex or marital

status would show significantly different levels of behavioral acceptance, especially the variable sex. It was theorized that in a healthcare environment however, where dedication to jobs is commonplace and family obligations may prevent the use of more expensive, time consuming alternatives, the variable of marital status may account for significant differences in the levels of satisfaction and behavioral acceptance. As mentioned earlier, the fact that 86% of the respondents are married make further analysis of this variable nearly impossible.

Age is significant when related to the satisfaction factors of useful and economic. Both of these significant relationships are understandable and exhibit a good deal of face validity. The highest mean scores for the factor useful, are for ages 55-64 and 26-34. One thing that both of these age groups have in common is time. Younger people have less of it while older people have more and do not have the patience to waste it. There were not enough respondents in the 25 and under age category, which is understandable given the educational requirements of the job types, and the middle two age groups have less mobility or are somewhat "stuck" with whatever information source which allows them time to fulfill other obligations such as family. The highest mean score for the factor economic is 26-34. This is very understandable as this is the group that has the least money to spend.Organizational tenure is significant when related to behavioral acceptance. Somewhat surprisingly is the finding that the highest mean score in the relationship of the two factors is the level of 21-25 years of experience. While it is understandable for people to want to keep up to date on new innovations, past research indicates a trend towards the fear of technology as we get older. It is possible that this tenure group has a reasonable level of job anxiety and is fearful of upwardly mobile younger people which is used to explain similar phenomenon.

We can therefore conclude that research hypothesis #1 was not statistically proven to be completely correct. One other personal variable, age, did create a significant difference when related to behavioral acceptance and the satisfaction factor economic. Job type and organizational tenure could only manage to produce 1 statistically different set of variances.

Hypothesis #2- Attitudinal factors, such as compatibility, credibility, sociability and ease of use will be significantly correlated with satisfaction and behavioral acceptance.

Hypothesis #3- Attitudinal factors, such as program quality and speaker quality will be significantly correlated with satisfaction by not with behavioral acceptance.

Because factor loadings were somewhat different than expected, factors such as compatibility and credibility either did factor or loaded with other variables which make logical sense. The variables associated with ease of use factored with other variables such as inexpensive and effectiveness. This factor was renamed utility.

Table 4.8 is a correlation matrix which indicates the significance, strength and direction for each correlation. From the table, 26 sets of correlations an be derived, 16 between attitudinal factors and the dependent variables, 2 between speaker trait factors and the dependent variables and 8 sets of correlations when the dependent variables were correlated with each other. The satisfaction factor usefulness, is correlated with: delivery, topic selection, interest, utility, perceptiveness and the dependent variables economic and immediacy. Economic is correlated with user input, interest, utility, perceptiveness, respectability and the dependent variables usefulness and immediacy. Immediacy is correlated with delivery, interest, utility, perceptiveness

Coeff P=	Usefulness	Economic	Immediacy	Behav.accept
Delivery	.427 ***	-.033	-.163 *	-.128
Program quality	.132	-.035	-.067	-.261 **
Topic selection	.158 *	-.011	-.250	-.079 **
User input	.091	-.147 *	.135	-.132
Interest	.332 ***	.269 **	-.320 ***	-.093
Utility	.440 ***	.471 ***	-.346 ***	.131
Perceptiveness	.169 *	.202 **	-.313 ***	.053
Sociability	.035	-.062	-.006	.272 **
Expressiveness	-.061	-.138	.108	-.016
Teaching ability	-.049	.032	.054	.058
Speaking aids	.070	-.096	.057	-.169 *
Respectability	-.008	-.235 **	.139	-.024
Usefulness		.354 ***	-.377 ***	.163 *
Economic	.354 ***		-.406 ***	.094
Immediacy	-.377 ***	-.406 ***		-.156 *

***= p≤.05**

****= p≤.01**

*****= p≤.001**

TABLE 4.8

Pearson Correlation Coefficients

and the dependent variables usefulness and economic. Behavioral acceptance is significantly correlated with program quality, topic selection, sociability, speaking aids and the dependent variables usefulness and immediacy.

The factors interest, utility and perceptiveness were significantly correlated with all three satisfaction factors. Statistically, utility proved to be the best factor when correlated with satisfaction. All three of the correlations between satisfaction and utility were at the .001 significance level and all correlations are moderate in strength. The strongest correlation is between utility and the satisfaction factor economic.Immediacy and usefulness are the strongest dependent variables when correlated with other dependent variables. Both are significantly correlated with behavioral acceptance but both correlations are weak. No one factor was significantly correlated with all of the dependent variables.

Among the surprising results of the correlation analysis was the lack of significant correlations between satisfaction ans sociability, speaker aids and satisfaction. It would seem on the surface that these attitudinal factors would correlate with satisfaction but were noticably absent from the analysis.

Regression Models

In order to test the possibility of a linear relationship and to determine which factors will act as predictors for the

Variance in **Usefulness**
Explained by Regression Model

Indep. Variable	Beta	T	Sig	% of total explained var
Utility	.445	4.95	.000	19.8
Delivery	.34	3.94	.000	30.8
Interest	.223	2.6	.063	38.2
Topic selection	-.206	-2.13	.035	38.2
			F=14.891	
			Significance=.000	

Variance in **Economic**
Explained by Regression Model

Indep. Variable	Beta	T	Sig	% of total explained var
Utility	.472	5.33	.000	22.2
Interest	.307	3.66	.000	31.6
Delivery	-.305	-3.595	.000	39.5
Respectability	-.224	-2.807	.006	44.2

F=19.077
Significance=.000

Variance in **Immediacy**
Explained by Regression Model

Indep. Variable	Beta	T	Sig	% of total explained var
Interest	-.328	-3.461	.006	10.7
Utility	-.302	-3.33	.002	19.9
User input	.211	2.34	.000	24.2
Perceptiveness	-.246	-2.77	.004	29.8
Topic selection	-.231	-2.523	.013	34.2

F=9.890
Significance=.000

Variance in **Behavioral acceptance**
Explained by Regression Model

Indep. Variable	Beta	T	Sig	% of total explained var
Program quality	-.387	-4.178	.000	14.9
Sociability	.384	4.531	.000	29.7
Teaching ability	.180	2.124	.036	32.8

F=15.806
Significance=.000

TABLE 4.9
Regression Summaries

dependent variables, a stepwise regression was run. Table 4.9 is a summary of the regression output.

All of the regression equations proved to be good predictors by the amount of variance that the predictor variables accounted for and the significance level of the equations.

The best predictor variables for the satisfaction factor of usefulness are: utility, delivery, interest and topic selection. The total variance of usefulness explained by the factored variables is 38.2%. Each of the included variables appears fits into the equation theoretically and the equation has a reasonably high F value which serves to support the case that the included variables are good predictors.

The satisfaction factor economic, is best predicted by the variables: utility, interest, delivery and respectability. The total factor variance accounted for by the variables is 44.2%. Once again the variable utility, was the first included in the equation and accounts for 22.2% of the total factor variance accounted for by the equation. The regression equation for the factor economic, is the strongest in terms of F values and total variance accounted for. Two of the variables, delivery and respectability, are somewhat negatively correlated which indicates that a change in the delivery or respectability score will create a negative change in a users economic satisfaction level.

The regression equation for the dependent variable of immediacy, includes the factors: interest, utility, user input, perceptiveness and topic selection. The total variance in immediacy accounted for by all the variables is 34.2% and all factors in the equation except for user input are negatively correlated. The negative betas may be explained by the constant change in the need for immediate information gathering. A change in any of the factors which make up immediacy, for the exception of user input, will bring about a negative change in the immediate need for the information. Theoretically this does make sense because if topics, speakers

or other similar attitudes about the information to be delivered changes, this will naturally affect the level ofsatisfaction. Since these changes in perception are often negative in nature, the shift in satisfaction will be negative as well.

The regression equation for behavioral acceptance includes only 3 factors: program quality, sociability and teaching ability. While there are only three variables in the equation, total variance accounted for is 32.8%. Each of the included variables accounts for a fair amount of variance with program quality accounting for 14.9% while sociability accounts for 14.8% of the total variance accounted for in behavioral acceptance by the three variables. Program quality is somewhat negatively correlated meaning that a change in program quality will mean levels of behavioral acceptance will change in a negative direction. This finding is not surprising because of how sophisticated our viewing expectations have become. We expect that quality will be equal to the broadcast quality that we receive on our television sets at home. Any deviation from these expectations may cause the user to seek alternative information sources.

Summary

Hypothesis #1 was somewhat disproved by this research project. No significantly different relationship between job type and the dependent variables of behavioral acceptance and satisfaction was uncovered. Organizational tenure did create a significant difference when related to the dependent variables.

In analizing hypothesis #2, attitudinal factors such as delivery, topic selection, user input, interest, utility, perceptiveness and respectability displayed marginal or significant correlations with the satisfaction factors. Three of the factors, interest, utility and perceptiveness are

significantly correlated with all three of the satisfaction factors. Program quality, topic selection, speaking aids and sociability were the only attitudinal factors that were significantly correlated with behavioral acceptance.

Utility and interest proved to be the best predictor variables as they appeared in all three of the regression equations for satisfaction variables. The variables uncovered by the regression equations accounted for at least 32% of the total variance accounted for in each of the four equations, with the equation for the factor economic accounting for 44%.

Hypothesis #3 was statistically disproved. The only significant correlation which involves program quality is the correlation with behavioral acceptance. Teaching ability did not correlate with any of the dependent variables.

The factors uncovered by the analysis did prove logical and significant in explaining and predicting levels of satisfaction and behavioral acceptance.

CHAPTER V

Conclusions and Recommendations

Overview

This final chapter includes several conclusions drawn from the research gathered for this study, past studies related to this research and their practical limitations. This chapter will conclude with some recommendations for further research to better aid programmers, managers and researchers in gathering a better understanding of how to meet the potential applications of telemedicine and similar technologies.

Review of procedures

This study has explored the application of a new technology in a state-wide network setting. Two important outcomes have been measured; satisfaction and behavioral acceptance. An attempt has been made to predict those factors which are believed to be most important for increasing levels of these two vital outcomes.

Data was collected by distributing a 10 page self-administered mail questionnaire. Questionnaires were sent out to physicians, nurses and managers in the 125 member hospitals of the Michigan Hospital Information Network. The attitudinal variables of telemedicine as an information source, program and speaker quality and information on respondents attitudes towards the network, were reduced to several factors for ease of analysis.

Analyses of variance were done on the personal variables which were likely to influence satisfaction and behavioral acceptance. differences in personal variables, such as job type, Multiple regressions were run to provide analyses of possible linear relationships between the predictor variables and the criterion variables. From the regression analyses, predictor models were constructed to aid in determining which factors are most important in increasing levels of satisfaction and behavioral acceptance.

Conclusions and discussion

The analyses that were done provide managers and programmers vital information about the attitudes of the three main user groups of the Healthcare Information Network. Research by Ajzen & Fishbein concludes that attitudes of users must be understood before taking the next step in predicting behavioral acceptance. This research allows HIN managers to see what variables are most important to the formation of users attitudes. The attitudinal factors which statistically proved to be correlated most highly with levels of satisfaction are: interest and utility. Two key variables make up the factor interest, user interest in continuing education and pace. It cannot be assumed that because a certain amount of continuing education is required, people will find their experience with telemedicine enjoyable. The material must be presented in a way that users maintain an interest level. The other variable which makes up interest, pace, is related to the first variable. People in the health care profession have to deal with rising costs, slashed budgets, decreasing hospital populations and a changing political environment where lawsuits often dictate policy and treatment. The last thing that users want to do is to sit in a conference room, or even in their own home, and view a program which is too

long and dragged out. These personnel are not used to sitting around in meeting rooms or waiting for something to attract their attention. Programmers must keep this time schedule in mind. Speakers should be instructed on how to convey their subject manner in a quick and concise manner.

The most important factor formed by this research was utility. Telemedicine must be inexpensive, comfortable, easy to use, effective, convenient, useful and simple if personnel are to utilize the technology to its full potential. Health care professionals have had equipment that has tried to make their job easier since medicine was a declared a science. It cannot be assumed that these personnel will treat telemedicine, a tool created for the same purpose, any different than a stethoscope or any other tool. For telemedicine to fully succeed, it will need to become almost second nature to users like any other instruments they use. Users will have to be trained how to use the networks to get the most out of them. At present it seems like this is not being done. Greater efforts to train users how to get the most out of the programs they view is almost as important as creating programs which are full of useful information.

As important as interest and utility were found to be in telemedicine, neither factor is a significant predictor of behavioral acceptance. Both are excellent predictors of satisfaction levels, which will at least serve to reinforce behavior, but not to predict additional network usage. Other factors which help to predict satisfaction are delivery, topic selection, user input, perceptiveness and respectability of the speaker. Delivery and topic selection appeared in two of the three satisfaction regression equations with delivery proving to be a slightly better predictor. The appearance of delivery in the regression equations indicates the importance of information quality, speaker quality, speaker ability and the learning potential

of the program. This factor serves to reinforce the belief that people are not satisfied with simply being presented the information. The information must be presented with quality and by a quality instructor or speaker. Several comments were made by users on the questionnaires that these deliver methods needed some additional attention. Topic selection is another factor which makes a great deal of sense but and the way it loaded was exactly as predicted. Topic selection is a good predictor of two factors of satisfaction, usefulness and immediacy. Any factor dealing with topic selection, time allotted to topic and timeliness of the topic should affect levels of satisfaction. Perhaps somewhat surprisingly however was the fact that topic selection did not enter the regression equation for behavioral acceptance. One could theorize that topic selection would affect how many of the programs a user views in a year but many other factors also affect behavioral acceptance.

Since the Healthcare Information Network has been in Michigan for such a short time, less than a year, many of the member hospitals are very new to the network. About fifteen hospitals returned their questionnaires blank with the explanation that they were so new to the network, they did not feel they could comment on the programming or about telemedicine in general until they had a little more experience. One explanation for some of the factors which were expected to help predict behavioral acceptance, like topic selection, utility, delivery and interest, is the possibility that there were not that many program offered to users. People may have seen a good number of the programs offered to them that pertained to their specialty already. It is possible that while satisfaction levels could have been higher, until more programs are made available to their specialty, they may not be able to view more programs. Those factors which were included in the regression

equations were program quality, sociability and teaching ability. One fact not mentioned earlier is that the regression equation for behavioral acceptance accounted fore the least amount of variance of the four predictor models.

While the equation for behavioral acceptance is significant and its F value is fairly substantial, it only includes three factors. Sociability was not expected to be included in the equation but serves as proof that health care personnel will not utilize a technology unless it conforms with a few of the standard normatives of its users. Users feel that levels of formality and sociability will affect their decision to accept an information source or whether to seek an alternative source. This is a fairly large finding since some of the earlier research tends to indicate that behavioral acceptance will not be affected by this factor. Somewhat surprising was the finding that technical program quality is negatively correlated with behavioral acceptance. One possible explanation for this is that users feel that productions which are produced with production quality in mind are not seen as important as speaker and information quality. This finding is somewhat significant in that it indicates that healthcare personnel feel that the topic and the ability of the speaker to relate the subject matter is more important to their decision whether or not to use telemedicine rather than one of its information alternatives.

Health care professionals apparently will view programs if the technical quality is perceived as less than broadcast quality. The danger exists that when an alternative becomes available with equal or superior topics and speakers, users may abandon telemedicine if the alternative also displays superior production quality. Health care networks finished second to in-service training when respondents were asked to rank-order six information alternatives. Televised presentations of information can perhaps better illustrate

to participants concepts and techniques which may not be presented that way via alternative sources provided they are high quality programs. Several of the respondents noted that there were audio problems with some of the programs and they simply would no "waste their time trying to figure out what the speakers were saying". Users expect more than "talking heads" which is an expression that means that simply showing a person standing or seated, talking about a subject just will not do anymore.

Despite the fact that some of the findings which were extracted from the statistical procedures were somewhat unexpected, they should prove very useful.

Recommendations

The attitudinal factors which are most important to users will allow researchers, programmers and network executives to concentrate on how to better enhance levels of satisfaction and behavioral acceptance. Several key factors need to be addressed before a substantial gain in either satisfaction or behavioral acceptance can occur. The network has grown to a large enough size to integrate their resources and has a much larger pool of speakers and instructors to choose from. These speakers must be instructed on how to best utilize the technology. The formal, somewhat cold nature of network communications must conform more to what health care personnel are used to. All technologies have to relate to potential users for behavioral acceptance to take place and it the importance of this happening with health care professionals can not be overstated. These personnel are used to dealing with people and deserve the same treatment in their continuing education. The network must be as dedicated to this cause as physicians, nurses and hospital managers are to theirs or telemedicine will never realize its full potential. Network

programmers and managers must work on enhancing levels of satisfaction as well as behavioral acceptance. As mentioned earlier, while satisfaction is not directly connected to behavioral acceptance, it will at least serve to reinforce behavior. Even though superior technical quality was not an important predictor of behavioral acceptance, the availablity of alternatives should warrent caution in overlooking program quality. Respondents feel that topic and speaker quality are more important to their decision to use telemedicine than technical quality but users make become fickle.

Directions for further research

Several attitudinal factors emerged that were moderately correlated with user satisfaction. One concept which was not explored was the role that opinion leaders and peer pressure play in the decision process. It would also be helpful to compare levels of satisfaction and behavioral acceptance within each hospital across the various job types.

One lesson learned through this project is that time of year will affect return rate. Several people contacted through this study indicated that participation would have been much easier in the late fall or winter when staff size and responsibilities are at more manageable levels.

This study took place within a network structure that has undergone massive changes in the last year. One important factor that was somewhat lacking in this study was stability. When so many changes occur within the network structure, uneasiness and confusion often occurs. Several hospitals sent their questionnaires back because they were too new to the system. By surveying users who have been involved with the network for a longer period of time, results may be more like what was expected.

APPENDIX A

TO: ALL MHIN TELECONFERENCING COORDINATORS

FR: MARLENE HULTEEN, EXECUTIVE PRODUCER, MHIN

RE: TELEMEDICINE SURVEY

The Michigan Hospital Information Network, the Healthcare Information Network, and Michigan State University are now working together as part of our continuing effort to deliver our members the kind of programming and healthcare information most useful to their needs. Your cooperation is vital to the success of this project.

Very shortly, probably as soon as next week, you will be receiving three (3) questionnaires from the Healthcare Information Network from their main office in Princeton, New Jersey. We are asking that you distribute one of these questionnaires to a physician, one to a nurse, and one to a hospital administrator/manager. Because this a survey being done as part of a masters thesis and it is necessary that we get unbiased data, the method by which you choose the three people to give the questionnaire to is very important. Make a list of all the physicians that have seen at least one MHIN or HIN program or teleconference. From this list choose the fifth (5th) name and give them a questionnaire to complete. Make a similar list of all nurses that have seen at least one program or teleconference and choose the eighth (8th) name and give them a questionnaire to complete. Make a third list of all the administrators or managers that have seen at least one program or teleconference and choose the third (3rd) name on the list and give them a questionnaire to fill out. If any of the three refuses to complete the questionnaire, go back to the list, start with the name immediately after the refused party and choose either the next 5th, 8th, or 3rd name (depending on whether you are choosing another physician, nurse, or manager.

A few days after you hand it out, please go back to the three people and collect the questionnaire. If they are not finished, give them a few more days but please urge them to complete it as soon as possible. After you have collected the questionnaires, please return them to:

STEVE BECK
3305 WOOD ST.
LANSING, MI 48906

To allow time for the responses to be analyzed, it is important that you get these questionnaires sent back as soon as possible. The results of this survey will be made available to us to allow us to make programming decisions and any necessary changes to make the Healthcare Information Network and the Michigan Hospital Association even stronger.

To give you some background information on the person who is designing and analyzing the questionnaire, here is a short biography:

Steve Beck is the head video teaching assistant in the department of telecommunication at Michigan State University. His interest in this project is his concern with quality of continuing education and his interest in it's application in medicine, the latter of which was spawned by his mother who has been a registered nurse for 32 years.

If you have any questions about the distribution of the questionnaire or any other part of this project please do not hesitate to call me. Your help in this project is very important and very appreciated.

APPENDIX B

June 5, 1987

Telecommunications and medicine have combined to help close the information gap through a process called Telemedicine. More research is necessary however to find ways to deliver better continuing education to health care professionals. This survey is being done in cooperation with the Healthcare Information Network and the Michigan Hospital Information Network to find out what policies, regulations and programs are important to physicians, nurses, dietitians, and hospital managers/administrators.

Please take a few minutes of your time to fill out this questionnaire and promptly return it to your teleconferencing coordinator. Your answers will allow us to pin-point areas which need special attention and provide us with the necessary information we need to make the Healthcare Information Network exactly what you need to keep up-to-date in your specialty.

You may be assured of complete anonymity. Your name will never be placed on the questionnaire. This insures that no one will be able to tell how you answered any of the questions. Completion of the survey is strictly voluntary and returning it constitutes consent of the respondent. If you do not wish to complete this questionnaire, please return it to your teleconferencing coordinator.

The results of this research will be made available to managers and programmers of the Michigan Hospital Information Network and the Healthcare Information Network. If you would like to receive a summary of results, please write or call me to keep your name anonymous. Please do not put your name and address on the questionnaire.

I will be happy to answer any questions that you might have. Please write or call if I can be of any assistance.

Sincerely,

Steven L. Beck
Project Coordinator
3305 Wood St.
Lansing,Michigan 48906

(517) 372-7594

TELEMEDICINE SURVEY

1. How many Michigan Hospital Information Network (M.H.I.N.) or Healthcare Information Network (H.I.N) programs have you viewed in the last year? (circle one number)

    1. 5 OR LESS
    2. 6-10
    3. 11-15
    4. 16-20
    5. MORE THAN 20

2. What reason(s) do you watch programs on the M.H.I.N.-H.I.N.? (circle all numbers that apply)

    1. CONVENIENCE
    2. QUALITY OF INFORMATION
    3. SUBJECT MATTER OF PROGRAM(S)
    4. QUALITY OF TEACHING
    5. LOW COST
    6. REQUIRED BY DEPT. HEAD OR SUPERVISOR
    7. CURIOSITY
    8. SAVES TIME
    9. OTHER (please specify)_____

3. Do you usually watch M.H.I.N.-H.I.N. programs: (circle one number)

    1. ALONE
    2. WITH A FEW COLLEAGUES
    3. IN A LARGE GROUP
    9. OTHER (please specify)_____

4. Where do you usually watch M.H.I.N.-H.I.N. programs? (circle one number)

    1. IN A CONFERENCE ROOM
    2. IN A LOUNGE
    3. IN YOUR OFFICE
    4. IN A DESIGNATED ROOM IN THE HOSPITAL
    5. AT HOME
    9. OTHER (please specify)_____

5. How many "live" programs or teleconferences have you attended? (give specific number)_____

6. Have you ever phoned in a question during a "live" program?

   1. YES —How many times?_____ 2. NO

   6a. Why not? <--
   1. TOO SHY
   2. DIDN'T HAVE A GOOD QUESTION
   3. DIDN'T HAVE TIME
   4. COULDN'T GET THROUGH
   5. OTHER (please specify)_____
   _____

7. Please rate the following factors of the Michigan Hospital Information Network on a 5 point scale with 1 being poor, 2 fair, 3 satisfactory, 4 good, and 5 excellent.

	Poor 1	2	3	4	Excellent 5
	(circle number below)				
Video quality	1	2	3	4	5
Audio quality	1	2	3	4	5
Quality of information	1	2	3	4	5
Topics selected	1	2	3	4	5
Time allotted per topic	1	2	3	4	5
Timeliness of topic selection	1	2	3	4	5
Quality of speakers	1	2	3	4	5
Speakers ability to present topic understandably	1	2	3	4	5
Your interest in continuing medical education	1	2	3	4	5
Pace of programs	1	2	3	4	5
Program length	1	2	3	4	5
Scheduled broadcast time of teleconferences	1	2	3	4	5
Ability to ask questions	1	2	3	4	5
Usefulness of programs for learning	1	2	3	4	5
Ability to provide feedback on programs, speakers, and topics	1	2	3	4	5

8. How many times a year do you go to medical conferences or other face-to-face seminars to get information in your specialty, for CME-CEU credit and for general knowledge?
(circle one number)

   1. 5 OR LESS
   2. 6-10
   3. 11-15
   4. 16-20
   5. MORE THAN 20

9. Please rate the following factors in terms of your acceptance of telemedicine with 1 being unimportant and 5 being very important.

	UNIMPORTANT 1	2	3	4	VERY IMPORTANT 5
	(circle number below)				
Speed of information dissemination	1	2	3	4	5
Ability to see operations/policies in practice via videotape	1	2	3	4	5
No need to travel	1	2	3	4	5
Having written materials on subject while viewing program	1	2	3	4	5
Ability to phone-in during programs for clarification of issues or questions	1	2	3	4	5

10. Please rank the following in order of importance as an information source of industry advancements with 1 being least important and 6 being most important. (number each source)

    ____ Magazines

    ____ In-service training

    ____ Hospital memos

    ____ Healthcare networks

    ____ Co-workers

    ____ Conventions

11. For the following statements, please answer on a scale from 1 to 5 with 1 being that you strongly disagree, 2 that you disagree, 3 neutral, 4 that you agree, and 5 strongly agree.

	STRONGLY DISAGREE				STRONGLY AGREE
	1	2	3	4	5
	(circle number below)				
Televised medical education (telemedicine) is a good source of information.	1	2	3	4	5
I usually pay more attention to a live speaker than I do a televised speaker.	1	2	3	4	5
All factors being equal, information gained from an M.H.I.N.-H.I.N. program is as useful as information gained through a class, a conference or other face-to-face method.	1	2	3	4	5
Maintaining face-to-face interaction with colleagues is vital in gathering information on my profession.	1	2	3	4	5
I generally learn more from a "live" speaker than a televised speaker.	1	2	3	4	5
I would recommend telemedicine to my colleagues.	1	2	3	4	5
I fear that telemedicine will decrease my ability to travel to conferences to meet with fellow colleagues.	1	2	3	4	5
Resources spent on telemedicine may be better utilized elsewhere.	1	2	3	4	5
It is helpful to be able to "replay" the information back at a later date if needed.	1	2	3	4	5
I do not wish to attend meetings to watch television.	1	2	3	4	5
I find most of the programs on the M.H.I.N.-H.I.N. informative and useful.	1	2	3	4	5

12. Using the adjectives below, please indicate how you feel about using telemedicine as an information source for your profession. For example, if you felt that telemedicine is an effective source of information you would mark:

INEFFECTIVE____:____:____:____:____:____:____EFFECTIVE

Generally, using **telemedicine** as an information source in my profession is:

INFORMAL____:____:____:____:____:____:____FORMAL

EXPENSIVE____:____:____:____:____:____:____INEXPENSIVE

UNSOCIABLE____:____:____:____:____:____:____SOCIABLE

UNRELIABLE____:____:____:____:____:____:____RELIABLE

UNCOMFORTABLE____:____:____:____:____:____:____COMFORTABLE

DIFFICULT____:____:____:____:____:____:____EASY

INEFFECTIVE____:____:____:____:____:____:____EFFECTIVE

INCONVENIENT____:____:____:____:____:____:____CONVENIENT

IMPERSONAL____:____:____:____:____:____:____PERSONAL

INFLEXIBLE____:____:____:____:____:____:____FLEXIBLE

COMPLEX____:____:____:____:____:____:____SIMPLE

INSENSITIVE ____:____:____:____:____:____:____SENSITIVE

NOT USEFUL____:____:____:____:____:____:____USEFUL

13. Please rate the following speaker traits in terms of importance to you as an effective speaker with 1 being unimportant and 5 being very important.

	UNIMPORTANT 1	2	3	4	VERY IMPORTANT 5
	(circle number below)				
Speech clarity	1	2	3	4	5
Knowledge of subject matter	1	2	3	4	5
Speaker's prominence in their specialty	1	2	3	4	5
Speaking style	1	2	3	4	5
Use of humor	1	2	3	4	5
Use of graphics and special effects	1	2	3	4	5
Pace of speaker	1	2	3	4	5
Speaker's setting (background, location)	1	2	3	4	5
Your location (as you view speaker)	1	2	3	4	5
Pauses for questions and clarification	1	2	3	4	5
Use of handouts	1	2	3	4	5

14. Do You feel that Continuing medical education units (CMEs-CEUs) should be mandatory for health care personnel?
(circle one number)

    1. YES
    2. NO
    9. UNDECIDED

15. Do you think telemedicine (televised medical programs) can provide proper continuing education for health care personnel?
(circle one number)

    1. YES
    2. NO
    9. UNDECIDED

16. Do you think telemedicine can be used to teach non-clinical classes for credit?
(circle one number)

1. YES
2. NO—Why not?_____

_____

_____

9. UNDECIDED

17. What types of programs would you like to see more often on the Michigan Hospital Information Network?
(circle all that apply)

1. LEGISLATIVE UPDATES
2. MEDICAL RESEARCH REPORTS
3. LEGAL/BUSINESS ADVICE
4. PATIENT CARE INFORMATION
5. PATIENT HOW-TO'S (for patient viewing)
6. CASE STUDIES
7. JOB REFERRAL/ADVANCEMENT INFORMATION
8. DRUG INFORMATION
9. SELF-IMPROVEMENT
0. OTHER (please specify)_____

Finally, we would like to ask a few questions about yourself for statistical purposes.

18. Are you a: (circle one number)

1. PHYSICIAN
2. NURSE
3. HOSPITAL MANAGER/ADMINISTRATOR

19. Age: (circle one number)

1. 25 OR UNDER
2. 26-34
3. 35-44
4. 45-54
5. 55-64
6. 65-74
7. 75 AND OVER

20. How many years have you been out of school and working in the health care profession?
(circle one number)

1. 5 YEARS OR UNDER
2. 6-10 YEARS
3. 11-15 YEARS
4. 16-20 YEARS
5. 21-25 YEARS
6. MORE THAN 25 YEARS

21. What is your marital status?

1. SINGLE
2. MARRIED
3. DIVORCED
4. SEPARATED
5. WIDOWED

22. Are you a:

1. MALE
2. FEMALE

Please use this page, and others if needed, to make any further comments, suggestions, and-or criticisms that you may have about programming or practices of the Healthcare Information Network, the Michigan Hospital Information Network, this questionnaire
or telemedicine in general.

THANK YOU VERY MUCH FOR YOUR TIME AND EFFORT. WITHOUT YOU, THIS PROJECT COULD NOT BE COMPLETED.

please send questionnaires to:

Steve Beck
Project Coordinator
3305 Wood St.
Lansing, MI 48906

APPENDIX C

MEMORANDUM

TO: All MHIN Teleconferencing Coordinators

FROM: Marlene Hulteen

DATE: June 23, 1987

RE: Telemedicine Survey

Two weeks ago, you received three questionnaires from our office along with instructions on the dispersion of the survey to selected health care personnel.

Many of you have already returned the questionnaires to the project coordinator in the envelopes provided. Thank you very much for your prompt attention. Some of you have yet to return the completed surveys. I urge those of you who have not returned them to try to convince those people whom you have handed out the questionnaires to, how important their input is. Please try to get the completed questionnaires back as soon as possible, no later than the June 26th deadline.

In order to better understand the needs of our users, the completion of these questionnaires is extremely important. We need you for the implementation of this vital step.

If you have any questions or need additional questionnaires, please feel free to contact me immediately. Thank you very much for your cooperation on this important project.

MH/sl

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