Introducing Computer-Based Telemedicine in Three Rural Missouri Counties

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INTRODUCTION

Technology is perhaps one of the greatest tools under the control of mankind. It can be used for positive or negative purposes, and has proven a powerful force for change (Surry, 1997). In fact, some would argue that technology is a key governing force in society, and that technological change drives social change (Smith, 1996). The Internet is one technology that has contributed to societal change, and has provided opportunities to revolutionize health care. The Internet has afforded the medical community a mechanism to provide access to information in a timely manner. This is particularly important in today’s society due to the continually expanding body of medical knowledge, and the changes in health care delivery that require practitioners to make more important and complex decisions in less time (Lundberg, 1998; High, et al, 2000).

The Internet has the potential to improve the care provided to patients and to enhance biomedical research by connecting practitioners to the most up-to-date information available (Gallagher & McFarland, 1996; Westberg & Miller, 1999). However, an important consideration in the diffusion of information technologies was put nicely by Enrico Coiera (1995) when he said, “Medical informatics is as much about computers as cardiology is about stethoscopes. … Any attempt to use information technology will fail dramatically when the motivation is the application of technology for its own sake rather than the solution of clinical problems” (Coiera, 1995).

Rural health communities face unique issues in providing care to their population. Not only has it been difficult to recruit health care professionals, but also to retain them. Isolation, lack of communication, difficult access to updated medical information, little contact with colleagues, and lack of continuing medical education opportunities have been identified as factors contributing to low retention rates and shortage of supply of rural health care providers, particularly physicians (Conte, et al, 1992; Harned, 1993; Mackesy, 1993;
The University of Missouri-Columbia’s Telemedicine Demonstration Project was developed in December of 1995 to address rural health care provider needs such as isolation, lack of communication, rapid access to updated medical information, contact with colleagues, and continuing medical education opportunities. The Missouri Telemedicine Network (MTN) includes two components: video conferencing and computer infrastructure. Funding for the project came, in part, from the National Library of Medicine (NLM), with the stipulation that the University would provide a thorough evaluation on the computer component. Thus, the evaluation portion of the Telemedicine program is referred to as the Rural Telemedicine Evaluation Project (RTEP). This study focused on the utilization of a portion of the computer component, known as the RTEP workstation, in three rural Missouri counties.

The RTEP workstation is an Internet program that is housed on a server on the Internet in three rural Missouri communities. Elements of the RTEP workstation include access to e-mail, the World Wide Web (WWW), community information, and an address book - all designed to address the unique challenges of rural health care, including access to electronic clinical records.

While on the surface the RTEP workstation appears to have the ability to address successfully some of the issues of rural health care identified earlier, the individuals who are enrolled in the demonstration project may not be willing to utilize the new technology in a way that will allow the RTEP workstation to address these issues. Examining the utilization of this technology gives insight into the various issues surrounding acceptance of this technology by the participants.

**RESEARCH QUESTIONS**

**Research Question 1**: Is utilization of the e-mail and WWW portion of the RTEP workstation, as measured by the

**Figure 1: The Technology Acceptance Model**

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<table>
<thead>
<tr>
<th>Perceived Usefulness</th>
<th>External Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>B/I</td>
</tr>
<tr>
<td></td>
<td>Actual Utilization</td>
</tr>
</tbody>
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**Theoretical Foundations**

Diffusion of innovation research examines how various factors interact to facilitate or impede the adoption of a specific, new product or practice among members of a particular group. The four major factors that Rogers (Rogers, 1995) identified as influencing the diffusion process are the innovation itself, how information about the innovation is communicated, time, and the nature of the social system where the innovation is being implemented. From Rogers’ original work in 1962, an onslaught of diffusion research has been conducted, resulting in various predictive models with the intent of utilizing the model to accelerate the adoption of the innovation. One such model is the Technology Acceptance Model (TAM).

Fred Davis (Davis, 1989) originally developed the TAM, under contract with IBM Canada, Ltd., in the mid-1980s for the purpose of evaluating the market potential for a variety of then-emerging PC-based applications in the area of multi-media, image processing, and pen-based computing. TAM was used to guide investments in the early development of these various technologies (Davis, 1995).

The TAM purports to provide a basis for tracing the impact of external factors on internal beliefs, attitudes, and behavioral intentions. The TAM suggests that behavioral intentions (BI) are jointly determined by the person’s attitude (A) and perception of the technology’s usefulness (U), with relative weights estimated by the regression: BI = A + U (Davis, 1989).

In the TAM, the behavioral intention (BI) of the users to actually utilize the technology is determined by their attitude toward using. However, the attitude has first been influenced by two specific beliefs: the user’s perception of how easy the technology is to use, or “perceived ease of use” (EOU) and the perception of how useful the technology will actually be in the user’s job, or “perceived usefulness” (U). ‘A’ determines the user’s ‘BI’, which results in their actual utilization (Davis, 1989; Davis, 1989; and Davis, 1996).
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