AN EVALUATION OF REMOTE COMMUNITIES SERVICES TELECENTRES IN FIVE RURAL NEWFOUNDLAND COMMUNITIES

PATRICIA DWYER

An Evaluation of Remote Communities Services Telecentres in Five Rural Newfoundland Communities

by

Patricia Dwyer

A thesis submitted to the

School of Graduate Studies

in partial fulfillment of the

requirements for the degree of

(Masters of Community Health: Master of Science)

Division of Community Health/ Medical School/Faculty of Medicine
Memorial University of Newfoundland

May 2004

St. John's Newfoundland

ABSTRACT

Citizens of rural communities face many challenges related to distance, environmental factors, socioeconomic barriers, transportation issues, and communication systems availability. Rural communities have been found to be disadvantaged in terms of access to: (a) health care; (b) peer support/consultation among professionals in a variety of occupations; (c) continuing education; (d) a range of centrally located government services; (e) economic markets; and (f) key decision makers in the public and private sectors. Telecommunication technologies have been recognized as powerful tools for reducing the impact of rural isolation and enhancing the delivery of health, education, and public and private services.

One initiative, the Remote Community Services Telecentres (RCST), a shared use facility implemented in rural communities to provide telelearning, telehealth, communications, and information access services, was established in five remote communities in Newfoundland and Labrador as a model to effectively meet the needs of individuals and professionals separated by distance. This study reports the findings from the evaluation of this model in those five communities.

The evaluation found that the use of the RCST model in five sites is limited, but growing. Active participation in the centres has demonstrated that the technology can work, and the growth in utilization over the course of the study indicates that the telecentre is acceptable and useable by community stakeholders. The longevity of the RCST, however, is not clear. In the absence of key policy changes around health provider reimbursement and dedicated funding for continued

use of ICTs to enhance rural access to services, the RCST model may fail to survive beyond the initial funding and enthusiasm for the project.

ACKNOWLEDGEMENTS

Many people contributed to the development and implementation of this project. This report could not have been written with out the information and support so generously provided by the numerous individuals at the participating sites and the project partners, who so kindly responded to the various questionnaires associated with the evaluation and devoted their energy to this report. Their efforts were greatly appreciated.

Some of the information for this document was adapted, with permission, from the original project proposal documents and the ongoing and final report documents compiled as part of the project funding agreement.

Special acknowledgement is extended to: Dr. Segovia who provided support, input, and supervision into the original design, methodology, data collection and preliminary drafts of this thesis ; and Dr. Neville for assuming the role of thesis supervisor and mentor upon the death of Dr. Segovia in the fall of 2002.

Thank you to the following individuals who have provided time, support, encouragement and cooperation to this thesis report:

Committee: Dr. Jorge Segovia (retired supervisor)

Dr. Doreen Neville (supervisor)

Dr. Bill Bavington

Dr. Gerard Farrell

Sandra Goobie, Research Assistant II, Telemedicine/TETRA

Keith Sheppard, RCST Project Manager

Mike Mooney, Associate Director, Technical Services, Telemedicine/TETRA

Mary Lynn Gambin, Technical Support, Telemedicine/TETRA

Mary Ann Kelly, Technical Support, Telemedicine/TETRA

Wendy Ennis, Scheduler, Telemedicine/TETRA

Lise Horth- Susin, PHEP Coordinator, Health Labrador Corporation

Kim Osmond, PHEP Coordinator, Twillingate Health Centre

Andrea Battcock, Independent Telehealth Consultant

Dr. Carl Robbins, Chair/Director Telemedicine/TETRA

Karen Simon, PHEP Coordinator Assistant, Port aux Basques Site

Barb Grimes, PHEP Coordinator Assistant, Twillingate Site

Michael Dwyer, my husband and motivator

Devin, Tara, & Erin, my children for their understanding and support

My sisters and brother for never letting me give up and for believing in me.

Thanks is extended to the project partners and their staff: Telemedicine/TETRA, Telesat Canada, Futureworks Inc., Collaborative Network Technologies (Colabnet), and the Communication Research Centre (CRC) who provided the technical knowledge and people support that helped to make the project a reality.

TABLE OF CONTENTS

TABLES AND FIGURES

CHAPTER 1: INTRODUCTION

1.0 Introduction

Citizens of rural communities face many challenges related to distance, environmental factors, socioeconomic barriers, transportation issues and communication systems availability (Statistics Canada, 1999). Rural communities have been found to be disadvantaged in terms of access to: (a) health care; (b) peer support/consultation among professionals in a variety of occupations; (c) continuing education; (d) a range of centrally located government services; (e) economic markets; and (f) key decision makers in the public and private sectors (Canadian Medical Association, 1992; Jennissen, 1992; Improving Health Care for Rural Populations, 1996).

Telecommunication technologies have been recognized as powerful tools for reducing the impact of rural isolation and enhancing the delivery of health, education, and public and private services. Telecommunications give access to markets and decision-makers and are an essential condition for economic diversification (Qvortrup, 1998). Telecommunications are also a means of providing training, education, and public and private services (Hollett and Sons, 1998; Advisory Council on Health Info-structure, 1998). However, in rural communities, telecommunications access and availability are often limited. (Ovortrup,1998; Fuchs, 1998; Hollett & Sons, 1998; Telecentre Evaluation, 1999).

We know that distance, environmental factors, socio-economic barriers and transportation issues can also inhibit high quality and cost effective healthcare (Canarie, 1997; Qvortrup, 1998; Curran & Noseworthy, 1999; American Medical Association, 1996; Statistics Canada, 1999).

Communications technologies can provide the means to extend and enhance medical care from urban centres to remote communities (Health Canada, 2000; Mehta, Wakefield, et al, 2001) and help to eliminate or reduce the impact of distance and isolation (Canarie, 1997).

In Newfoundland and Labrador, geographically dispersed population, environmental and telecommunication challenges have led to the need for innovative solutions to assist rural communities to meet these challenges and enhance the lives of their citizens. Remote Community Services Telecentres (RCST) have been established in five rural/remote communities, Nain, Goose Bay, Twillingate, Forteau, and Port aux Basques, to address these identified issues. The RCST is intended to be a resource available to all citizens in a geographic area to provide support and improved access to health services, education, business, and/or community capacity building options.

1.1 The Remote Community Services Telecentre Project in Newfoundland and Labrador

The Remote Community Services Telecentre (RCST) concept was developed to provide a number of applications including telelearning, telehealth, communications, and information access services through a conventional network facility (telephone or cable) or through the use of shared wire-line and wireless (i.e. terrestrial, wireless, and satellite) communications infrastructures (see Appendix A for a glossary of frequently used terms in the telecommunications field). The RCST model was envisioned as a way of providing network-based advanced services to rural and remote communities. The concept is based on a flexible, shared-use facilities model that could be custom fitted to the needs of a community or region, in

which a variety of technologies and services could be integrated to meet the specific needs of the community and the environment in which it would operate. An RCST would become a shared resource for a community or region, a common point through which a variety of services could be concentrated for cost effective access. These facilities could range from a single computer, in a remote community, providing telemedicine services, to a facility with multiple systems, providing a full set of network-based education, health, business and social services to a community.

The primary purpose of the RCST project in Newfoundland and Labrador was to implement an effective delivery system for medical, educational, and information services into selected rural and remote areas in Newfoundland and Labrador. The project objectives included:

1. To design, develop and implement an effective information technology platform
2. To create a flexible model that can be quickly adapted to the needs of the pilot communities in light of the needs assessments conducted.
3. To develop new telehealth services in conjunction with the adaptation of existing services
4. To evaluate and refine the RCST service and technology model to ensure its wider scale applicability on a provincial and national basis.
5. To develop a technology model that can be adapted to a range of differing network and technology infrastructures, in line with the differing environments across Canada.
6. To develop a technology and service model that is cost-effective and sustainable at the community level on an ongoing basis.

1.2 Literature Review

The review of the literature includes selected references, relevant articles, papers and reports. Published literature was obtained by searching MEDLINE, journals, the Internet, articles, papers, Telemedicine Information Exchange, and the Cochrane Library. Key words searched included: telemedicine or telehealth; remote consultation; rural health issues; rural health access; challenges to rural health delivery; telecentres; telemedicine evaluation or telehealth evaluation.

The Internet search for key words returned 2,674 matches. Relevant articles and reports were retrieved and reviewed on the basis of the information contained in the abstract. Limitations included: difficulties in obtaining articles (unavailability of website or not in library holdings); limited details regarding instruments used in reports or studies that were retrieved, and most importantly, the lack of standardized evaluation frameworks or approaches for evaluating telecentres and telemedicine/Telehealth. As with any literature review, bias is a possibility due to the fact that positive results are more likely to be published than negative or inconclusive results.

1.2.1 Problems Rural Communities Face

Statistics Canada (1999) states that rural communities' face many challenges related to distance, environmental factors, socioeconomic barriers, transportation issues and communication systems availability. Therese Jennissen (1992) reported that the provision of social services, education, and job training influence people's quality of life, and ultimately their health. Many articles support that these issues can also inhibit high quality and cost effective healthcare (Canarie, 1997; Qvortrup, 1998; Curran & Noseworthy, 1999; American Medical Association, 1996;

Statistics Canada, 1999). Rural communities have been found to be disadvantaged in terms of overall health status and well-being, as well as access to: health care; recruitment and retention of health professionals; continuing education; a range of centrally located government services; economic markets; and key decision makers in the public and private sectors (Canadian Medical Association, 1992; Jennissen, 1992; Improving Health Care for Rural Populations, 1996). Each of these is discussed below.

(a) Overall Health Status and Wellbeing

Up to 30% of Canada's population lives in rural, remote and northern areas of the country (Health Canada, June 2000). Statistics Canada reported in 1992 that 46.4% of the Newfoundland and Labrador population lived in rural areas. Rural Canada is growing in population at a half percent annually, and as baby boomers retire to the country where many of them have their roots, this will accelerate (Statistics Canada, 2001). The general socio-economic climate for employment, income, and the environment has important implications for the health of rural Canadians (Jennissen, 1992).

The health needs of rural Canadians are often different from those of urban Canadians and northern and isolated communities face unique health challenges posed by geography and long distance (Society of Rural Physicians of Canada, 1998). There is a trend towards progressive deterioration in health status as one moves from areas bordering urban centres into the more rural and remote regions (Pampalon, 1991), manifested in substantially higher rates of diabetes, respiratory and infectious diseases, as well as violence-related deaths, in some aboriginal communities. Combined, there is an increase in mortality in rural regions as evidenced by life

expectancy (State of Rural Healthcare, 2001). Consistent with other measures of the health of the population, there is an association with socio-economic factors: life expectancy decreases as the rate of unemployment increases and the level of education decreases, in rural areas.

(b) Access To Health Services

Accessibility to health care is one of five cornerstone principles of the Canada Health Act, Canada's federal health insurance legislation, which establishes the criteria and conditions (the national standards) related to insured health care services. The provinces of Canada are constitutionally responsible for the administration and delivery of health care services. They decide where their hospitals will be located, how many physicians they need, and how much money they will spend on their health care systems (Canada Health Act Overview, 1999).

Although all residents of Canada theoretically have equal access to services under the *Canada Health Act*, there are regions in Canada, mainly rural and northern regions, that are medically under serviced, and lacking in social services (Canadian Medical Association, 1992). Rural regions, with the most ill health and higher rates of long-term disability and chronic illness, as well as increased mortality, have the least access to health services (Statistics Canada, 1999).

Rural residents have recently had increased difficulties accessing services, as a consequence of rural hospital closures and centralization of many health services in larger cities. The lack of community services in many smaller centres means that patients discharged early from hospitals often lack community-based care. Canadians living in smaller rural communities also have farther to travel to see a physician than do city dwellers. (Improving Health Care for Rural

Populations, 1996) The longer distance to doctors, for Canadians living in low-income areas in rural Canada, may be further compounded by limited public transportation. Rosser (1999) reported that the need to travel can produce worse outcomes because some patients will not travel and others, especially for emergent conditions, will suffer negative health outcomes due to the inherent risks of travel and the time it takes.

Rural communities also often lack the services of allied health professionals, such as: counselors, therapists, social workers, and childcare workers. This problem is exacerbated by a lack of information and support in a number of areas such as sex education for children and youth, information on the adverse effects of drugs, alcohol and smoking, education about childbirth, breastfeeding and infant care, healthy eating, parenting, and the prevention of violence in the home.(Jennissen, 1992)

(c) Recruitment and Retention of Health Providers

Rural regions encounter difficulties in recruiting and retaining health care providers. The chronic and often critical shortages of health care providers are major challenges in rural health care delivery. While 31 percent of Canadians live in rural areas, only about 17 percent of family physicians and about four percent of specialists practice there (The State of Rural Healthcare, 2001). A 1999 study, funded by Health Canada, projected that our overall supply of doctors will reduce from 56,775 in 1999 to 52,438 in 2021. Relative to the population, this means the ratio will fall from 1.82 physicians per 1000 people in 1999 to 1.39 in 2021 (a 24% decrease). Statistical modeling predicted a decrease of rural physicians from 5,531 in 1998 to 4,529 in 2021. The ratio of physicians per 1000 population will decrease from an already low 0.79

physicians per 1000 population in 1999 to 0.53 by 2021 (a 33% decrease) (Buske, Yager, Adams, et al, 1999). Our existing health system trends will cause accelerated rural attrition and increasing disparity between rural and urban Canada in terms of access to physicians.

Decisions to leave rural practice are usually influenced by non-monetary factors, such as a shortage of professional back-up, long hours of work, limited opportunities for further training, insufficient job opportunities for partners, and concerns over children's educational opportunities (American Medical Association, 1996; Canadian Medical Association, 1992). Although the distribution of physicians appears to be the aspect of rural health most commonly discussed in the literature, the availability of and access to, other health care professionals are also of concern.

(d) Continuing Education

Professionals:

The need for professional education is greatest for those professionals (health professionals, teachers, law enforcement officers, etc) practicing in isolated communities. For them, opportunities for professional, educational and personal contact are reduced as compared to those who benefit from proximity to fellow professionals. Thus, there is need for models of educational delivery (such as distance education) that are not dependent on physical proximity of students and teacher (Crowder, Lindley, et al, 1999). Interaction between and among practicing professionals is the cornerstone upon which critical, continuing professional education must be built.

The need for continuing professional education within the health professions is especially acute, particularly for those professionals where it is a requirement for practice (i.e. College of Family

Physicians of Canada). Health professionals require access to continuing education programs, regardless of their location. Medical research and technological developments continuously inject new information and products into the health care workplace (Walker et al., 1998; Anderson, 1995). The challenge for rural health care providers is to stay abreast of the latest health research information, given the rapid advances of new information published, updated or revised information, and the constantly expanding and rapidly changing body of knowledge in the health sciences (Whitten et al,1998; Anderson, 1995).

Adult & General Education:

Adults living in areas of low population density, remote from major centers, face many difficulties in acquiring advanced training and instruction (Anderson, 1995). These difficulties can include a lack of up-to-date information on available programs, lack of learning materials and resources, costly and time-consuming travel, poor transportation services, unpredictable weather conditions, lack of societal encouragement and support services, limited availability of needed courses, and often a lack of program stability and continuity. (Ontario Ministry of Education, 1987) Distance learning networks may permit lifelong continuing education for rural residents who cannot afford the relocation or the long drive time required to attend courses in distant locations. (Parker, 1996)

Small rural schools have difficulty offering advanced placement courses or a wide variety of math, science and foreign language courses (Ontario Ministry of Education, 1987). In order to provide students with the best education available, rural schools have to pool their resources and

to draw on outside talents not available locally. With appropriate distance learning networks, these options are possible (Anderson, 1995).

(e) Range of Centrally Located Government Services

There is a need for governments and development agencies to deliver information and other public services to the population in rural and remote areas, as well as their need to collect information from these areas (Ernberg, 1998a&b). Increasingly, access to local and federal government information and resources is being made available to citizens on-line. The Internet also allows individual and community access to government agencies and local officials (Mark, Cornebise & Wahl, 1997).

Unfortunately, the Internet is still limited in its reach. Internet usage for postings of information or agency rules, regulations, and data are helpful but not yet adequate to ensure access in all areas, and are particularly unlikely to serve citizens in poor countries or rural areas. As pointed out by James Katz in the Benton Foundation (1998) report on low-income communities in the information age, "The information poor will become more impoverished because government bodies, community organizations, and corporations are displacing resources from their ordinary channels of communication onto the Internet" (p. 5).

(f) Economic Markets

The future of rural society very much depends on the diversification of rural economies (Ovortrup, 1998). Canadian communities are undergoing dramatic changes as a result of the transition to a knowledge economy and are confronted with multiple social, environmental and economic challenges (The Rural Times, 1999). Rural areas face repeated economic downturns,

loss of traditional industries, changing demographics and concerns over environmental degradation. Many rural economies are primarily dependent on agriculture, forestry, mining and fishing. However, today these activities can only support a limited number of people, and need access to external markets in order to survive (Campbell, 1995). Thus, to preserve rural society, the rural economy must be diversified; it must attract small and medium-sized enterprises to rural communities and develop better access to external markets, to decision makers and information providers (Ovortrup 1998). Experience has shown that the attraction of small and medium-sized enterprises is hampered by difficulties other than their small size and lack of resources. Geographical and socio-cultural distance from markets and decision-centres, lack of easy access to information, lack of appropriate services (public services, training programmes, etc.), lack of training facilities for the workforce, and lack of links with other firms also limit diversification (Browne & Swanson, 1995).

The modern economy is highly dependent on services and information. Telecommunications and computer technologies have the ability to diminish the importance of distance in the processing of information and the provision of services (Campbell, 1995). However, rural communities tend not to produce the economies of scale that make it less expensive to provide an advanced telecommunications infrastructure, powerful computers, and well-developed networks (Parker, 1996). Given the economy's increasing reliance on computers and telecommunications, those without access to technology and the necessary training and education to use it appropriately will be unable to enjoy the economic benefits associated with technologies (Fuchs, 1998; Gonzalez, 1995).

(g) Key Decision Makers in the Public and Private Sectors

Public Sector

Rural areas face different issues than urban areas and therefore have different policy needs. Currently local policy development tends to be ad-hoc and not based on broad sources of information; it often reflects locally powerful people and vested interests (Browne and Swanson, 1995; Volpe National Transportation Systems Center, 1998). Too often policies are prepared without consideration of local capacities to implement them (Volpe National Transportation Systems Center, 1998). If policy is to be understood, respected, and implemented at local levels, it must respect local needs and capacities. Processes are needed to support local input to policy making, so that policies may be enabling rather than constraining, and reflect local circumstances.

Rural citizen access to decision-making is important because people want and need to shape the choices that affect their well-being, such as: the quality of the air they breathe, the purity of the water they drink, their neighborhood, the availability of resources, etc. (Browne and Swanson, 1995; Hewitt, 1989). Information communications technologies offer hope to rural areas left behind by the disadvantages of distance and population dispersion and diversity.

Private Sector:

Much of the economic development in rural communities will depend on risk-taking entrepreneurial small businesses (Qvortrup, 1998). Role models, incentives, social support, and a variety of services (including financial, technical, accounting, legal, consulting, training, and marketing services) are all required. Rural businesses with appropriate products and with Internet access need opportunities to reach beyond their local market to other rural areas, and to urban

and international locations, either directly or through distributors (Parker, 1996). For people in rural places, it is important to have links to the global networks of large firms where information, commerce, and decisions are centered (Malecki, 1996). However, rural people often lack local access to the Internet and other on-line services or pay long distance toll calls to reach them.

1.2.2 How Technology Can Address Rural Community Problems

Telecommunication technologies have been recognized as powerful tools for reducing the impact of rural isolation and enhancing the delivery of health, education, and public and private services (Canarie, 1997). They give access to markets and decision-makers and create an essential condition for economic diversification (Qvortrup, 1998). The means by which telecommunications technology can address the major problems facing rural communities is reviewed below.

(a) Enhanced Health Care

Telecommunications technology, in particular, telehealth/telemedicine, has considerable potential to have either positive or negative impacts on access to and delivery of rural health services. The potential of telehealth lies in supplementing the skills and abilities of existing rural health workers to address problems that would otherwise require patients to travel out of the community to access health care services.

More than twenty years ago, Dr. Max House, one of Canada's telemedicine pioneers, started using analogue technology to transmit one way video and two way audio between doctors and

their patients in remote areas of Newfoundland (Elford, 1995-97; Ryan, 1998). From its beginning as an audio-only teleconference network serving nine communities in Newfoundland and Labrador, Memorial's teleconference system (TCS) has grown to meet a need for an effective, cost-efficient communications system to augment health and education services in the province. As a provincial communications resource, in addition to providing a technical network service, Telemedicine/TETRA also provides distance education services in the health field, medical data transmission and consultation, and research in health and telecommunications (Elford, 1997). Building on the telephone model, TETRA continues to explore innovative, cost-effective solutions and modern telecommunications opportunities in response to the challenges of practicing and providing health care posed by the province's geography.

Technology has made it easy to deliver health care services over distance. However, health care provider reimbursement for services delivered via telemedicine is practically non-existent, thus implementation is impeded. (TeleMedicine, 1997; Advisory Council on Health Info-structure, 1998; Pong, Hogenbirk, & Pearson, 1998; Robinson, 1998; Office for the Advancement of Telehealth, 1998; Fields, 1999). Furthermore, legal liabilities, reimbursement, confidentiality, and security are challenges very much associated with telemedicine (Pong & Hogenbirk,, 1999). Technical and clinical standards, provincial and territorial laws, licensure, regulations, and guidelines for privacy and security, as they relate to telehealth, need to be consistent and compatible across jurisdictional boundaries (Gobis, 1997; Advisory Council on Health Info-structure, 1998; Pong, Hogenbirk, & Pearson, 1998; Pong & Hogenbirk 1999; Robinson, 1998). It is unlikely that telehealth will be implemented on a broad basis unless these issues are appropriately addressed (Pong & Hogenbirk, 2000).

(b) Access to Continuing Education and Training

The nature of work and requisite job skills are changing everywhere, and rural areas are no exception. More than ever, rural prosperity depends on increasing rural citizens' access to educational opportunities (Ontario Ministry of Education, 1987). The information economy both enables and requires life-long learning, as individuals and communities continually adapt to changing circumstances and opportunities brought about by economic and social change and technological innovation. Telecommunications have been used to support the distance delivery of education to health care professionals in a timely and interactive manner (Walker et al., 1998; Oeffinger et al., 1992, Moore & Hartman, 1992). New technologies open new opportunities for distance learning, for sharing knowledge globally and for learner-oriented and customized approaches to learning (Global Knowledge Conference '97).

Continuing education can address the needs of adult learners of every age and every social and economic background who wish to improve their skills for employment or to develop new or existing interests, as well as disabled persons who are homebound and unable to participate in regular group programs. Continuing education courses and programs can help develop the self-esteem of these learners, whatever their age or background. (Ontario Ministry of Education, 1987) A community technology center can provide a place where adults can learn new skills, using telecommunication technologies (Campbell, 1995).

(c) Economic Diversification

Canadian communities are undergoing dramatic changes as a result of the transition to a knowledge economy and are confronted with multiple social, environmental and economic

challenges (Browne & Swanson, 1995). Improved communication and consultation tools, along with more effective partnerships with other government departments, other communities and the private sector, will strengthen the ability of Canada's Aboriginal, rural and northern communities to plan, make decisions and share valuable best practices crucial to sustaining the livelihood of these communities (The Rural Times, 1999; Ernberg, 1998a).

The potential for economic gain exists for small and large businesses because computers and communications networks are becoming more affordable and easier to use. In addition, businesses are benefiting from the information revolution by using information technology to streamline their inventories, increase productivity and identify new markets (Ovortrup, 1998). Businesses are using information technologies to provide new services and/or reinvent themselves through telecommuting and electronic commerce initiatives.

Telecommunication facilities will diminish the distance from business decision-centres, increase the amount of accessible information, support the availability of services and training and help to re-establish the missing link to distant firms and markets (Ovortrup, 1998). Telecommunications are a means for two-way communications and may help a small rural enterprise to increase sales abroad. The real economic advantage for rural businesses will be for them to be able to provide information about their goods and services to the rest of the world through the Internet (Malecki,1996). The information services carried over new telecommunications superhighways will transform rural economies as much as the interstate highway system and the railroads changed rural communities in earlier times (Parker, 1996).

The adoption of information technologies in rural communities is, however, in some ways a double- edged sword. Providing ways for rural consumers to have better electronic access to vendors outside their local community may improve their quality of life, but will not necessarily improve the local economy (Parker, 1996), because telecommunications enables foreign firms to penetrate local rural markets. Rural services must be organized and provided in such a way that they support the rural communities instead of giving large, external companies a competitive advantage over local interests (Fuchs, 1998; Campbell, 1995).

(d) Access to Decision Makers

New information technologies create opportunities for sharing information, fostering dialogue, and providing public officials, individuals, and communities with tools for effective governance (Global Knowledge Conference '97). Information and communication technologies focus on the use of communication and information tools to support decision-making and encourage dialogue between citizens and public authorities, thereby enhancing democratic governance (Browne and Swanson, 1995). Through ICT's, individuals and communities have greater access to policy dialogue and a chance to contribute to it, allowing underrepresented populations to make their voices heard (Campbell, 1995). Telecommunications enables the opportunity to bring together local level decision makers in national and regional forums to debate current issues, seek the advice of public and private partners and share opportunities.

1.2.3 The Telecentre Experience

The first reported 'telecentres" were found in Denmark and Sweden in 1983 (Gomez, Hunt, and Lamoureux 1999). Today there are a great variety of telecentre experiences around the world,

many of them drawing on earlier efforts to establish 'telecottages' 'virtual village halls' 'telelearning centres' and telecentres in Europe and North America and in developing countries (Gomez, Hunt, and Lamoureux 1999; Anderson et al. 1999). While these initiatives have been given many names, the word 'telecentre' serves as a generic term to encompass the array of experiences. While facilities and usage vary across telecentres, all reflect the intention to address the issues of access by providing technology, developing human capacity and encouraging social and economic development (Gonzalez, 1995). The International Development Research Centre (IDRC) supports a variety of telecentre experiences in Asia, Africa and Latin America; some represent collaborations with the International Telecommunications Union (ITU), the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and other partners (Gomez & Hunt, 1999). A British organization, The Telecottage Association, in 1995 reported the existence of 120 telecottages in the United Kingdom, 49 in Finland, 40 in Australia, 23 in Sweden, as well as others in Germany, Portugal, Ireland, Denmark, Canada, Norway, and Brazil (Campbell, 1995).

A crown corporation in Newfoundland and Labrador, the Enterprise Network Inc., which established the first telecentre in Forteau, Labrador, in 1989, launched North America's first rural informatics development service in 1988. In 1992, Enterprise Newfoundland and Labrador, with funding from the Strategic Employment Opportunities Program, expanded the telecentre model. The purpose of this expansion was to develop local economies through the creation of awareness in information technology and with a particular focus on improving the opportunities and choices in skills, employment and services for rural areas.

A formative evaluation of the *Strategic Employment Opportunities Program (1996)* reported that a variety of factors inhibited the development of an effective program design: (a) the broad objectives of the program resulted in a diverse array of projects in which the risks and potential benefits varied widely; and (b) weaknesses in program delivery arose as a consequence of inadequacies in program design, particularly with respect to assessment criteria. These telecentres were closed by the provincial government in September 30, 1997, with the promise of more widely dispersed services to the economic zones (Kanfi, & Tulus, 1998; Fuchs, 1998).

In Case Studies from the Global Telecentre Movement, Fuchs (1998) reported that community telecentres provide benefits to people in the entire community and spread new capacity and skills to people in schools, health institutions, local governments and community agencies. The experiences in Canada, Wales, and Sweden found that the people who work in the telecentres are the most important ingredient, coupled with the application of existing technologies rather than the development of new ones. Many Telecentres were established because the infrastructure was not there and they became the way to build the awareness and demand for better infrastructures, services, and understanding of the role of telecommunications in our social and economic lives (Fuchs, 1998).

1.2.4 Issues in The Evaluation Of Telecentres

It has been proposed that telecentres can reduce costs, provide access to networks of information and services, enable rural residents and businesses to increase their level of competence, and/or function as distance learning and telemedicine facilities (Campbell 1995; Fuchs, 1998; Gomez et al, 1999). However, there has been little critical evaluation of telecentres,

Many telecentre projects are still in an embryonic stage and interest in their evaluation is preliminary. To compound the situation, there are no solid evaluation tools and comparable results to guide evaluation efforts. Gomez, Hunt, and Lamoureux (1999) identified that a concerted effort is required in a number of areas to conduct in-depth research on: the demand by people for telecentre services; community involvement, participation and use; gender and cultural issues; training needs and materials; marketing and operation; policy, trade and regulatory issues; technological choices and developments; sustainability; the social impact of telecentres and the role of ICTs in the "development" process itself.

A key evaluation issue is the *sustainability* of telecentres. The majority of telecentres have been established as short-term or 'pilot' programs through public funding (Bryden *et al*, 1993). It is not possible to say yet whether publicly funded or subsidized telecentres can be successfully maintained when public support is withdrawn. Another issue that arises is how telecentres are to be *evaluated*: it is only in terms of a specific set of criteria that we can determine whether or not a telecentre has achieved a state of sustainability; or whether a telecentre should continue to receive public funding (Bryden et al, 1993; Gomez, 1999; Whyte, 1999).

The International Development Research Centre (IDRC) commissioned a number of studies to better understand the social impact of telecentres in Latin America, Asia, and Africa (Gomez & Hunt, 1999). Preliminary results demonstrated there is a diversity of experiences in these regions and while some have achieved a certain degree of success and sustainability, others have only

survived a few months. Initial results do not provide overwhelming evidence of the positive impact of telecentres. A lack of methodological tools confirms the difficulty in assessing telecentres in a systematic way.

The Pan Global Networking, International Development Research Centre (IDRC) held an international working meeting, September 1999, "Telecentre Evaluation: A Global Perspective" to: (a) explore the challenges and opportunities of telecentre evaluation; (b) understand and compare evaluation frameworks and methodologies; (c) assess the needs and resources available for telecentre baseline evaluation, monitoring, impact assessment; (d) identify issues affecting telecentre performance; and (e) to provide an opportunity to exchange experiences and lessons across regions (Gomez, Hunt, and Lamoureux 1999). It was reported that initial results from telecentre evaluation efforts paint a picture that is perhaps not as bright as we are led to believe by the discussion surrounding information and communications technologies (ICTs) for development. Thus, we should not be surprised if the results of future evaluations are not as positive as many people expect. While it is generally agreed there exists potential use for ICT's in sustainable development, determining the approach to measuring its impact remains a major challenge in evaluation.

KPMG Consulting (1999) completed a "Review of the literature on evaluation in telehealth" for The Commonwealth Department of Health and Aged Care Australian New Zealand Telehealth Committee, as part of a project to develop a generic methodology for the evaluation of the clinical and cost effectiveness of telehealth in Australia. The focus was on identifying the types of evaluation approaches that have been and are being used, together with the circumstances in

which they are applied. Particular importance was placed on understanding what types of evaluation questions have been addressed in telehealth and the particular methods used to answer these different types of questions. The review concentrated on recent approaches to telehealth evaluation, the issues affecting design and conduct of such evaluations and the methods applied to manage these issues.

The report provided a review of the most recent literature available regarding telehealth evaluation. The conclusion was that although a reasonable number of telehealth evaluation references were located and reviewed, generally the literature was scant on discussion of evaluation design and the methods used. In many cases, an evaluation was reported with little detail on methods. Some references were principally theoretical in nature, offering support for evaluation and for the benefits of a consistent evaluation methodology, but without discussion of what that methodology might look like. The report indicated that there is an identified need to move from proof-of-concept research to more applied research and longer-term projects.

In summary, at the time that the evaluation of the RCST project was designed and implemented, there were no established telecentre evaluation protocols, frameworks or widely accepted and utilized evaluation tools which could be accessed and incorporated into the study.

1.3 Purpose of the Study

The purpose of this study was to conduct an evaluation of the RCST models in five (5) communities in Newfoundland and Labrador. The objectives for this evaluation were to:

1. Provide data on how, when and why the multipurpose system is used on an ongoing basis.
2. Provide data on the accessibility, quality and effectiveness of the multipurpose technology from the perspectives of the end users.
3. Evaluate user, patient and health professionals' overall satisfaction with the RCST.
4. Determine if the RCST facility successfully fits and functions within the participating communities.

CHAPTER 2: METHODOLOGY

2.0 Research Design

This study was a descriptive program evaluation of the RCST model (a delivery system for medical, educational, and information services) in five sites in rural Newfoundland and Labrador and included formative and summative evaluation components. The formative evaluation involved continuous monitoring of the implementation and activities of the RSCT model in each site to assess: (1) utilization of the services available and (2) end-user perceptions of the model with respect to accessibility, quality and effectiveness of the services received. The summative evaluation focused on: (1) assessment of overall user satisfaction with the RCST model and (2) perceptions of key stakeholders with respect to the degree of successful fit between the RCST model and the needs of the participating communities.

2.1 Setting

Newfoundland and Labrador is Canada's most eastern province and consists of two parts: the island of Newfoundland (111,390 sq. km), and Labrador situated on the mainland (294,330 sq. km). With a population of 551,792 the population density is approximately 9.06 persons per square kilometer (Minister of Industry, 1997). Located on the east coast of the island the provincial capital, St. John's, with a population of 174,051, is the only community larger than 20,000 (Minister of Industry, 1997). The rest of the inhabitants live primarily in small communities scattered along the coast. Although paved roads connect most communities, some are accessible only by boat or small plane. The climate is inclement and winters, particularly in Labrador, can be severe. Because of the geography and climate, travel can be difficult. .

Five communities were selected for implementation of the RCST model: 3 in Labrador (Goose Bay, Nain, Forteau) and 2 on the island portion of the province (Port aux Basques, and Twillingate). The selection of the five rural Newfoundland communities within the project was based on a number of factors. A detailed profile of each community is presented in Appendix B.

The selection of Goose Bay and Nain arose from ongoing telehealth initiatives in Labrador by TETRA. Due to the geographic nature of Labrador and the fact that many communities are isolated, it has been held that this region could receive the highest benefit from network-based service delivery. TETRA had already been conducting a telehealth initiative with the Goose Bay hospital (the Labrador Telemedicine Project) and had been trialing the delivery of some remote community services into the remote community of Black Tickle. In looking at Labrador it had been decided to test the RSCT facility model as part of a three-tier health system incorporating a provincial facility (St. John's), a regional centre (Goose Bay) and a remote community supported by the regional centre. Upon consultation with the medical staff in Goose Bay it was determined that Nain would be the community that could benefit the most from the RCST concept in light of ongoing health care issues within the community (staff retention, medical staff training, lack of full-time access to a physician). The proximity of Nain to the Voisey's Bay mineral development was also felt to offer potential for sustaining the operation of the facility on a long-term basis.

Forteau was selected on the basis of its existing facility (the former Enterprise Network Telecentre), the commitments made by the local community to support the development of the

facility, and the regions track record for adopting and supporting technology-based service initiatives. Forteau was also felt to offer a unique opportunity to test and refine the business and community service components of the RCST model, given the community's focus on the RCST to support business, communication services, and education. This business focus (with the capacity to add Telehealth services as required) was felt to offer a good potential for the ongoing operation of the centre past the end of the research and development phase. The presence of the facility in Forteau would also make it available to several other small rural communities (Blanc Sablon, Lanse aux Claire, Pinware, Red Bay) that have an established pattern of using the existing telecentre facilities, providing the RCST services to a population base of over 2500 people.

The project site, Twillingate, was selected on the basis of its specification as a pilot site for the Multidisciplinary Service and Teaching Units (MDSTU) as this project progressed it was renamed as the Primary Healthcare Enhancement Project (PHEP) and Telecentres for Education and Community Health (TEACH) projects. Of the three TEACH and PHEP sites, Goose Bay was already within the RCST project and Port Aux Basques had ready access to digital communications facilities through the local telecommunications provider (Newtel). (As implementation proceeded Port aux Basques local access was not readily available and funding was sought through the Health Transitions Fund that allowed Port aux Basques to be included in late 1999 as a RCST site.) The nature of the telephone facilities in Twillingate are such that it was projected that the most communications bandwidth that could be obtained would be in the 128kb range, which would limit the service delivery options available. It was felt that the bandwidth-on-demand facilities within the RCST project, coupled with the telehealth and

telelearning services that would be provided, would considerably enhance the implementation of PHEP and TEACH in Twillingate and Port aux Basques. This would now allow a uniform set of services to be applied in each PHEP site without service restrictions.

While the project proposal was being prepared, the champions in the communities were consulted and overwhelming enthusiasm to participate in the pilot operations was experienced. These communities through these champions and other members of the communities had been approached after the Telesat & ESA/ESTEC meeting of 27 August 1998 at which time ESA accepted the RCST project proposal and agreed that Telesat should proceed with phase I of the two phase pilot operations project. At this time the communities understanding of what this project could bring to the communities and what their role would be increased significantly and work began to formalize the relationships through a series of Memorandums of Understanding between the RCST consortium and the local partners.

To ensure equipment was compatible and accessible, identical roll about video conferencing units (Intel Team Station) and a patient examination camera were installed at each site, except the Forteau site. All units were located at health centres (hospital or clinic) with the exception of Forteau, where a "proshare" unit was installed at the local business centre. Nain and Goose Bay were also provided with a workstation at each site that was used for "store and forward" purposes. Each site was also equipped with a general-purpose personal computer station for internet, word processing, and printer. Satellite bandwidth–on-demand allowed the communities to schedule or block book, through TETRA, Internet (128 kbs) or Video conferencing (384 kbs) as required.

2.2 Sample

In order to introduce the RCST concept and proposed intervention in each community, efforts were undertaken to engage a wide variety of community stakeholders in activities, which would lead them to some involvement with the center, and eventual participation in evaluation of the RCST. At the beginning of the project, CEO's of each Health Board involved in the project, were sent a copy of the project proposal requesting an individual at each site be identified who could act as a representative of the organization during the implementation of the RCST. From this preliminary contact, a list of informants/contacts was developed for each participating site. The invited contacts/informants had experience and expertise in health, health education, and association with various organizations within their communities. An Open House in each community was advertised and hosted by local community champions in the health centers of all sites, with the exception of Forteau where this occurred at the local Business center. The public was invited to attend an information session and demonstration of the proposed telecentre and technologies. The sample involved in the evaluation of the RCST model, included a variety of users of the system as discussed below:

(a) Utilization: The investigator used the TETRA scheduling data base, RCST Satellite Time Request Form, as well as Internet Log Book, to collect and compile statistics on the utilization of the RCST services in each community, from startup (September 1999) to the completion of the study (June 2000).

(b) Telecentre Users: Through promotional activities, in the communities, a variety of users (business, government, non-health groups) were provided access to the services. Participants were requested to complete a Telecentre Evaluation Form and leave it at the Telecentre or Fax it back to TETRA.

(c) Patients: were recruited via the professionals and health care providers providing care, who made contact with the potential client and obtained consent and provided information as required.

(d) Health Professionals: Doctors, nurses, pharmacists, lab and x-ray, clerical staff, administrators, clergy, etc. and education program facilitators were initially invited, by local champions, or via posters, e-mail, and word of mouth, to attend a face-to-face overview presentation and/or meet one-on-one (if requested by an individual). Throughout the life of the project, presentations and demonstration were delivered via videoconference, at the request of the community coordinator or program facilitator, to these professionals.

(e) Education Program Facilitators and Participants: Education sessions were booked through TETRA and once confirmed, the program facilitator either a) notified participants or b) advertised the session by e-mail, poster, or invitation to the event. Participants were requested to complete a Telecentre Evaluation Form and leave it at the Telecentre or fax back to TETRA.

(f) Technical Staff: Individuals who were involved in facilitating and coordinating activities at each site were invited to participate in the evaluation.

2.3 Instruments

A number of instruments were developed for use in the study and are described briefly below. Copies of the instruments are provided in Appendix C: Data Collection Tools.

2.3.1 Instruments Designed to Track RCST Utilization

Instruments to track utilization were designed by the project management team.

- ***TETRA Scheduling Database***: all requests (email, telephone, fax, or in person) for satellite time and use of project facilities was coordinated and logged through a centralized scheduling system database located in TETRA. The database collected information on the format of the session, purpose, contact information, site requesting access and sites connected, and duration of session.

- ***RCST Satellite Time Request Form***: This form was designed to be completed by all individuals requesting access to satellite services, including videoconferencing, Internet access, or store-and-forward services. The scheduling form collects information on the format of the session, its purpose and the requestor's source of information about the availability of the service.

- ***Internet Access Tracking Log***: In an effort to profile users and to track the time and purpose of internet use, a sign in/out book was put in place at each workstation.

2.3.2 Instruments Developed to Elicit User Feedback Regarding Accessibility, Quality and Effectiveness of the Technology

The research assistant and the researcher, in consultation with physicians and nurses at the participating sites, designed these instruments.

- ***Telecentre Evaluation Form***: a 12-item questionnaire/exit survey was designed to elicit feedback from all telecentre users. Questions addressed frequency of use, reason for use, cost effectiveness, aspects of the service liked and disliked, accessibility of the facility, and usefulness of the service.

- ***Patient Evaluation Form***: a 12-item questionnaire was designed to elicit feedback from patients who used the telemedicine facilities to obtain a consult from a health provider. Questions addressed previous experience with the technology, comfort level with the technology, assessment of quality of the provider-patient interaction, alternatives to seeking care which would be required if telemedicine services were not available and the costs associated with these alternatives.

- ***Health Professional Evaluation Form***: a 15-item questionnaire was designed to solicit feedback from health professionals who used the telemedicine services of the RCST to assess patients. Questions addressed technical quality of the system, use of peripheral devices during the consultation (such as cameras), aspects of the system which were liked and disliked, identification of alternative strategies for clinical consultation if the RCST

was not available, methods to be used for follow-up care post the telemedicine consult, and suggestions for changes.

2.3.3 Instruments Designed to Elicit Overall Satisfaction with the RCST Services

The researcher and research assistant developed the following instruments to elicit satisfaction:

- ***Interview Guide for Key Informant Interviews with Health Education Application Users***: This semi-structured interview was designed for administration to students who used the health education applications in the RCST. The interview consists of approximately 14 questions requiring 30 minutes to complete, and assessed user satisfaction with the RCST facility, perceptions of its successes and challenges, cost savings, and applications.

- ***Interview Guide for Key Informant Interviews with Health Education Session Facilitators, Primary Health Enhancement Project Managers, Coordinators and Assistants:*** This semi-structured interview, consisting of approximately 15 questions, required 45-60 minutes to complete and assessed user satisfaction with the RCST facility, community needs, cost effectiveness, as well as perceptions of the RCST successes and challenges.

- ***Interview Guide for Key Informant Interviews with Health Professionals Involved In Patient Consultations Via Video-Conferencing or Store and Forward Technology:*** This semi structured interview consisted of approximately 12 questions and required 30 minutes to complete. It was designed to elicit health care providers' experience and satisfaction with the RCST services, their perceptions regarding videoconferencing versus face-to-face consultations, and benefits and barriers for providing patient care.

- ***Technical Support: Key Informant Questionnaire***: A 17 item questionnaire was distributed in March and April 2000 and required approximately 30 minutes to complete. It was designed to solicit feedback from users/coordinators who supported the videoconferencing services of the RCST. Questions addressed training, technical support, percent of time required to support users, aspects of the system that were liked and disliked, and suggestions for changes.

2.4 Pretesting

Instruments developed by the investigator and research assistant were pre-tested with TETRA's administration (Director and Associate Director of Programs) and/or a minimum of two interviewees, to provide feedback on the readability and clarity of the questionnaire items. Instruments were refined as required before general use.

2.5 Data Collection

Combinations of quantitative and qualitative research methods were used to gather data. Data were collected and reviewed from implementation activities, questionnaires, key informant interviews, and by reviewing and analyzing monthly reports and computerized scheduling information.

Data collection related to utilization of RCST applications, and user assessments of accessibility and quality (formative evaluation) was an ongoing process throughout implementation of the RCST.

- ***System Utilization***: All use of project facilities, from June 1999 to April 2000, was coordinated and logged through a centralized scheduling system located in TETRA, to track how, when, and why the system was used. Scheduling documents kept in the Telemedicine Centre included information on: participating sites, date and time of session, contact person or organization, service request.

- ***Questionnaires***: From September 1999 to June 2000 all questionnaires were completed on site and forwarded, by fax or mail, by the Primary Health Enhancement Coordinator or site coordinator to the investigator's office at TETRA in St. John's.

Data collection regarding user and community stakeholder evaluation of overall effectiveness of the RCST and their satisfaction/assessment of degree of fit between the model and their community (summative evaluation) was completed during the final phase of the project.

- ***Key Informant Interviews***: All interviews were conducted, via telephone, between March and June 2000 by the research assistant located at TETRA.

- ***Technical Support: Key Informant Questionnaire:*** Between March and April 2000 questionnaires were distributed via mail to technical site support staff and Telemedicine/TETRA technical staff, involved in the delivery of RCST applications, to assess their satisfaction with the system in general and specifically with the training received.

2.6 Data Analysis

Qualitative data was contextualized, interpreted and analyzed by the researcher and research assistant. Question responses were complied into one document for each separate question and examined for similar or like responses and relationships between responses, allowing common themes to be identified and reported. Analysis of the qualitative data included: familiarization with the data (review and reading, and listening); transcription of recorded material; organizing data; anonymizing data; identification of themes and relationships between responses; refinement of themes and categories; and reporting.

Quantitative data was tabulated based on the frequency of response to each element of each question.

2.7 Limitations of the Study

- Geographic separation limited the investigator's ability to ensure evaluation instruments were distributed, collected, and forwarded for inclusion in evaluation.

- Evaluation instruments, developed by the investigator and research assistant, were not extensively tested prior to implementation. Therefore, the conclusions that could be drawn are limited.
- Small sample size in some areas of evaluation restricted generalization beyond the sample.

CHAPTER 3: FINDINGS

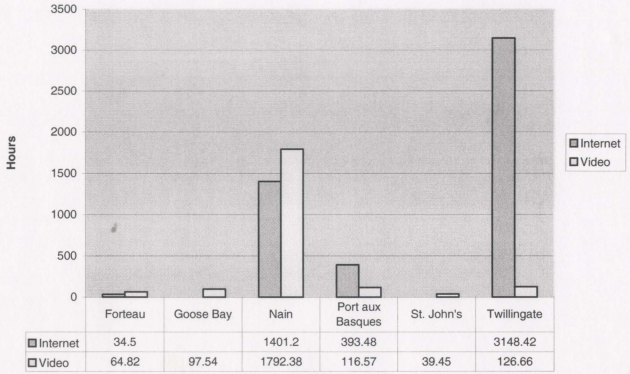
The findings of the study are organized and presented around the study objectives.

3.0 Utilization of the Multipurpose System (How, When and Why the System is Used)

As noted previously in the Methodology chapter, the project management team and researcher utilized three instruments to track utilization of the RCST: TETRA Scheduling Database, the RCST Satellite Time Request Form and an Internet Access Tracking Log. Users were non-compliant in terms of completing the Internet Access Tracking Form. Therefore, the findings pertaining to utilization were obtained from the TETRA Scheduling Database, as all use of project facilities was coordinated and logged through a centralized scheduling system located in TETRA. The following sections summarize the reports from that system in terms of usage, on a site and application basis. It was not possible to track the number of users/attendees at each site and thus data reflect the number of times or hours a particular site participated.

How the System Was Used: The RCST sites could use the communications technology in one of two ways, Internet access or videoconference connection (both of which had to be scheduled with St. John's). Figure 1 presents the total hours of use of Internet and video usage by site, June 1999 – April 2000. Nain and Twillingate were the highest users of Internet access (1, 401 hours and 3, 148 hours respectively). The remote nursing center in Nain was the highest user of video (1,792 hours) followed by Twillingate with 120.56 hours of use.

Figure 1: Summary of hours for video and Internet by site (June 1999 – April 2000)



	Forteau	Goose Bay	Nain	Port aux Basques	St. John's	Twillingate
Internet	34.5		1401.2	393.48		3148.42
Video	64.82	97.54	1792.38	116.57	39.45	126.66

Why The System Was Used: The systems available could be used for business related interactions, medical professional development, training for system users, post-secondary education, consultations, nursing education and judicial services. Table 1 presents the total hours booked for each application type by site. Internet access was the most requested application by Nain, Twillingate, Forteau, and Port aux Basques, for a total 4978.6 hours (69% of all bookings). The primary request for video conferencing availability was for remote patient consultations 24.3% (most frequent request from Nain), followed by a total of 2.85 % (205.69 hours) for medical professional development with all sites, except Forteau, participating.

Table 1: Summary of Applications Hours by Site (June 1999- April 2000)

	Community						
Category	**Forteau**	**Goose Bay**	**Nain**	**Port aux Basques**	**St. John's**	**Twillingate**	**Total hours**
Internet Access	34.5	0	1402.2	393.48	0	3148.42	**4978.6**
Consultations	0	4.73	1741	2.73	0	4.5	**1752.96**
Medical Professional Development	0	40.48	43.23	37	10.5	74.48	**205.69**
Technology Demonstrations	6.75	11	1.5	26.65	11.5	11.5	**68.9**
Business	39.93	7	0	12	0	3.9	**62.83**
Post Secondary Education	12.19	7	0	20.48	2.5	10.98	**53.15**
Training	2.5	12.43	1	9.48	11.5	4.6	**41.51**
Nursing Education	0	8.5	3	4	2.95	14.5	**32.95**
Technical Support	3.45	4.4	1.65	4.23	0.5	2.2	**16.43**
Judicial Services	0	2	0	0	0	0	**2**
Total hours	**99.32**	**97.54**	**3193.58**	**510.05**	**39.45**	**3275.08**	**7215.02**

When the Services Were Used. Table 2 illustrates the communication patterns between RCST sites, including St. John's, for video applications and the number of times each was requested. The site requesting connection to another is listed first, and the site that they connected to is listed second. For example, under Link, F-SJ means that Forteau requested linkages to St. John's 12 times in June 1999 and a total of 50 times over the 11 month study period. The data also indicate that most requests occurred in the fall and winter months, with the exception of November and December. Internet requests were excluded from this table, as all Internet requests were channeled through St. John's.

Table 2: Communication Patterns by Request from Sites (excluding Internet)
June 1999 - April 2000

	Date											
Link	Jun-99	Jul-99	Aug-99	Sept-99	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00	Total Requests
F-SJ	12	4	0	5	10	4	4	5	5	0	1	**50 (12.5%)**
GB-F	0	0	0	0	0	2	0	0	2	0	0	**4 (1%)**
GB-O	0	0	0	0	1	0	0	0	0	0	0	**1 (0.3%)**
GB-SJ	3	2	0	5	10	4	2	6	8	12	6	**58 (14.5%)**
N-GB	0	0	1	1	1	7	3	20	22	21	19	**95 (23.7%)**
N-SJ	2	2	0	0	3	1	0	1	1	1	0	**11 (2.7%)**
N-T	0	0	0	0	0	0	0	0	0	0	1	**1 (0.3%)**
PaB-SJ	0	0	1	22	11	8	3	4	5	5	7	**66 (16.5%)**
SJ-SJ	0	3	0	0	0	0	0	0	10	4	4	**21 (5.2%)**
T-PaB	0	0	0	0	0	2	0	0	0	0	0	**2 (0.5%)**
T-PaB-SJ	0	0	0	0	0	0	0	0	0	1	0	**1 (0.3%)**
T-SJ	11	16	0	13	8	8	6	8	8	4	7	**89 (22%)**
T-SJ-PaB	0	0	0	0	0	0	0	0	0	1	0	**1 (0.3%)**
SJ-PaB-SJ	0	0	0	0	0	0	0	0	0	1	0	**1 (0.3%)**
Total	**28 (7%)**	**27 (7%)**	**2 (0.5%)**	**46 (11.5%)**	**44 (11%)**	**36 (9%)**	**18 (4.5%)**	**44 (11%)**	**61 (15%)**	**50 (12.5%)**	**45 (11%)**	**401 (100)%**

Legend:	F - Forteau	GB – Goose Bay	N- Nain
	O - Ottawa	PaB – Port aux Basques	SJ – St. John's
	T - Twillingate		

3.1 Accessibility, Quality and Effectiveness of the Technology

Four instruments were utilized to elicit feedback from users: RCST Telecentre Evaluation Form, Patient Evaluation Form, Health Professional Evaluation Form, and Activities Report.

RCST Telecentre Evaluation Form The RCST Telecentre Evaluation Form, designed as an exit survey, was distributed to each telecentre location to collect feedback from those individuals who used the Remote Community Satellite Telecentres. Participants were reminded and encouraged, at the beginning of each session, to complete the form at the end of their session. It should be noted that not all participants completed forms, thus the response rate does not reflect all users. Completed forms were collected by the coordinator at each site and forwarded to the researcher, or the individual could fax directly to TETRA offices. One hundred and sixty five (165) forms were completed and returned from September 1999 – April 2000. The following is a summary of the responses.

As shown in Table 3, clients of the Remote Community Services Telecentres have generally positive comments and perceptions of the service. They:

- report repeat usage (44%),
- use the telecentres principally for educational and health applications (n=83 & 32 respectively),
- report that video-conferencing is by far the most frequently used service (n=142),
- almost unanimously report that they would use the service again and recommend that a friend or colleague use the service (99.4%),
- rate the service as excellent or very good (96%),

Table 3: RCST Telecentre Evaluation Form Results
(September 1999-April 2000)

RCST Location (number of completed evaluation forms collected as of April 30, 2000)		
GOOSE BAY	7 (4.2%)	Forty four percent of the respondents accessed the system in Port aux Basques, 32% in St. John's, 24% in Forteau, and less than 5% in Goose Bay and Twillingate. No completed forms received from Nain site.
FORTEAU	24 (14.5%)	
PORT AUX BASQUES	73 (44%)	
TWILLINGATE	8 (4.8%)	
ST. JOHN'S	53 (32%)	
TOTAL	165	

Question	**Results**	**Comments**
1. This was the ….. time that I've used the centre		Forty four percent (44%) of the respondents were first time users of the center and 30% second time users, while 15% had used the telecentre more than 4 times.
☐ 1st	73 (44.2%)	
☐ 2nd - 3rd	49 (29.7%)	
☐ 4th - 8th	16 (9.6%)	
☐ more than 8th	25 (15%)	
Did not respond	2 (1%)	
2. This time I used the telecentre for the following type of application: (select more than one if appropriate.)		*In response to this question: percentages are not relevant as respondents could select more than one if appropriate.* The majority of respondents (83) used the centre for education applications and 32 for health applications *(please note: the terms health and education were not defined; therefore, were often confused).* Other users included: military, Telesat System, Smart Communities Project, info. exchange, discussion with group in Twillingate professionalizaton of fishermen, focus group, evaluation, SWCAC meeting, inservice sessions arranged as part of nurse practitioner roles and issues course networking session, judicial, health adm., committee meeting.
☐ Health	32	
☐ Small Business	19	
☐ Education	83	
☐ Other	46	
Did not respond	5	

3. The type of service that I used in the telecentre was: (select more than on if appropriate)		*In response to this question: percentages are not relevant as respondents could select more than one if appropriate.* The system was accessed most often for videoconferencing. Other communications responses included training and orientation to the technology.
☐ Videoconference	142	
☐ Internet Access	4	
☐ Email Access	4	
☐ Information	16	
☐ Other communications	20	
a) Did using the telecentre save you a trip? If yes, how much do you estimate are the cost savings?		More than 59% did not respond to this question. 13.9% responded that using the telecentre saved them a trip. The amount of savings varied between $200 and $1500 per session. One respondent stated the amount saved was "priceless" due to time of year and destination of travel.
Yes	23 (13.9%)	
No	44 (26.7%)	
Did not respond	98 (59.4%)	
4. b) Did using the telecentre for this service allow you to participate in an activity that cost or distance would not have allowed you to participate in?		The majority of respondents (57%) stated that the telecentre did allow them to participate in an activity that cost or distance would not have allowed them to participate.
Yes ☐	94 (57%)	
No ☐	51 (21.2%)	
Did not respond	20 (18%)	
5. Would you use the telecentre again?		An overwhelming 98% of respondents stated they would use the telecentre again.
Yes ☐	162 (98%)	
No ☐	0	
Don't Know ☐	3 (2%)	
6. Would you recommend use of the telecentre to a colleague or friend?		99% would recommend the telecentre to a colleague or friend.
Yes ☐	164 (99.4 %)	
No ☐	0	
Don't Know ☐	0	
Did not respond	1 (0.6%)	
7. What I liked most about using the telecentre was:		The most common responses were "very interactive", "the ability to network with individuals in other communities", as well as, "easy to use and quality of connection", "knowledgeable and approachable staff".

<table>
<tr><td colspan="2">8. What I like least about using the telecentre was:</td><td>When asked what they liked least about the telecentre the most common response was the slight audio delay. Other comments related to small technical problems both with audio and video, the equipment being threatening, not being able to hear participants (especially with a large group) and limited space.</td></tr>
<tr><td colspan="2">9. How would you rate the facilities?</td><td rowspan="5">When asked to rate the facilities on a scale from "Excellent" to "Poor", the majority of the respondents rated the facilities between "Excellent" 55.2% and "Very Good" 39.4%.</td></tr>
<tr><td>Excellent □</td><td>91 (55.2%)</td></tr>
<tr><td>Very Good □</td><td>65 (39.4%)</td></tr>
<tr><td>Good □</td><td>7 (4.2%)</td></tr>
<tr><td>Poor □</td><td>0</td></tr>
<tr><td>Did not respond</td><td>2 (1.2%)</td></tr>
<tr><td colspan="2">10. Overall, on a scale of 1 to 10 (10 being highest), I would say that the telecentres' usefulness should be given a rating of</td><td rowspan="8">Similarly, on a scale from 1 – 10, with 10 being the highest, 39.4% would say that the telecentres' usefulness should be given a rating of 10 and more than 40% rated between 8 and 9.</td></tr>
<tr><td>Scale 1-5</td><td>0</td></tr>
<tr><td>Scale 6</td><td>2 (1.2%)</td></tr>
<tr><td>Scale 7</td><td>10 (6%)</td></tr>
<tr><td>Scale 8</td><td>44 (26.7%)</td></tr>
<tr><td>Scale 9</td><td>34 (20.6%)</td></tr>
<tr><td>Scale 10</td><td>65 (39.4%)</td></tr>
<tr><td>Did not respond</td><td>10 (6%)</td></tr>
<tr><td colspan="2">11. An appropriate additional service that the telecentre should offer is:</td><td>The most common responses given, when respondents were asked for suggestions on possible additional services, included "multi-site linkage", "larger TV screen" and "more services and training (beginner's package and practice sessions) in rural areas".</td></tr>
<tr><td colspan="2">12. Would you be willing to be interviewed about the telecentre as a part of our evaluation? If yes, your contact information is:</td><td>58 respondents provided contact information.</td></tr>
</table>

Patient Evaluation Form

All sites were provided with the Patient Evaluation Form to be distributed to patients or their families involved in consultations using the videoconferencing system. Patients were recruited via the professionals and health care providers providing care, who made contact with the potential client and obtained consent and provided information as required. Of the ten (10) consultations (cardiology and autism) conducted, five (5 autism) questionnaires were completed and returned. The following is a summary of the responses.

All five of the respondents had never before used the videoconferencing system. All reported feeling comfortable with the use of the system and stated that the equipment did not inconvenience them in any way. All 5 respondents reported that they were able to communicate with the healthcare professional in a satisfactory way and they were satisfied with the quality of care they received by videoconference. One of the five respondents stated that "my care was better" by using the videoconferencing systems than of face-to-face. The other four respondents stated that their consult was the "same as in-person".

Videoconferencing saved all participants a long distance trip, which would include travel to and from their hometown, travel to and from the hospital, accommodations, meals, babysitting and time off from work. The cost savings ranged from $1280.00 to $3000.00. When asked if they would be interested in using the telemedicine system again all 5 respondents stated "yes".

Health Professional Evaluation Form

On-site coordinators were encouraged to have the questionnaire available at the time of consult and encourage completion. Health professionals were requested to complete this questionnaire each time they used the telemedicine services of the RCST to assess patients. Eight (8) completed forms were received, even though ten (10) patient interactions were scheduled (see Patient Evaluation responses above) and during Key Informant Interviews there was reference to more than sixty (60) patient consultations via videoconferencing or store and forward during the project time frame.

When asked what they like most about the Video conferencing system five of the eight respondents stated "time saved in travel" (by the professionals and the client) and "decreased cost". When asked for recommendations to improve the Video conferencing system five of the eight respondents stated improvements in "sound system" or "better voice point"

All respondents stated that the equipment was easy to use and they were comfortable with using the system. The facilities were rated as very good. Other general comments include the following:

> *"Hopefully, this program will continue. It has been well received in this community by all involved"(RCMP Officer)*
>
> *"Patient consultation in real time is time consuming . . . [with the video conferencing system] have to wait to talk and logistics of getting patients set-up. This is offset by the time saved from not having to travel" (Physician)*
>
> *"We feel that the [Video conferencing system] has been a very positive initiative as it saves time and cost of flying an apprehended person and an RCMP member or guard out to Goose Bay and back. As well, it is better for the client as in many of the cases they do not have to leave the community and have to arrange for child care and other assistance" (RCMP Officer).*

3.2 Satisfaction with the RCST Services and RCST Impact in the Community

Four instruments were utilized to collect information regarding user satisfaction with the RCST, fit and function within the community, and to determine if the RCST facility provides patient savings or health care provider savings. These included: Key Informant Interviews with 1) Health Education Application Users; 2) Health Education Session Facilitators & Primary Health Enhancement Project (PHEP) Informants; 3) Health Professionals Involved in Patient Consultations; and 4) Technical Support: Key Informant Questionnaire

Key Informant Interviews with Health Education Application Six coordinators or facilitators, who had been involved in health education or information sessions, were contacted by the research assistant, via telephone, to solicit their participation in a semi-structured interview designed to assess satisfaction with the facility, accessibility, effectiveness and successes and challenges. If the contact agreed to be interviewed, a scheduled time was established and a copy of the questions was distributed prior to the interview. All six contacted agreed to participate. Results are reported below.

Three of the six respondents experienced difficulties with the service; however, of the problems stated all were minor and were fixed quickly (i.e." the receiving site did not book satellite time before the session"). All respondents stated that using the videoconferencing system was an effective method for conducting education/informational sessions. When asked how they found the videoconferencing as an alternative to meeting face-to-face, the comments were positive and included: "A lot better than using the telephone ... good to see in the room and interact with the participants", "Seemed to convey most of the things as good as face-to-face", "... we found after

a site visit ... meeting the people in the flesh... helped with future sessions", "Very effective... you can never replace face-to-face interaction but it is the next best step".

All six respondents stated that this facility positively affects the access to their program. Three of the respondents stated that if it were not for this service all participants in rural sites would not be able to attend the session. Five respondents noted there was a cost saving, to either the participants or group, by using videoconferencing. The cost savings ranged from approximately $200.00 up to $5500.00.

Some of the challenges identified for using this system for health education/information sessions included the following: details of x-rays were difficult to see from a slide; having multiple learners at multiple sites utilizing different technologies caused confusion; those presenting have to be made aware of the technology and capabilities; it is hard to assess how people feel; and some people fear the technology. When asked if there were any disadvantages to using this system three of the respondents did not think there were any disadvantages. Other comments included "we have to go to the university [St. John's site] and "making the links to more urban centres may weaken the links or relationships in the [rural] community'. Two of the respondents stated the potential cost in the future might be a disadvantage to using videoconferencing.

The comments given for advantages for using videoconferencing for health and information services were very similar. The two most common responses were: "the ability to reach out to rural areas" and "increase access to programs for rural areas". Other advantages stated were: "avoid travel", "interactive process", "decreases costs", "allow wider audience to attend". "helps

to develop more peer and professionals relationships".

When asked if they plan to use the system in the future, 5 of the 6 respondents said "yes". One respondent stated it would depend on the cost and the grants their program received. The respondents plan to use the system for conferences, meetings, education, and possibly for client assessments.

Health Education Session Facilitators & Primary Health Enhancement Project (PHEP) Key Informants Ten individuals, who had been involved in both the PHEP and RCST project (PHEP Provincial Manager, PHEP Coordinators, PHEP Assistants and Physicians), were contacted by the research assistant, via telephone, to solicit their participation in a semi-structured interview pertaining to their involvement with both the RCST and PHEP projects and how the RCST and PHEP worked together, successes and challenges and satisfaction with the telecentre, satisfaction with the facility, accessibility, effectiveness and successes and challenges. If the contact agreed to be interviewed a scheduled time was established and a copy of the questions was distributed prior to the interview. Ten individuals were interviewed. All comments were taped and recorded by the interviewer (Research Assistant). Results are reported below.

The telecentre in the pilot sites was utilized for various applications and by a variety of users. One commonly stated application was for continuing education for a variety of health professionals (social workers, nurse practitioners, department of family medicine, speech language pathologists etc.). The telecentre was also used for various multi-disciplinary meetings,

for example, South Western Health Committee, By-Laws Committee, Dieticians meetings, to name a few. In addition, the telecentre was used for trials of patient consultations between sites.

One of the objectives of the RCST project was to provide an information and communication infrastructure for the PHEP. Key informants were asked if the RCST project was effective in supporting the PHEP. Seventy percent (70%) n=7/10 of the respondents stated "Yes". Ninety percent (90%) n=9/10 of respondents stated that the RCST project has positively effected the access to health services in the communities. It has improved access mostly for health professionals by providing Internet access and enabling them to attend continuing medical education sessions and has increased access for the general public by allowing some consultations to occur via videoconferencing. However, due to the reimbursement barrier for physicians, the number of consultations has been low.

Ninety percent (90%) n=9/10 of respondents believe that the quality of care for people in the community has been positively effected because of the RCST facility. Enabling health professionals to access various education sessions and to interact with colleagues in other sites indirectly enhances the quality of care given to the communities. When respondents were asked if this model was a cost-effective way to support health related activities, 80% (n=8/10) of respondents believed it was cost effective by decreasing time away from work, travel, and accommodation costs.

Recruitment of health professionals to rural areas is an important issue in Newfoundland and Labrador. Seventy percent of respondents (70%) n=7/10 stated "yes" when asked if the RCST

facility provided a way to help address this issue. The majority of respondents felt it would enhance the retention of professionals to the rural areas by offering continuing medical education, contact with family members living elsewhere, and correspondence with other professionals in more urban sites.

When thinking about the telecentre for health applications, some of the most commonly stated challenges faced included: MCP reimbursement for physicians, not having a telemedicine coordinator or technical person on site, not having someone in Ottawa on call 24/7 to deal with satellite problems. When asked about barriers the most common responses were: unable to give the telecentre the attention needed because of lack of a telemedicine coordinators or technical person, MCP reimbursement for physicians and unreasonable timelines.

When respondents were asked for the positive results of the RCST telecentre the following responses were stated: allows health professionals to access information that they would not normally be able to access, saves costs due to travel, acts as a communication link, it has "put us [community] on the map both regionally and provincially". The RCST model has been used not only for health related issues but also for Human Resources and Employment, Department of Education, MUN Extension Services, Judicial court proceedings, clergy and various community groups, to name a few.

Health Professionals Involved in Patient Consultations: Four health professionals (3 physicians and 1 Project Coordinator), involved in patient consultations via videoconferencing or store and forward, were contacted by the research assistant to request their participation in a semi-

structured interview related to their experience and satisfaction with the system. All four contacts agreed to be interviewed and a scheduled time was established and a copy of the questions was distributed prior to the interview. All comments were taped and recorded by the interviewer (Research Assistant). Results are reported below.

Three of the health professionals used videoconferencing (synchronous) and two used store and forward (asynchronous) technology for patient consultations. From these consultations, three of the respondents had experienced some small technical difficulties but all were resolved very quickly. All four participants felt that the videoconferencing system or store and forward are effective methods for conducting patient consultations. When asked how they felt patient care was effected, all respondents said it was "not as good as face-to-face", however, it is the "next best thing".

All respondents agreed that the equipment adapted to meeting the needs of the patient and family, as well as, positively affecting the access to health services. In relation to the cost-effectiveness, three respondents thought it is a cost-effective way for conducting patient consultations. The use of store and forward technology "decreases some medivac transports which could be up to $5000 a transport". Videoconferencing "saved in potential travel for both the physician and parents", for example, it would cost "over $1000.00 for air travel from Nain to St. John's". One respondent was not convinced that it is a cost-effective system due to the cost of the equipment and potential cost of satellite/communication time.

All respondents agreed that other physicians and health professionals would be interested in

using the system for patient consultations. Suggestions for getting others involved included paying the fee-for-service physicians, allowing observations of sessions, promoting the technology, providing training and teaching the benefits of using this system in practice. All agreed that the reimbursement issue is a definite barrier to physicians using the system for consultations. Suggestions on how to resolve this barrier included involving the provincial government, developing a billing code for videoconferencing and developing a fee protocol.

When considering the Telecentre for patient consultations, some of the challenges recognized included: scheduling various sites for appointments, training and support; making the equipment more accessible in St. John's; and getting the process up and running. With store and forward the challenges included trying to recall the patient's face and history and determining body language. The disadvantages included: "the families are conscious that the area in St. John's [TETRA/Telemedicine department] is part of the hospital in which patients are not normally seen and they are a little bothered by their (lack of) privacy". With the store and forward technology two disadvantages were stated: a) some physicians may think the technology is not user friendly; and b) this program is unable to create an electronic file for patient information.

The advantages of this system for patient consultations were: " very convenient for families who can't fly to see specialist"; "it decreases the amount of time it takes to see a patient"; "It decreases the travel and accommodation cost for family or physician"; " Allows people to get help in their own environment ... without the trouble of coming to St. John's",; and "saves time and costs and gives a continuum of care".

Other recommendations included: explore the possibility of having this equipment accessible from the new Janeway site; get a discussion organized with all stakeholders and the Department of Health and Community Services to discuss plans for telehealth; and develop a software for the store and forward in which patient files and medical records could be kept and organized.

Technical Support: Key Informant Questionnaire Nineteen (19) key informant questionnaires were mailed to individuals involved in the delivery of RCST Telehealth applications in Newfoundland and Labrador. Respondents were asked to complete the questionnaire and return in the enclosed self-addressed envelope. Eleven (11) questionnaires were returned, for a 58% response rate. The following is a summary of the responses.

Eight of the respondents had previous telecommunications experience before being involved with RCST. Six of the respondents had attended a training session, of which three of the six, of those who attended training session, rated this training as excellent and the other three who attended training session rated the training as fair to good.

Seven out of the eleven respondents felt they received sufficient training to work with telemedicine, however, nine felt they could use more training. More training was suggested with regards to trouble-shooting of software and equipment and more "hands-on" practice with an experienced person.

Respondents reported the following applications used at their site: all reported that Internet, hand held examination camera, and video conferencing were utilized; eight had accessed and utilised store and forward technologies; and three had access for teleradiology. Eight of the respondents

stated they found these applications to be user-friendly. When asked to state the challenges faced on a day-to-day basis related to telehealth applications, the most common responses were: lack of time to commit to promoting the applications; and lack of support in the remote sites; breakdown in internal site communication regarding local issues and concerns. The majority of respondents did not know of any protocols/guidelines available at their site related to telehealth communications. Six respondents felt there is a need to develop protocols/guidelines for the sites.

When asked what they like most about the telehealth system, the most common responses were: the "ability to access education and health services" at a distance; and the "ability to interact face to face with other sites". When asked what they liked least about the telehealth system, the feedback varied from respondents experiencing technical problems, not having the proper training to be confident to trouble-shoot; and/or "not having time to commit to setting up applications" to "salaries for support staff needs to be competitive with industry equipment support".

Ten (of the eleven) respondents could see a demand for future telehealth services in their community. Nine of respondents felt they get acceptable support from their institution and eight felt they received acceptable support from the St. John's site.

When asked what they would recommend to improve the telehealth system, common suggestions included: better communication, which includes the development of protocols/guidelines for all

CST sites; continued staff education; and increased communication to the public and government on the benefits and abilities of telehealth applications.

CHAPTER 4: DISCUSSION OF FINDINGS

The four questions posed for this study were related to issues of utilization; access, quality and effectiveness; satisfaction; and the fit and function of an RCST model within five communities in Newfoundland and Labrador. This chapter: (1) identifies the challenges of evaluation experienced throughout this initiative; (2) integrates the findings across communities and measurement approaches, by study objective; and (3) discusses the implications of the study results for future programming and evaluation efforts.

4.0 Challenges To Conducting Evaluation in this Initiative

Conducting research in small remote communities poses many challenges, the most significant of which in this study was the small sample size and the overlap in roles of key informants. The two hundred and nine (209) participants in the study included 39 staff (22 health professionals, 6 coordinators/facilitators, and 11 technical support providers); five patients/or guardian; and 165 telecentre users (general population). The small numbers of staff in remote sites meant that a crossover of roles was not uncommon; i.e. a nurse or doctor who participated in health consultations may have been the coordinator/facilitator of educational sessions and also may have provided technical support, thus provided feedback and responses based on their various roles. This was true for all remote sites, with St. John's being the exception as human resources were more plentiful in that location. The small number of system users in each community also meant that an individual may have attended the RCST site and completed an exit survey more than once (15% of those who had completed the Telecentre Evaluation Form stated they had used the telecentre eight or more times over the study period). As well, the shortage of personnel in general resulted in high workloads for all staff in remote sites. This factor, combined with a

lack of personnel who were available to support the education activities at each site, and the distance from the sites to the evaluation coordinator, presented additional challenges in terms of insuring that all evaluation forms were completed and submitted in a timely fashion. Nonetheless, despite the significant constraints faced by all participants, evaluation feedback which was received was supportive of the project overall.

4.1 Synthesis of Findings, Across Sites and Measurement Instruments, By Study Objective

4.1.1 RCST Utilization (How, When and Why the Multipurpose System was Used)

Four of the RCST sites were located in health centers and one site (Forteau) was located in the business center. Differences in patterns of use and type of user emerged in the evaluation. Not unexpectedly, health activities became the dominant pattern in the health sites and business purposes and users were dominant patterns that emerged in Forteau.

The TETRA Scheduling Database indicated that the most requested service was Internet access. However, users did not often complete exit surveys or sign into the logbook for this service. For Internet access, no special set up, technical support, or receiving individuals were required. Once users were familiar with the location and times that Internet access was available, generally assistance was not required. As this usage became commonplace, it is possible that individual users forgot to complete exit surveys, or to mention Internet use in key informant interviews. . The majority of respondents (key informant interviews and exit surveys) indicated that they utilized the RCST for video conferencing. The video conferencing system required coordination,

scheduling, space, set up, technical support and other participants (all of which would possibly increase the likelihood that documentation of the system use would occur).

Four hundred and one (401) videoconferences were scheduled, by the various sites, for a total of 7,215 hours of use during the period between June 1999 and April 2000. Only those requests for videoconference that could be accommodated were documented. Upon reflection, all requests should have been recorded, as this type of data would have captured more completely the community's desired use of this technology and the reasons for denial of the service request.

The primary request for video conferencing was for remote patient consultations from Nain for access to physicians in Goose Bay, particularly for January to April months, when inclement weather is usually the norm. The time requested was for after-hours use (mostly weekend emergency standby), to facilitate availability and allow connection on demand. From the key informant interviews, it is clear that this link was utilized on occasion. However accurate record keeping was not maintained at either site, thus exact numbers cannot be reported. Nain was the only site to have an established link, via the project, with their administrative regional health authority, Goose Bay, which would be the normal pattern of referral, administration, and support. This would explain the increased volume of activity/requests between these two sites.

The next most common use of videoconferencing was for distance delivery of education programs. However, successful utilization of the system for this purpose was not without its challenges. In the beginning, appropriate materials to support distance education programs were in short supply. In almost all cases, off-the-shelf material did not exist, requiring much

discussion with educational providers (such as: MUN School of Nursing and The Centre for Nursing Studies, Trade Colleges, etc) to either work to adapt traditional face-to-face programs for distance delivery or in some cases to create new material. Training, support, demonstrations, and buy-in from the administrators of programs and presenters were required. Local champions helped to overcome some of the challenges associated with changing current practices and implementing the new technologies, as is consistent with past studies (Drucker, 1999; Fuchs, 1998). As indicated by the number of educational activities that the remote sites participated in (Medical Professional Development, 206 programs; Nursing Education, 33 programs; Post Secondary Education, 53 programs; demonstrations, 69 programs; and training, 42 programs), challenges were overcome and increased access to education programs was successfully accomplished.

The other reported uses of the RCST sites were for the purposes of accessing libraries, government agencies and regional business expertise.

4.1.2 Accessibility, Quality and Effectiveness of the Technology

4.1.2.1. ***Access To the RCST Facility***: One cannot understand the meaning of a new technology through its technical features alone, but must consider how users make sense of it and employ it in their daily practices. The RCST model was intended to provide communities with access to high quality and effective technology that was useful to multiple users and supportive of the community's needs. Prior to implementation of the RCST model, the project team held consultations within each community to determine the best location for community access, human resource support, administration, and use. The evaluation indicated that physical access

did not pose a problem at the sites, as each established location accommodated users and provided assistance as required. The one exception was due to space restrictions at the Nain site, where larger groups could not be comfortably accommodated. Once this was recognized, a second site in Nain was established at the local community College and this issue was resolved.

Overall, there was general satisfaction with the location of the RCST within each community. Nonetheless, there were some differences of opinion within communities regarding the suitability of the location selected for the RCST. For example, not all users liked the idea of having to leave their offices to access the RCST; others thought the location of an RCST in a health facility improved the relationship between the health facility and the community, while others did not see the health facility as "neutral ground" within a community.

There were several comments about the improved access to education that the technology afforded. A participant commented a benefit was "not having to travel long distances" and another made the point that videoconferencing allows "more people to attend."

4.1.2.2 Quality and Effectiveness of the Technology: The high rate of non-completion of evaluation forms limited the type of information that was available to determine the quality and effectiveness of the technology and the external generalizeability of the findings. Nonetheless, completed evaluation forms and the key informant interviews indicated that the facility was very effective in supporting the Primary Health Care Enhancement Project (PHEP) and increasing access to health services in the project sites. Respondents also stated that the RCST facility indirectly affected the quality of care of people in the communities by allowing health professionals access to continuing education and correspondence with other health professionals.

Access to continuing education, particularly in rural locations, has been well recognized as a challenge for rural health care providers (Walker et al. 1998; Anderson, 1995; Whitten et al, 1998).

The majority of participants expressed satisfaction with the video quality, although some reported that the 4-5 second audio delay did require getting used to. Respondents reported that face-to-face interactions are the ideal, however one respondent stated that "my care was better" by using the videoconferencing systems instead of face-to-face while other respondents stated that their consult was the "same as in-person", and in general that using video conferencing was "the next best thing to face-to-face" interaction. Improvements in "sound system" or "better voice point" were suggestions from some participants. Respondents consistently reported that the equipment was easy to use and they were comfortable with using the system. The facilities were rated as very good. It appears that interactions improved as familiarity with the technology increased.

The majority of respondents believed the RCST model was cost-effective as it saved on cost of travel, accommodations, and time away from work. However, some people were sceptical about the cost of the equipment and eventual cost of satellite time. These findings are similar to larger studies of patients and their families (Argy, & Caputo, 1999; Fuchs, 1998; Gomez & Hunt, 1999).

4.1.3 User Satisfaction

The high rate of non-completion of evaluation forms also limited the type of information that was available to determine user satisfaction with the RCST model and services provided.

Respondents who completed evaluation forms and/or participated in the key informant interviews indicated that they were satisfied with the quality of services offered, pointing out that the RCST had opened them to wider audiences, facilitated external communication, and promoted knowledge. Many indicated they were repeat users of the RCST, and all respondents reported that they would use the RCST again and recommend it to a colleague or friend. The increased use of the technology for accessing education programs supports the suitability of video conferencing for distance education.

4.1.4 Fit and Function of the RCST Model Within the Community:

An overwhelming majority of respondents could definitely see a future need for this technology in their community. The major indicator of the acceptability of the model is the extent to which the RCST model has been used to expand service delivery on a provincial basis. Significant accomplishments in this area include:

- The development of a proposal for the creation of a large-scale regional network for Labrador (SmartLabrador) based on the RCST model, that was one of eleven national projects funded under a competitive national program (Smart Labrador);
- The funding of a community network trial by Human Resource Development Canada (HRDC) to assess the RCST model for ongoing service delivery;
- The funding of a primary health care initiative by Health Canada and the provincial Department of Health and Community Services based on the RCST health facility model.

However, key barriers to the adoption of the RCST model on a long-term sustainable basis were identified and focused primarily on (a) communications costs (the operating costs of the satellite

facilities); (b) the problems caused by physician payment schemes that do not provide for payment for consultation services delivered through distance technologies; (c) budget constraints; and (d) the need for ongoing technical support. Each is discussed briefly below.

(a) *Communications Costs* A major debate concerning telecentres and public access points in general is the issue of financial sustainability (Aires & Finlay, 2000; Campbell 1995; Fuchs, 1998; Gomez et al, 1999). During this study, provision of communications technology via satellite was viewed as a Research and Development (R&D) activity (and thus free of charge to the sites). The post-project satellite cost has not been determined. The issue of ongoing operational costs for the RCST model will depend on the final pricing proposal that is developed by the service provider for the bandwidth on demand technology used in the RCST project. Many respondents were concerned that costs in this area might become prohibitive. However, the RCST model can also be implemented using terrestrial (land-based) communications facilities, giving the communities the ability to implement a solution that best suits their technology and budgetary environment.

(b) Physician Reimbursement for Telehealth Services It has been stated repeatedly in the literature that unless there is reimbursement or payment for practitioners using telehealth technologies, there can be no widespread adoption of telehealth technologies (Robinson, David M., TKY Group, 1998; Pong, Hogenbirk, & Pearson, 1999; The Keston Group And Infotelmed Communications Inc. March 30, 2000; Telemedicine - From a Legal Perspective, 2002 ; Eastern Area Health Education Center (AHEC), Inc. 2003). Most of the telehealth literature in relation to the present study and most of the studies reviewed regard the current lack of payment for

telehealth practitioners to be a major barrier. A survey conducted by the Secretariat of the Advisory Council on Health Info-structure, Health Canada (1998), revealed that reimbursement was seen as crucial to the development of telehealth services in Canada and respondents believed that there was a policy void and that there was no coordinated approach across the country in relation to telehealth reimbursement.

The National Initiative for Telehealth Guidelines (NIFTE) (2003) environmental scan of telehealth reimbursement findings indicated that there are mixed funding mechanisms in place with respect to remuneration of health professions for telehealth services. They report that all provinces and territories in Canada, except Ontario, have some form of plan for reimbursement of physicians providing telehealth services however, coverage is not complete or consistent across the country. The report states "The restrictions placed on fee-for-service reimbursement of physicians for telehealth services in some jurisdictions are believed to inhibit the uptake and integration of telehealth into the health care system. From a human resources perspective, restrictions on fee-for-service reimbursement affect the recruitment and retention of physicians into telehealth practice. Generally, reimbursement is not a problem for those health professionals who are paid as salaried employees in organizations providing telehealth services." (section 4.6)

In Newfoundland and Labrador, the Medical Care Plan (MCP) has two methods for reimbursement of physicians; a salaried model and a fee-for-service model. Currently, the MCP policy restricts coverage of telemedicine to interpretation of radiographs, radiology tests, pathology slides, and electroencephalograms (EEG) transmitted electronically to a remote

specialist for interpretation, and child tele-psychiatry. World-wide, health care provider reimbursement for services delivered via telemedicine is practically non-existent (Aires & Finlay, 2000; TeleMedicine, 1997; Advisory Committee on Health Info-structure, 1998; Pong, Hogenbirk, & Pearson, 1998; Robinson, 1998; Office for the Advancement of Telehealth, 1998).

This evaluation found that in the fee-for-service environment, some physicians provided limited services without compensation as part of the proof-of-concept exercises, but expect to be reimbursed for services to continue on an ongoing basis. Salaried physicians, on the other hand, were not in this situation. Hence the use of telemedicine for consultations was not embraced at the sites where fee-for-service physicians are predominant, but it was utilized extensively between Nain and Goose Bay, where the physicians who participated in the project were salaried. The lack of reimbursement for physicians was also identified as a barrier to recruiting physicians to pilot the technology for consultations. It is widely agreed that telehealth will never be implemented on a broad basis unless appropriate methods and reimbursement for telemedicine services is introduced (TeleMedicine, 1997; Advisory Council on Health Info-structure, 1998; Pong, Hogenbirk, & Pearson, 1998; Robinson, 1998; Office for the Advancement of Telehealth, 1998).

Different jurisdictions, to varying degrees, have attempted to include telehealth into the reimbursement system. However, few provinces have implemented comprehensive telemedicine schedules or official policies (Pong, Hogenbirk, & Pearson, 1999; Telemedicine - From a Legal Perspective, 2002). In Canada, teleradiology is reimbursable in many provinces and territories. More inclusive reimbursement schemes have been, or are being, developed in Alberta and Nova Scotia. The "LET'S CHIPP IN: NATIONAL WORKSHOP" August 2001 reported that "the full

implementation of telehealth will not be realized until concerns over reimbursement are addressed in every province and territory." At this time, seven provinces -- Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, Manitoba, Saskatchewan, and Alberta -- have policies ensuring that physicians are financially reimbursed for some of the telehealth services they provide. However, the lack of regulations suggests that there are reimbursement problems within provinces as well as between provinces. As telehealth moves out of health institutions and into doctors' offices, reimbursement will become an issue in the area of overhead expenses. Reimbursement will also become an issue for other types of clinicians -- including nurses, home care providers, therapists (occupational, speech, physio) in private clinics -- and hence more regulations will be needed. (Pong & Hogenbirk, 2000; NIFTE, 2003)

Pong, Hogenbirk and Pearson in a background paper written by for the Advisory Council on Health (1999) state that:

> *"The absence of policies regarding physician reimbursement for engaging in telehealth practice could stifle the development of telehealth. .....However, unless the reimbursement issue is appropriately addressed, it is unlikely that telehealth will be implemented on a broad scale. Physicians are unlikely to provide extensive telehealth services if they are not compensated, in one way or another, for their time and effort". (p3) and "Because of uncertainties and concerns about the impact of telehealth, many third-party payers, including provincial/territorial Ministries of Health, are reluctant to change reimbursement policies to fund telehealth. But unless telehealth is practiced in real-life settings and on a much broader scale, we will not be able to assess its impact and implications". (p 12)*

In March, 2000, four provinces – Nova Scotia, Manitoba, Saskatchewan and Alberta have adopted reimbursement policies for telehealth providers and, as expected, those provinces are currently amongst the most active in the use of telehealth technologies.(Pong & Hogenbirk, 2000)

(c) Budgetary Constraints Health boards in the province are functioning with large budgetary constraints, therefore, funding to invest in technology is limited. The technology required for videoconferencing was supplied by the RCST and all videoconference services were provided free of charge. However, when interviewed, several participants addressed the issue of sustainability and budget implications. While the services of the RCST were provided free of charge during the study, creating demand for the service may have been discouraged, because the board was uncertain that they would be able to sustain funding once the demonstration project was over. This fiscal constraint could help explain why in particular there was less use of the RCST for telehealth than anticipated. Administrators and decision makers may not have wanted to create the expectation that videoconferencing would be available in the future.

(d) Need for Ongoing Technical Support. Budget constraints (noted above) can also impact on the capacity of the sites to hire and retain staff to coordinate and support the RCST applications over time. The local staff within a centre should not only understand the needs of the community and create an environment for the members of the community to visit the centre and use the facilities, but also must be able to do first line maintenance and operation of the local infrastructure. This requires local staff to participate in training and to play an active role at the time the centres are implemented. In addition, a functional support system to identify and resolve technical issues within a facility without negatively impacting on operations and capacity to provide ongoing operational support is required.

4.2 Implications of the Findings for Future Evaluation Efforts

In September 1999, the International Development Research Centre (IDRC) held an international working meeting on telecentre evaluation, at Far Hills, Quebec, to create awareness about and strengthen local, national and regional initiatives, and provide an opportunity to exchange experiences and initial results with each other. Through an acquaintance at IDRC, the researcher was able to access the report in the spring of 2000, before it was made available for public distribution. Although it was too late to utilize the findings and recommendations for the evaluation design of this paper, there are many similarities between the issues that emerged from the RCST evaluation and the recommendations from this workshop/meeting report. These are briefly outlined below:

1. Identify the Focus of the Evaluation: Workshop participants proposed that the key telecentre evaluation questions should address:(a) who is accessing the center and for what purpose; (b) when access is required; and (c) user satisfaction with the system. To date, these questions have not been consistently addressed or evaluated. The RCST evaluation did try to address these questions; but problems encountered with sample size and independence of observations noted earlier in the discussion limit the external generalizeability of the findings.

2. Include Stakeholders in the Evaluation Process: The need for community-based, participatory evaluation was a recurrent theme of the workshop, with telecentre staff directly involved (through community consultation) in the shaping of service, by planning, collecting

data, interpreting it, and taking action. All stakeholders need to be engaged through the evaluation. The RCST evaluation did attempt to encourage community participation. Champions and coordinators at each site were involved in the development and refining of the evaluation tools. As well, their support was crucial in collecting the data, communicating issues, finding solutions, and implementing corrective action as required.

3. Use Multiple Approaches to Evaluation: Hudson (1999) noted that evaluation activity may serve two different but related functions: *(a) formative:* feedback on the project or activity: how well it is working, what changes or improvements should be made, what was learned that could be applied in other similar projects; and (b) *summative:* Did the project achieve its goals? How can what is learned about how ICTs contribute to social and economic development? These functions are related in that the feedback or process information may help to improve projects so that they are more likely to accomplish their goals, and some of the information collected such as data about who is using telecentres, and for what purposes, can be useful both for feedback to the project and for tracing project impacts, as demonstrated in the RCST evaluation. It was also recommended that the evaluation should include an assessment of the sustainability of the activity beyond the pilot project phase.

4. Develop Standardized Approaches to Evaluation Design and Data Collection:
Whyte (1999) provides a detailed approach to telecentre evaluation, including development of a research plan, formulation of indicators, and methods for data collection. She suggests that the sharing of research protocols and the design of common research frames and models, methods and instruments, indicators and analysis, will: (a) strengthen individual studies; (b) provide the

tools for comparative analysis; and (c) permit testing of hypotheses about the role and impact of community telecentres and ICTs in community development. The evaluation of the RCST reported in this study would have benefited tremendously if such a template had been available at the time the study was conducted.

It should be possible to identify commonly available indicators that can be tracked to answer short-term questions such as: who is using the telecentre and what services are being used? and the longer term questions of: what difference did the telecentre make and is the telecentre sustainable? In the RCST evaluation, we used both available indicators (such as the TETRA Scheduling database) and indicators developed for the study (such as the Telecentre Evaluation Form). It is important to develop an inventory of the best indicators used in evaluation, in order to create consistency in measurement and reporting of evaluation findings in future studies.

4.3 Discussion Summary

The common challenges identified with telecentre evaluation include: lack of common research frameworks, methods, and instruments. The reports and papers from the Far Hills workshop concluded that the lack of consistent data collection has impeded the collection of meaningful and comparative data to effectively determine the social and economic benefits of telecentre implementation. The experiences of this researcher with the evaluation of the RCST support the findings in the literature regarding this point.

Ideally, in the course of conducting the RCST evaluation, process and outcome measures would have been selected from an existing inventory of valid and comparable measurement tools.

However, at the time of the study this inventory did not exist, and its development today is far from complete. The questionnaires and tools developed for the study proved not to be ideal. In the absence of a common understanding and agreement about what was important to measure, an effort was made to collect as much information as possible, resulting in lengthy forms (a probable contributor to the low completion rates reported in this study).

This evaluation report finds that the use of the RCST model in five sites is small but growing. Active participation in the centres has demonstrated that the technology can work, and the growth in utilization over the course of the study indicates that the telecentre is acceptable and useable by community stakeholders. The longevity of the RCST, however, is not clear. In the absence of key policy changes around health provider reimbursement and dedicated funding for continued use of ICTs to enhance rural access to services, the RCST model may fail to survive beyond the initial funding and enthusiasm for the project.

CHAPTER 5: SUMMARY, RECOMMENDATIONS, AND CONCLUSIONS

5.0 Summary

The Remote Community Services Telecentre (RCST) concept was developed to provide a number of applications including telelearning, telehealth, communications, and information access services through a conventional network facility (telephone or cable) or through the use of shared wire-line and wireless (i.e. terrestrial, wireless, and satellite) communications infrastructures. The RCST model was envisioned as a way of providing network-based advanced services to rural and remote communities. From a technology, service, and social perspective, the concept was based on a flexible, shared-use facilities model that could be custom fitted to the needs of a community or region. A variety of technologies and services could be integrated to meet the specific needs of the community and the environment in which it would operate. An RCST would become a shared resource for a community or region, a common point through which a variety of services could be concentrated for cost-effective access. The primary purpose of the RCST project in Newfoundland and Labrador was to implement an effective delivery system for medical, educational, and information services into five selected rural communities.

This study was a program evaluation of the RCST model in five sites in rural Newfoundland and Labrador, and included formative and summative evaluation components. The formative evaluation involved continuous monitoring of the implementation and activities of the RSCT model in each site to assess: (1) utilization of the services available; and (2) end-user perceptions of the model with respect to accessibility, quality and effectiveness of the services

received. The summative evaluation focused on: (1) assessment of overall user satisfaction with the RCST model and (2) perceptions of key stakeholders with respect to the degree of successful fit between the RCST model and the needs of the participating communities.

Combinations of quantitative and qualitative research methods were used to gather data. Data related to utilization of RCST applications, and user assessments of accessibility and quality (formative evaluation) were collected from questionnaires, key informant interviews, program activities reports and computerized scheduling information. Data regarding user and community stakeholder evaluation of overall effectiveness of the RCST and their and satisfaction/assessment of degree of fit between the model and their community (summative evaluation) was collected during the final phase of the project through key informant interviews and a technical key informant questionnaire.

Telehealth and continuing professional education applications were the most frequently utilized in the five communities. Many of the technologies within the RCST enhanced the ability of local health care providers to access regional health care services and continued education. Interactive conferencing provided access to expertise and the means to reduce the isolation of health care professionals. The RCST provided distance learning through interactive conferencing and other multimedia technologies. It allowed a link to other educators, public schools, community colleges, universities, trade schools, technical colleges, and the business community. The RCST was also used to provide enhanced access to libraries, health care providers, government agencies, and local and regional business. Interviews with stakeholders revealed strong support among a range of personnel who are convinced that the RCST is effective for a range of clinical,

training, and administrative purposes. Respondents found the system to be generally user-friendly but also expressed the need to have more technological support available to remote regions.

Users expressed overall satisfaction with the services offered through the RCST and perceived it to be a technology that fit with their community's needs. Further evidence of the acceptability of the model is its recent use to expand service delivery on a provincial basis, through funding of additional demonstration projects by national and provincial agencies. However, barriers to long term sustainability of the RCST model were identified and included: uncertainty regarding ongoing communications costs (particularly those associated with satellite technology); absence of policies for payment of health service providers who participate in telehealth consultations; budget constraints faced by regional health providers and other public facilities; and the need for ongoing technological support in the sites.

The uptake of telehealth applications (even high demand areas) is impacted by situational and environmental factors and it was determined that health care professionals/providers in rural areas are facing: increasing workloads, a decreasing number of providers, and a decrease in resources available, all of which impact on their willingness to try new technologies and to participate in the evaluation of such approaches.

The evaluation of the RCST model faced several challenges, including the absence of a unifying framework or agreed upon approach to evaluation of telecentres; use of non standardized instruments, small sample sizes and low response rates in small communities where key

informants often play overlapping roles and time for participation in evaluation activities is at a premium. Recommendations for future evaluation approaches were identified, based on the findings of this study and recent publications in the field post conduct of this study.

5.1 Recommendations

1. A dedicated site coordinator position for each site is required to promote and support the use of the Centre and its participation in future evaluation activities;
2. More rigorous assessment of telecentre services is required, including: (a) data on patient outcomes; (b) a more comprehensive measure of user satisfaction which considers demographic variables, cost, travel time for patients or specialists, waiting times, and quality and availability of local services; (c) a more comprehensive measure of referring and consulting provider satisfaction which includes consideration of training, specialty designation, years in practice, and type of practice; (d) refinement of the definition of the target population for RCST services; and (e) cost analysis.
3. Future evaluation of the RCST should involve collaboration with other telehealth and telecentre projects throughout Canada and incorporate the recommendations from the Far Hills Workshop. This should include the identification of the main questions the evaluation is to address, the involvement of key community stakeholders, the use of multiple approaches to evaluation and the use of consistent evaluation protocols and data collection instruments across projects.
4. Once the above recommendations have been acted upon, an extensive evaluation should be conducted to determine the social and economic impact of the RCST model in Canadian communities.

5.2 Conclusions

The RCST project provided an information technology base (in terms of both communications and information access/delivery) to five rural communities, delivering a range of Internet access, video conferencing, telehealth applications, and health education content and services. The RCST evaluation indicated that the model was acceptable to users and suitable for expansion to other communities, but barriers to its continued sustainability remain. Limitations of the evaluation approach utilized in this study were recognized. Future evaluation efforts should involve collaborative approaches across jurisdictions in Canada, using standardized frameworks and instruments.

REFERENCE LIST

Advisory Committee on Health Info-structure, 1998. "Connecting for Better Health: Strategic Issues". Interim Report. Minister of Public Works and Government Services. http://www.hc-sc.gc.ca/ohih-bsi

Advisory Council on Health Info-structure Secretariat, *Status Report on Telehealth in Canada: A Report Prepared for the Key Policy Issues Working Group*(Ottawa: Advisory Council on Health Info-structure, Health Canada. Unpublished Report, 1998).

Aires, L.M. & Finley, J.P. (2000) "Telemedicine activity at a Canadian university medical school and its teaching hospitals". Journal of Telemedicine and Telecare, (6:31-35)

American Medical Association, 1996. "The promotion of Quality Telemedicine, Part 1". Joint Report of the Council on Medical Services and Council on Medical Service, 1996 Meeting of the AMA House of delegates, Chicago. Chapter 7, Section 3. 5/29/00 http://www.ama-assn.org/apps/pf_new/pf_online?f_n=browse&doc=policyfiles/HnE/H-480.969.HTM

Anderson,T.D., 1995. Continuing Professional Education in a Rural Context: Does Interactive, Distance Education Meet the Need? International Journal of Continuing Education Practice.

Anderson, Van Crowder, Dion and Truelove 1999 "The first mile of connectivity" http://www.fao.org/waicent/faoinfo/sustdev/Cddirect/CDan0010.htm

Argy, O. & Caputo, MP, *The Global Application of Video Conferencing in Health Care: An Introduction to Telemedicine and Visual Collaboration in Medicine*, January 1999. Presentation: National Rural Health Association 20th Annual Conference, Seattle, WA

Browne, W. P. and Swanson, L. "Living with the Minimum: Rural Public Policy." In The Changing American Countryside: Rural People and Places, Emery Castle, ed. University Press of Kansas: Lawrence, KS. 1995.

Bryden, J., S. Black & F. Rennie, 1993. Final report on the evaluation of community teleservice centres in the Highlands and Islands. Nethy Bridge: Arkelton Trust.

Buske LM, Yager SN, Adams OB, Marcus L, Lefebvre FA. Rural community development tools from the medical perspective: A national framework of rurality and projections for physician workforce supply in rural and remote areas of Canada. Report to Health Canada April 1999

Campbell, C.J., 1995. Community Technology Centers: Exploring a Tool for Rural Community Development (part 1 of 6) The Center for Rural Massachusetts, University of Massachusetts, Amherst. Accessed August 1999: http://www-unix.oit.umass.edu/~ruralma/CTC.html

Canada Health Act Overview, 1999. Health Canada. Accessed September 1999: http://www.hc-sc.gc.ca/medicare/chaover.htm

Canadian Medical Association, *Report of the Advisory Panel on the Provision of Medical Services in Underserviced Regions*, March 1992, p. 1. National Anti-Poverty Organization. *Rural Health*. Ottawa, n.d.

Canarie, 1997. "Telehealth in Canada: Clinical Networking, Eliminating Distances". Industry Canada p4.

Crowder, L.V., Lindley, W.I., Bruening, T.H. and Doron, N, January 1999. Agricultural Education for Sustainable Rural Development: Challenges for Developing Countries in the 21st Century. Extension, Education and Communication Service (SDRE), FAO Research, Extension and Training Division. http://www.fao.org/sd/exdirect/exan0025.htm

Curran, V. & Noseworthy, T., 1999. "Distance learning and the Health professions: A Synthesis report of the Literature Investigating Continuing Professional Health Education at a Distance". Centre for Collaborative Health Professional Education, Faculty of Medicine, Memorial University of Newfoundland.

Eastern Area Health Education Center (AHEC), Inc. 2003. HISTORY of TELEHEALTH, Jewett City, CT www.easternctahec.org/educationtelehealth.html

Elford, R. "Telemedicine Activities at Memorial University of Newfoundland: A Historical Review, 1975-1997" (1998) 4:3 Telemedicine J. 207.

Ernberg, J. (1998a, 7-9 December 1998). Universal Access for Rural Development: from action to strategies. Paper presented at the Seminar on Multipurpose Community Telecentres, Budapest. Available online: http://www.itu.int/ITU-D/univ_access/telecentres/papers/NTCA_johan.html

Fields, F., 1999. "A "What If" Scenario for Telemedicine Reimbursement Based on ATSP/TT Survey Findings". Telemedicine Today *Feb 7(1): 32*

Fuchs, R. (1998). If You Have a Lemon, Make Lemonade: A Guide to the Start-up of the African Multipurpose Community Telecentre Pilot Projects. Ottawa: IDRC. Publisher : FutureWorks Inc./IDRC MCT Advisor
Available online: http://web.idrc.ca/en/ev-8785-201-1-DO_TOPIC.html

Fuchs, R. (1998). "Little Engines that Did" - Case Histories From the Global Telecentre Movement. IDRC Study/Acacia Initiative. Ottawa: IDRC. Available online: http://web.idrc.ca/en/ev-10630-201-1-DO_TOPIC.html

Global Knowledge Conference '97. Global Knowledge for Development in the Information Age Conference (GK '97). Hosted by the World Bank and the Government of Canada. June 1997, Toronto, Canada. Accessed: 02/04/99 http://www.globalknowledge.org/

Gobis L (Dec 1997) An overview of state laws and approaches to minimize licensure barriers. *Telemedicine Today* ***5(6)*** : 14-5, 18.

Gómez, R. and Hunt, P. (1999). Telecenter Evaluation: A Global Perspective.International Development Research Centre (IDRC), Ottawa.

Gomez, R., Hunt, P., and Lamoureux, E. Telecentre Evaluation and Research: a global perspective. *International Development Research Centre (IDRC), Canada. September 1999.* www.idrc.ca/telecentre/evaluation/html/06_Tel.html

Gonzalez, E. (1995). Connecting the nation: Classrooms, libraries, and health care organizations in the information age. U. S. Department of Commerce, National Telecommunications and Information Administration (NTIA). http://www.ntia.doc.gov/connect.html

Health Canada, 2000. "Information and Communication; Technologies for Better Health". Office of Health and the Information Highway: Information, Analysis & Connectivity Branch.

Health Canada, June 2000. Information: Rural Health.
http://www.hc-sc.gc.ca/english/media/releases/2000/2000_61ebk2.htm

Hewitt, Marla, "Defining "Rural" Areas: Impact on Health Care Policy and Research." Health Program, Office of Technology Assessment, Congress of the United States: Washington, D.C. July 1989.

Hollett & Sons Inc. 1998. "Telemedicine: Strategic Options". Observations and Reccommendations, P10. TETRA/Telemedicine, Memorial University of Newfoundland.

Hollett & Sons Inc. 1998. "Telemedicine: Strategic Options". Key Informant Interview Report. Pp. 10&14. TETRA/Telemedicine, Memorial University of Newfoundland

Hudson, H., 1999. Designing Research for Telecentre Evaluation. Far Hills Workshop, Quebec

Improving Health Care for Rural Populations. Research in Action Fact Sheet. AHCPR Publication No. 96-P040, March 1996. Agency for Health Care Policy and Research, Rockville, MD. Accessed 02/11/01http://www.ahrq.gov/research/rural.htm

International Development Research Centre (IDRC), September 1999. International Working Meeting: Telecentre Evaluation. Far Hills, Quebec.

Jennissen, Therese, December 1992. *Improving Rural Health*
HEALTH ISSUES IN RURAL CANADA
http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPBdP/BP/bp325-e.htm#INTRODUCTIONtxt

Kanfi, S. and Tulus, F., July 31, 1998 Acacia: What is a telecentre?. On CentraTEL, British Council, Johannesburg.

Katz, J. (1998). (1998) Report on low-income communities in the information age. Benton Foundation Accessed July 1999: http://www.readingonline/electronic/jaal/#Benton

KPMG Consulting, November 1999. "Review of the literature on evaluation in telehealth" The Commonwealth Department of Health and Aged Care Australian New Zealand Telehealth Committee. http://www.telehealth.org.au/discussion_papers/litreview.html

LET'S CHIPP IN: NATIONAL WORKSHOP, August 23, 24 and 25, 2001.Ottawa, Ontario Breakout Session 4.3: Regulatory Obstacles to National Implementation: Where Things Stand Now

Malecki, E.J., July 1996 Telecommunications Technology and American Rural Development in the 21st Century. Department of Geography, University of Florida, Gainesville. http://www.rural.org/workshops/rural_telecom/malecki/4.htm

Mark, J., Cornebise, J. & Ellen *Community technology centres: impact on individual participants and their communities.* Wahl Education Development Center, Inc. (1997)

Mehta, A., Wakefield, D., Kienzle, M., Scholz, T., 2001. "Pediatric Tele-Echcardiography: Evaluation and Transmission Modalities". Telemedicine Journal and E-Health, Vol. 7, November 1, 2001 pp. 17-25.

Minister of Industry. "Statistics Canada, a national overview: population and dwelling counts". Ottawa: Statistics Canada, 1997.

Moore, M. & Hartman, J.T. (1992). Information technology for rural outreach in West Texas. Bulletin of the Medical Library Association, 80(1), 44-45.

National Initiative for Telehealth Guidelines. (2003). National Initiative for Telehealth (NIFTE) Framework of Guidelines. Ottawa: NIFTE. http://www.nifte.ca/framework/english/about.htm

Oeffinger, J.C., Hiebeler, L., Sherman, T., Gaskill, M., Portante,T. et al. (1992). Innovative desktop learning tools: Implications for rural hospitals and physicians. Annals New York Academy of Sciences, 670, 76-90.

Office for the Advancement of Telehealth, 1998. "First Steps Toward Telemedicine Reimbursement" Rockville, MD. 5/6/00 http://telehealth.hrsa.gov/pubs/reimb.htm

Ontario Ministry of Education, 1987. Continuing Education, A Resource Document. Ministry of Training, Colleges and Universities, Canada. www.edu.gov.on.ca/eng/document/resource/continu.html

Parker, E.B., May 1996. Telecommunications and Rural Development: Threats and Opportunities. Parker Telecommunications, Gleneden Beach, OR
http://www.rural.org/workshops/rural_telecom/parker/6.htm

Pampalon, R. *Health discrepancies in rural areas in Quebec. Social Science and Medicine 1991; 33: 355-360.*

Pong R.W., Hogenbirk J. C. and Pearson D.A., October 22, 1999. TELEHEALTH AND PRACTITIONER REIMBURSEMENT. Observations Bulletin of the Telehealth Ethics Observatory, vol. 1, no. 5. Centre for Rural and Northern Health Research, Laurentian University, Sudbury, Ontario
http://www.ircm.qc.ca/bioethique/english/telehealth/archives/issue15.html

Pong, R., Hogenbirk, J. & Pearson, D. 1998. "Policy Paper on Telehealth: Practitioner Reimbursement Issues". A paper Prepared for the Advisory Council on Health Info-structure. Centre for rural and northern Health Research, Laurentian University.

Pong, Raymond W., et al Telehealth and Practitioner Reimbusement Issues, Discussion paper for the Advisory Council on health Info-structure, January 1999.

Pong, R. & Hogenbirk, J. Spring 1999. " Licensing Physicians for Telehealth Practice: Issues and Policy Options". Health Law Review Vol. 8, No. 1.

Pong, R. & Hogenbirk, J. Spring 2000. " Reimbursing Physicians for Telehealth Practice: Issues and Policy Options: Issues and Policy Options". Health Law Review Vol. 9, No. 1.

Qvortrup, L. 1998. Impact of Community Teleservices Centres (CTSCs) on Rural development. Telematics Project, Odense University. Accessed May 1999:
http://www.itu.int/ITU-D/univ_access/casestudies/qvortrup.html

Qvortrup, L. (1998) "Community Teleservice Centres: A Means to Social, Cultural and Economic Development of Rural Communities and Low-Income Urban Settlements". Impact of Community Teleservice Centres (CTSCs) On Rural Development (pp. 1 &15).
http://:www.itu.int/ITU-D-UniversalAccess/casestudies/qvortrup.htm

Robinson, D.M., 1998. "Telehealth Risks and Liabilities: Policy Options for Removing Barriers to Growth". The Techknowledgy Group submitted to the Advisory Council on Health Info-structure, Canada.

Rosser, W. Application of evidence from randomized controlled trials to general practice. The Lancet 1999; 353: 661-664.

Ryan, B. "Telemedicine predicted to see big growth: Norway shows the way with high-speed digital links that traverse the nation". Medical Post, vol. 34(20) 26 May 1998, p 42.

The Rural Times, Fall/Winter 1999. Canadian Rural Partnership. The Quarterly National Newsletter for Rural Canadians. Vol.1 Issue 1
http://www.rural.gc.ca/newsletter/edition1_e.phtml

Scharffenberger, G. 1999. Telecentre Evaluation Methods and Instruments: What works and why? Far Hills Workshop, Quebec

Society of Rural Physicians of Canada, 1998. Homepage. Retrieved January 2000.
http://www.srpc.ca/

State of Rural Healthcare, Society of Rural Physicians of Canada. Presentation to The Standing Senate Committee on Social Affairs, Science and Technology, MAY 31, 2001.http://www.srpc.ca/librarydocs/Kirby_SRPC.htm

Statistics Canada, 1996. "Health statistics: health survey overview". Ottawa: Statistics Canada.

Statistics Canada, 1999. *"Life Expectancy" Health Reports, Winter 1999, Vol. 11, No. 3 Statistics Canada, Catalogue 82-003*

Statistics Canada, 1992. *91 Census, Urban Areas: Population and Dwelling Counts*, Minister of Industry, Science and Technology, Ottawa, 1992, p. 178.

Statistics Canada, 2001. *Population structure and change in predominantly rural regions The Daily Jan 16, 2001 Catalogue 21-006 XIE*

Telecentre Evaluation, "A Global Perspective; Report of an International Meeting on Telecentre Evaluation". International Development Research Centre (IRDC) September 28-30, 1999

Telemedicine - From a Legal Perspective Apr 27, 2002. dotlaw.net is a provided by Gary Dunn & Associates, Computer & Technology Law Vancouver, British Columbia, Canada
http://www.dunn.com/dotlaw/page_6.shtml

TeleMedicine July/August, 1997. "DHS approves Medicaid reimbursement for telemedicine services". The newsletter for the Midwest Rural Telemedicine Consortium. 3/6/00

THE TELEHEALTH INDUSTRY IN CANADA : Prepared for the Life Sciences Branch, Industry Canada by Jocelyne Picot PhD and Trevor Cradduck PhD. THE KESTON GROUP AND INFOTELMED COMMUNICATIONS INC. MARCH 30, 2000.

Volpe National Transportation Systems Center, October 1998. Value of Information and Information Services. U.S. Department of Transportation, Research and Special Programs Administration . http://www.fhwa.dot.gov/reports/viiscov.htm#toc

Walker, J., Thomson, A, & Smith, P. (1998). Maximising the world wide web for high quality educational and clinical support to health and medical professions in rural areas. International Journal of Medical Informatics, 50(1-), 287-291.

Whitten,P. , Ford, D.J., Davis, N. , Speicher, R., & Collins, B. (1998) Comparison of face-to-face versus interactive video continuing medical education delivery modalities. The Journal of Continuing Education in the Health Professions, 18, 93-99

Whyte, A., (1999). " Understanding the Role of Community Telecentres in Development - A Proposed Approach to Evaluation " Far Hills Workshop, Quebec

BIBLIOGRAPHY

Advisory Committee on Health Info-structure, 1998. "Connecting for Better Health: Strategic Issues". Interim Report. Minister of Public Works and Government Services. http://www.hc-sc.gc.ca/ohih-bsi

Aires, L.M. & Finley, J.P. (2000) "Telemedicine activity at a Canadian university medical school and its teaching hospitals". Journal of Telemedicine and Telecare, (6:31-35)

Allen, A. 1998. A Review of cost effectiveness research Telemedicine Today, Oct. 6(5):10-2, 14-5

American Medical Association, 1994. "Evolving Impact of telemedicine". Joint Report of the council on Medical Services and Council on Medical Education, 1994 Meeting of the AMA House of delegates, Chicago. Chapter 7, Section 3. 5/29/00
http://www.ama-assn.org/cmeselec/cmeres/cme7-3.htm

American Medical Association, 1996. "The promotion of Quality Telemedicine, Part 1". Joint Report of the Council on Medical Services and Council on Medical Service, 1996 Meeting of the AMA House of delegates, Chicago. Chapter 7, Section 3. 5/29/00
http://www.ama-assn.org/apps/pf_new/pf_online?f_n=browse&doc=policyfiles/HnE/H-480.969.HTM

Anderson,T.D., 1995. Continuing Professional Education in a Rural Context: Does Interactive, Distance Education Meet the Need? International Journal of Continuing Education Practice.

Argy, O. & Caputo, MP, *The Global Application of Video Conferencing in Health Care: An Introduction to Telemedicine and Visual Collaboration in Medicine*, January 1999. Presentation: National Rural Health Association 20th Annual Conference, Seattle, WA

Browne, W. P. and Swanson, L. "Living with the Minimum: Rural Public Policy." In The Changing American Countryside: Rural People and Places, Emery Castle, ed. University Press of Kansas: Lawrence, KS. 1995.

Bryden, J., S. Black & F. Rennie, 1993. Final report on the evaluation of community teleservice centres in the Highlands and Islands. Nethy Bridge: Arkelton Trust.

Burstein Herrera, Y. (1999). The Universal Access Model - Cabinas Publicas in Peru.International Development Research Centre (IDRC), Ottawa

Buske LM, Yager SN, Adams OB, Marcus L, Lefebvre FA. Rural community development tools from the medical perspective: A national framework of rurality and projections for physician workforce supply in rural and remote areas of Canada. Report to Health Canada April 1999

Canada Health Act Overview. Health Canada. Accessed September 2001 http://www.hc-sc.gc.ca/medicare/chaover.htm

Canada Health and Social Transfer.Government of Canada-Department of Finance. Accessed July, 2001 http://www.fin.gc.ca/fedprov/chse.html

Canada Health Infoway, (1999). " Paths to Better Health". Final Report.(chp. 3, pp3-11) http://www.hc-sc.gc.ca/ohih-bsi

Canadian Medical Association, *Report of the Advisory Panel on the Provision of Medical Services in Underserviced Regions*, March 1992, p. 1.

Canadian Rural Information Services: "What is the population of rural Canada?" Agriculture and Agri-Food Canada 1996.

Canarie, 1997. "Telehealth in Canada: Clinical Networking, Eliminating Distances". Industry Canada p4.

Comer, J., Mueller, M. Access to Health Care: Urban-Rural Comparison from a Midwestern Agricultural State. Journal of Rural Health 1995; 11:128-136.

Conte, C., July,1997. The Learning Connection: Schools in the Information Age. *Benton Foundation. 950 18th Street NW, Washington DC 20006 USA*

Crowder, L.V., Lindley, W.I., Bruening, T.H. and Doron, N, January 1999. Agricultural Education for Sustainable Rural Development: Challenges for Developing Countries in the 21st Century. Extension, Education and Communication Service (SDRE), FAO Research, Extension and Training Division. http://www.fao.org/sd/exdirect/exan0025.htm

Curran, V. & Noseworthy, T., 1999. "Distance learning and the Health professions: A Synthesis report of the Literature Investigating Continuing Professional Health Education at a Distance". Centre for Collaborative Health Professional Education, Faculty of Medicine, Memorial University of Newfoundland.

Drucker, P.F., 1999. "Change Leaders; The ten Commandments of Change". Inc. Magazine, June 01, 1999. 5/1/01
http://www.inc.com/articles/details/printable/0,3535,CID804_REG14,00.html

Edwards, C., & Walton, G., 2000. "Change and the Academic Library: understanding, managing and coping". IMPEL2 Project, An eLib Project funded by JISC. Accessed:5/1/01
http://ilm.unn.ac.uk/impel/change1.htm

Elford, D.K. & Pederson, S. (1996) "Telemedicine in Northern Norway (A Visitor's Perspective)" Discussion Paper

Elford, R. History of Telemedicine/TETRA: Historical Review 1975-1997, Dec. 3,1997 http://www.med.mun.ca/telemed/history.htm

Ernberg, J. 1998. Partnerships And Participation In Telecommunications For Rural Development:Exploring What Works And Why. Integrated Rural Development And Universal Access: Towards A Framework For Evaluation Of Multipurpose Community Telecentre . Pilot Projects Implemented By Itu And Its Partners. Conference At The University Of Guelph, Guelph, Ontario, Canada. Accessed January 1999 At:Http://Www.Itu.Int/Itu-D/Univ_Access/Telecentres/Papers/Guelph.Html

Ernberg, J. (1998). Universal Access for Rural Development: From Action to Strategies.International Telecommunication Union (ITU), Geneva.

Ernberg, J. 30 November - 2 December, 1998 First International Conference on Rural Telecommunications: Universal Access for Rural Development from Action to Strategies.Washington, http://www.itu.int/ITU-D/univ_access/telecentres/papers/NTCA_johan.html

Ernberg, J. (1997). Universal Access by Means of Multipurpose Community Telecenters.International Telecommunications Union (ITU), Geneva

Fields, F. 1999. "A "What If" Scenerio for Telemedicine Reimbursement Based on ATSP/TT Survey Findings". Telemedicine Today *Feb 7(1): 32*

Fuchs, R. (1998). If You Have a Lemon, Make Lemonade: A Guide to the Start-up of the African Multipurpose Community Telecentre Pilot Projects. Ottawa: IDRC. Publisher : FutureWorks Inc./IDRC MCT Advisor
Available online: http://web.idrc.ca/en/ev-8785-201-1-DO_TOPIC.html

Fuchs, R. (1998). "Little Engines that Did" - Case Histories From the Global Telecentre Movement. IDRC Study/Acacia Initiative. Ottawa: IDRC. Available online: http://web.idrc.ca/en/ev-10630-201-1-DO_TOPIC.html

Global Knowledge Conference '97. Global Knowledge for Development in the Information Age Conference (GK '97). Hosted by the World Bank and the Government of Canada. June 1997, Toronto, Canada. Accessed: 02/04/99 http://www.globalknowledge.org/

Gobis L (Dec 1997) An overview of state laws and approaches to minimize licensure barriers. *Telemedicine Today* ***5(6)*** : 14-5, 18.

Gómez, R. and Hunt, P. (1999). Telecenter Evaluation: A Global Perspective.International Development Research Centre (IDRC), Ottawa. Available at: www.idrc.ca/telecentre/evaluation/html/06_Tel.html

Gonzalez, E. (1995). Connecting the nation: Classrooms, libraries, and health care organizations in the information age. U. S. Department of Commerce, National Telecommunications and Information Administration (NTIA). http://www.ntia.doc.gov/connect.html

Grigsby, B. 1996. "4th Annual Program Review – A Cooperative Study by Telemedicine Today and the Association of Telemedicine Service Providers". Telemedicine Today Magazine. Aug 5(4): 30-8, 42.

Gomez, R., Hunt, P., and Lamoureux, E. Telecentre Evaluation and Research: a global perspective. *International Development Research Centre (IDRC), Canada. September 1999.*

Hancock, T. & Groff, P. June 2000. "Information Technology, Health and Health care: A View to thee Future". CPRN Discussion Paper, Canadian Policy Research Networks pp 20-23.

Health Canada, 2000. "Information and Communication; Technologies for Better Health". Office of Health and the Information Highway: Information, Analysis & Connectivity Branch.

Health Canada, June 2000. Information: Rural Health.
http://www.hc-sc.gc.ca/english/media/releases/2000/2000_61ebk2.htm

Hewitt, Marla, "Defining "Rural" Areas: Impact on Health Care Policy and Research." Health Program, Office of Technology Assessment, Congress of the United States: Washington, D.C. July 1989.

Hollett & Sons Inc. 1998. "Telemedicine: Strategic Options". Observations and Reccommendations, P10. TETRA/Telemedicine, Memorial University of Newfoundland.

Hollett & Sons Inc. 1998. "Telemedicine: Strategic Options". Key Informant Interview Report. Pp. 10&14. TETRA/Telemedicine, Memorial University of Newfoundland
Hudson, H., 1999. Designing Research for Telecentre Evaluation. Far Hills Workshop, Quebec

Improving Health Care for Rural Populations. Research in Action Fact Sheet. AHCPR Publication No. 96-P040, March 1996. Agency for Health Care Policy and Research, Rockville, MD. Accessed 02/11/01http://www.ahrq.gov/research/rural.htm

Intelecon Research & Consultancy Ltd. (1999 and 2000). Funds for Rural Telecom Development: Experience in Latin America. Rural Funds Update. Available at: www.inteleconresearch.com/pages/forum2.html

Jennissen, Therese, December 1992. *Improving Rural Health*
HEALTH ISSUES IN RURAL CANADA
http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPBdP/BP/bp325-e.htm#INTRODUCTIONtxt

Jerant, A., & Lloyd, A. (2002). Applied medical informatics and computing skills of students, residents and faculty. Family Medicine, 32(4), 267-72.

Kayabwe, S. and Kibombo, R. (1999). Buwama and Nabweru Multipurpose CommunityTelecentres: Baseline Surveys in Uganda. International DevelopmentResearch Centre (IDRC), Ottawa.

Kayani, R. and Dymond, A. (1997). Options for Rural TelecommunicationsDevelopment. World Bank Technical Paper No. 359.

Khumalo, F. (1998). Preliminary Evaluation of Telecentre Pilot Projects. UniversalService Agency (USA), South Africa.

KPMG Consulting, November 1999. "Review of the literature on evaluation in telehealth" The Commonwealth Department of Health and Aged Care Australian New Zealand Telehealth Committee. http://www.telehealth.org.au/discussion_papers/litreview.html

Linkous, J, (1999) "Telemed Info & Resources: Predicting the Market for Telemedicine" http://www.atmeda.org/resources/marketreports.html

Linkous, J. 2000. "Towards a rapidly Evolving Definition of Telemedicine". Retrieved September 2001. http://main.1161/http://www.atmeda.org/news/definition.html

Malecki, E.J., July 1996 Telecommunications Technology and American Rural Development in the 21st Century. Department of Geography, University of Florida, Gainesville. http://www.rural.org/workshops/rural_telecom/malecki/4.htm

Mamary, E.M., & Charles, P. (2000). On-site to on-line: Barriers to the use of computers for continuing education. The Journal of Continuing Education in the Health Professions, 20(3), 171-5.

Manske, S.R., Lovato, C.Y., Shoveller, J., & Velle, K.A. (2000) Public health capacity and interest in using electronic communication for staff training and resource dissemination: A national survey. Canadian Journal of Public health, 91(4). 274-5.

Mark, J., Cornebise, J. & Ellen Wahl Education Development Center, Inc. (1997) *Community technology centres: impact on individual participants and their communities.*

Mayanja, M. (2000). Access and Empowerment Experiences and Lessons from theMulti-Purpose Community Telecentres (MCT) in Uganda. UNESCO.
McConnell, S. (1998). NGOs and Internet Use in Uganda. TeleCommons DevelopmentGroup (TDG).

McConnaughey, J., Nila, C. A., and Sloan, T. (1995). *Falling through the net: A survey of the "have nots" in rural and urban America.* U. S. Department of Commerce, National Telecommunications and Information Administration (NTIA).
http://www.ntia.doc.gov/ntiahome/fallingthru.html

McConnell, S. May 2001. Telecentres Around the World: Issues to be Considered and Lessons Learned. ICT Development Group for CIDS's Canada-Thai Telecentre Project. Accessed March 2004: www.it4dev.net/Other_papers/Telecentres.pdf

McKay, D.J., & Beesley, K. B., 2000. "Cooperation and Communication in Atlantic Canada: A Review of Liturature on Rural Issues" (Research Paper No. 36). Rural Research Centre: Nova Scotia Agricultural College. 10/16/00
http://www.nsac.ns.ca/rrc/atlan.htm

McKinsey and Company, Inc., 1995. National Information Infrastructure Advisory Council (NIIAC) . 630 Hansen Way, Palo Alto, California 94304; or to Margot Singer, McKinsey and Company, Inc., 55 East 52nd Street, New York, New York 10022.
http://www.uark.edu/mckinsey/preface.html

Mehta, A., Wakefield, D., Kienzle, M., Scholz, T., 2001. "Pediatric Tele-Echcardiography: Evaluation and Transmission Modalities". Telemedicine Journal and E-Health, Vol. 7, November 1, 2001 pp. 17-25.

Minister of Industry. "Statistics Canada, a national overview: population and dwelling counts". Ottawa: Statistics Canada, 1997.

Moore, M. & Hartman, J.T. (1992). Information technology for rural outreach in West Texas. Bulletin of the Medical Library Association, 80(1), 44-45.

Murray, W. and Cornford, D. (1999). "Telecottage and Telecentre Survey 1998."Teleworker Magazine, February.

Noorani H, Picot J. Assessment of videoconferencing in telehealth in Canada. Ottawa: Canadian Coordinating Office for Health Technology Assessment (CCOHTA); 2001. Technology report no 14.

Nickols, F., 2000. "Change Management 101; A Primer"
http://home.att.net/~nickols/change.htm

Nicogossian, A., Pober, D., & Roy, S., 2001. "Evolution of Telemedicine in the Space Program and Earth Applications". Telemedicine Journal and E-Health, Vol. 7, November 1, 2001 pp. 1-15..

Nursing Now, November 2000. "Telehealth: Great potential or risky terrain?" Canadian Nurse Vol.96, No. 10

Oeffinger, J.C., Hiebeler, L., Sherman, T., Gaskill, M., Portante,T. et al. (1992). Innovative desktop learning tools: Implications for rural hospitals and physicians. Annals New York Academy of Sciences, 670, 76-90.

Oestmann, S. and Andrew C. CHAPTER 1TELECENTRES - EXPERIENCES, LESSONS AND TRENDS. Dymond Intelecon Research & Consultancy Ltd.
http://www.col.org/telecentres/chapter%2001.pdf

Office for the Advancement of Telehealth, 1998. "First Steps Toward Telemedicine Reimbursement". 5/6/00 http://telehealth.hrsa.gov/reimb.htm

O'Hara J. (1994) "The South Bristol Learning Network - a 21st century cable-based telecommunications infrastructure". Educational media international (London), vol. 31, no.2, p. 86-91.

Ontario Ministry of Education, 1987. Continuing Education, A Resource Document. Ministry of Training, Colleges and Universities.
www.edu.gov.on.ca/eng/document/resource/continu.html

Opena, M. (1999). Multipurpose Community Telecentres in Selected PhilippineBarangays. International Development Research Centre (IDRC), Ottawa.

Orlikowski, W. & Hofman, J.D., 1997. "An Improvisational Model for Change management: The Case of Groupware Technologies". MITSloan Management Review. Winter 1997, Vol. 38, No. 2. 5/2/01. http://mitsloan.mit.edu/smr/past/1997/smr3821.html

Pampalon, R. *Health discrepancies in rural areas in Quebec. Social Science and Medicine 1991; 33: 355-360.*

Parker, E.B., May 1996. Telecommunications and Rural Development: Threats and Opportunities. Parker Telecommunications, Gleneden Beach, OR
http://www.rural.org/workshops/rural_telecom/parker/6.htm

Picot, J. (1996). " Is There a Telehealth Industry in Canada?" A conference Addressing Information. Technology Issues in Community Health http://itch.uvic.ca/itch96/papers/picot.htm

Pong, R., Hogenbirk, J. & Pearson, D. 1998. "Policy Paper on Telehealth: Practioner Reimbursement Issues". A paper Prepared for the Advisory Council on Health Info-structure. Centre for rural and northern Health Research, Laurentian University.

Pong, R. & Hogenbirk, J. Spring 2000. "Reimbursing Physicians for Telehealth Practice: Issues and Policy Options". Health Law Review Vol. 9, No. 1.

Pong, R. & Hogenbirk, J. Spring 1999. " Licensing Physicians for Telehealth Practice: Issues and Policy Options". Health Law Review Vol. 8, No. 1.

Qvortrup, L. (1998) "Community Teleservice Centres: A Means to Social, Cultural and Economic Development of Rural Communities and Low-Income Urban Settlements". Impact of Community Teleservice Centres (CTSCs) On Rural Development (pp. 1 &15).
http://:www.itu.int/ITU-D-UniversalAccess/casestudies/qvortrup.htm

Qvortrup, L. 1998. Impact of Community Teleservices Centres (CTSCs) on Rural development. Telematics Project, Odense University. Accessed May 1999: http://www.itu.int/ITU-D/univ_access/casestudies/qvortrup.html

Reilly, K. & Gomez, R.. Comaparing Approaches: Telecentre Evaluatrion Experiences in Asia and Latin America. Electronic Journal on Information Systems in Developing Countries (EJISDC) (2001)V4,R3,1-17 Accessed November 2003: http://www.ejisdc.org

Richardson, D. (1997). The Internet and Rural and Agricultural Development. FAO: Rome, Communication for Development. Food and Agricultural Organization of the United Nations (FAO)

Richardson, R. (July 14,1998) "Rural Telecommunication Services and Stakeholder Participation: Bridging the Gap Between Telecommunication Experts and Communication for Development Practitioners". http://www.telecommons.com/documents.cfm?documentid=17

Richardson, D. and Paisley, L. " Special: The first mile of connectivity; Advancing telecommunications for rural development through participatory communication". Development Communication: Specials, 28 July 1999; FAO Communication for Development Group.

Richardson, D., Ramirez, R. and Haq, M. (2000). Grameen Telecom's Village PhoneProgramme in Rural Bangladesh: A Multi-Media Case Study. TeleCommonsDevelopment Group (TDG).

Robinson, D.M., 1998. "Telehealth Risks and Liabilities: Policy Options for Removing Barriers to Growth". The Techknowledgy Group.

Rose, J.B. (1999). Multipurpose Community Telecentres: In Support of People-CentredDevelopment (Uganda). UNESCO.

Rosser, W. Application of evidence from randomized controlled trials to general practice. The Lancet 1999; 353: 661-664.

Ryan, B. "Telemedicine predicted to see big growth: Norway shows the way with high-speed digital links that traverse the nation". Medical Post, vol. 34(20) 26 May 1998, p 42.

Scharffenberger, G. (1999). Timbuktu Multipurpose Telecentre Baseline Survey:Community Information and Communications Profile. Pact Institute,Washington, DC.

Schanz, S., 1997. "1997: A Busy Legislative year for Telemedicine?" 8/10/00 http://telemedtoday.com/articlearchive/articles/LegislativeTelemedicine.htm

Scharffenberger, G. 1999. Telecentre Evaluation Methods and Instruments: What works and why? Far Hills Workshop, Quebec

Shaw, A. Telehealth projects, technologies and funding are surging across Canada. Canadian Healthcare Technology, Vol. 5, No. 7 October 2000.

Shore, K. 1999. The Internet Comes to Rural India. International DevelopmentResearch Centre (IDRC), Ottawa.

Slobodnik, A. & Slobodnik, D., "Change Management in a Human Systems Model: Four System Types". Presented at the HR Strategies in the M&A Process Conference Toronto, April 30, 1998. 5/1/01 http://www.optionsfc.com/FedPress.htm

Society of Rural Physicians of Canada, 1998. Retrieved January 2002. http://www.srpc.ca/

State of Rural Healthcare, Society of Rural Physicians of Canada. Presentation to The Standing Senate Committee on Social Affairs, Science and Technology, MAY 31, 2001.http://www.srpc.ca/librarydocs/Kirby_SRPC.htm

Statistics Canada. "Health statistics: health survey overview". Ottawa: Statistics Canada, 1996.

Statistics Canada. *"Life Expectancy" Health Reports, Winter 1999, Vol. 11, No. 3 Statistics Canada, Catalogue 82-003 http://www.statcan.ca/english/indepth/82-003/feature/hr1999_v11n3_win_a01.pdf*

Statistics Canada. *91 Census, Urban Areas: Population and Dwelling Counts*, Minister of Industry, Science and Technology, Ottawa, 1992, p. 178.

Statistics Canada. *Population structure and change in predominantly rural regions The Daily Jan 16, 2001 Catalogue 21-006 XIE http://www.statcan.ca/english/freepub/21-006-XIE/21-006-XIE00002.pdf*

Strategic Employment Opportunities Program (SEOP)- Newfoundland/Labrador March 1996 Human Resources Development Canada. Accessed February 1999 at: http://www11.hrdc-drhc.gc.ca/pls/edd/SEO_brf.shtml

Telecentre Evaluation. "A Global Perspective; Report of an International Meeting on Telecentre Evaluation". International Development Research Centre (IRDC) September 28-30, 1999

TeleMedicine July/August, 1997. "DHS approves Medicaid reimbursement for telemedicine services". The newsletter for the Midwest Rural Telemedicine Consortium. 3/6/00 http://www.mrtc-iowa.org/news0797.html

The Rural Times, Fall/Winter 1999. Canadian Rural Partnership: Did You Know? Vol.1 Issue 1 http://www.rural.gc.ca/newsletter/edition1_e.phtml

Toward Devolopment of a National Rural Health Strategy A report of the National Liberal Rural Caucus, April 30, 1999 http://www.srpc.ca/

Volpe National Transportation Systems Center, October 1998. Value of Information and Information Services. U.S. Department of Transportation, Research and Special Programs Administration . http://www.fhwa.dot.gov/reports/viiscov.htm#toc

Whitepaper, June 23, 1999." Telemedicie: A Brief Overview". Developed for the Congressional Telehealth Briefing . American Telemedicine Association. 3/29/00 http://www.atmeda.org/whatis/whitepaper.html

Whitten,P. , Ford, D.J., Davis, N. , Speicher, R., & Collins, B. (1998) Comparison of face-to-face versus interactive video continuing medical education delivery modalities. The Journal of Continuing Education in the Health Professions, 18, 93-99

Wilkins, R. and Adams, O *Healthfulness of Life: A Unified View of Mortality, Institutionalization and Non-Institutionalized Disability in Canada, 1978,* The Institute for Research on Public Policy, Montreal, 1983.

Whyte, A.,1999 " Understanding the Role of Community Telecentres in Development - A Proposed Approach to Evaluation " Far Hills Workshop, Quebec

Wootton, R. Telemedicine: a cautious welcome. BMJ 1996; 313:1375-7

APPENDIX A: GLOSSARY OF TERMS

The following terms can be interpreted in different ways. Within the specific context of this report they are defined as follows. They have been listed alphabetically for convenience.

Audioconferencing (AC)
AC is the real time transmission of voice between two or more users over a distance using standard telecommunications lines.

Bandwidth
Bandwidth is the range of frequencies that can be transmitted by a channel, measured in hertz (Hz) for analog systems and in bits per second (bps) for digital systems. Generally, as bandwidth increases, so does the speed at which information can be transmitted.

Distance Education
Distance education is the practice of providing education through multiple forms of communication to people in communities distant from where the presenter is located e.g., mailing materials, using teleconferences, the Telehealth network, Internet and others.

Infrastructure
There are several kinds of infrastructures. Telehealth principally relies on the communication infrastructure, broadly defined as the networks, systems and other hardware and software of telecommunications, broadcasting and computer communications, which are the three key technologies now converging to form the information highway.

Integrated services digital network (ISDN)
ISDN is a digital service that can transmit voice, data, and video simultaneously; it a set of protocols for high-speed digital transmission. Usually transmits at 64-128 Kbps, although higher speeds are possible.

MDSTU
Multidisciplinary Service and Teaching Units, later renamed to PHEP.

PHEP
Primary Healthcare Enhancement Project

Primary site
A primary site is a location where the data transmission originates and/or where the patient is located. There can be more than one primary site.

RCST
Remote Community Services Telecentre

Satellite transmission
Satellite transmission is the transmission of data, voice or video by means of an electronic device placed in orbit around the earth for the purpose of receiving and re-transmitting electromagnetic signals over wide geographic areas. Signals are sent to the satellite using communication uplinks and received in a satellite "footprint" or geographic area using communication downlinks.

Scalability
Technology purchased for telehealth should be capable of migrating into expanded capabilities without total replacement. For example, if there is high probability that a purchaser would eventually need to move from 128k to 384k of bandwidth for their telehealth network, then it would be a mistake to purchase a unit that would only operate at 128k. Rather, the correct choice would be a unit that would work at both 128k and 384k. Additionally, features and functions should be available as options rather than impacting the base cost of the technology. Various instruments for patient examination should be added to the base system as needed by the clinical applications being provided at each site.

Secondary site
A secondary site is a location where the data is received, where the consulting health professional is located. There may be more than one secondary site, and some sites act as both primary and secondary.

Session
A session is defined as the use of videoconferencing for any type of information exchange, regardless of the number of sites involved or the length of the communication. Each session involves at a minimum, two sites, and each site may include more than one participant.

Store-and-forward
Collects clinical data, stores them, and then forwards them to be interpreted later. These systems have the ability to capture and store digital still or moving images of patients, as well as audio and text data. A store-and-forward system eliminates the need for the patient and the clinician to be available at the same time and place. Store-and-forward is therefore an asynchronous, non-interactive form of telemedicine. It is usually employed as a clinical consultation (as opposed to an office or hospital visit).

TEACH
Telecentre for Education and Community Health

Telecommunications (electronic communication)
Telephone, facsimile, E-mail, E-mail listservers, smart cards and Web sites. The latter can include multi-media (text, graphics, audio & video), interactive bulletin board and databases.

Teleconsultation
Teleconsultation is electronic communication between a physician and another physician or other health professional for the purpose of making or confirming a diagnosis or obtaining a therapeutic opinion for a specific case.

Tele-education
Tele-education is electronic communication for the purpose of transmitting specific knowledge to system users that are separated by space and distance.

Telehealth
Telehealth is the use of communications and information technology to deliver health and health care services and information over large and small distances.

Telehealth applications
Telehealth applications can be defined in different ways, based on technology (such as videoconferencing), by activity (such as continuing health education or teleconsultation), by setting (such as remote or rural telehealth), or by medical or health care discipline (telepsychiatry, teledermatology, and other tele-specialties).

Telehealth facilities
Telehealth facilities refer to the health care facilities that have multimedia videoconferencing equipment.

Telehealth network
The Telehealth network refers to the ability to connect the Telehealth facilities through the use of telecommunications.

Telelearning
Telelearning is access to educational or training programs using a combination of online information, multi media and networks. It may or may not include the use of medical peripheral devices.

Telemedicine
The use of medical information exchanged from one site to another via electronic communication for the health and education of the patient or health care provider and for the purpose of improving patient care.

TETRA
Telehealth and Educational Technical Resource Agency

Videoconferencing (VC)
VC is the real-time transmission of voice, data, and video images between two or more users at some distance from one another.

APPENDIX B: COMMUNITY PROFILES

1. Goose Bay

Location: Central Labrador

Population: 8610

Economy: Unemployment is fairly high – the largest employer is the Department of National Defense (the base at Goose Bay is used extensively for NATO training).

Transportation: Large airport served by several airlines, with air service to communities in Coastal Labrador. A limited use gravel highway connects Goose Bay to Labrador West and the rest of Canada, and a passenger car ferry service runs from Lewisporte, Newfoundland during the summer.

Education: Goose Bay hosts a full K-12 system, as well as a community college (College of the North Atlantic, a private career college and extension services of Memorial University of Newfoundland).

Health care: Melville Hospital (31 beds, 14 physicians) serves the community and is the regional referral centre for Churchill Falls and the coastal Labrador communities (excluding coastal Labrador). Medical staff includes 1 general surgeon, 1 anesthetist, 1 OBS/GYN, and family practice physicians and residents. The hospital is equipped with laboratory and diagnostic imaging departments, and provides physiotherapy, mental health, social services, and occupational therapy on an inpatient, outpatient and community outreach basis. There is also a

Public Health Unit in the community that delivers the core provincial public health services program. The regional offices of the Health Labrador Corporation are located in Goose Bay, and there is ongoing liaison with the Labrador Inuit Health Commission and the Innu Nation Health Commission.

Requirements: As a regional medical facility the Melville Hospital in Goose Bay had two specific sets of requirements from a telehealth and health-related education perspective, they were:

Access to specialist services from the provincial health care centre (HCS – St. John's) to support or augment the services in the regional facility. This would include remote consultations with physicians in a number of disciplines, as well as specific services including radiology, pathology and psychiatry.

The ability to provide remote medical services to rural and remote communities within its region (in the case of this project, Nain), with the objective of better supporting the health care practitioners within the remote community.

In addition to the health requirements the current restrictions on bandwidth available in Goose Bay led to a need for enhanced services and facilities in the areas of distance education (the ability to effectively access web-based courses and education-focused video conferencing) and general business/community development. Central to meeting these needs is the ability to provide video conferencing capabilities to a number of key groups in the community (the Community College, Labrador Institute for Northern Studies) as well as the capacity for high-speed Internet access.

Champions

Health Labrador Corporation

Labrador Institute for Northern Studies

2. Nain

Location: Northern Labrador (the most northerly community with the Health Labrador Corporation's region).

Population: 1209 (largest community on the Labrador Coast). The majority of the population is aboriginal. English is the predominant language but many residents speak Innukitut.

Economy: High unemployment rate with an increasing percentage of the population employed year round with the Labrador Inuit Association, the Labrador Inuit Health Commission and several businesses. Many people are employed in seasonal industries (i.e. fishing). Nain is the closest community to the large mineral (nickel) discovery at Voisey's Bay (the community is starting to be used as a service centre for the exploration effort, straining existing community services).

Transportation: Air (gravel airstrip suitable for day flights only) and sea during summer. Air and land (snowmobile) during the winter.

Education: There is a K-12 school facility, with a new primary school under construction.

Health Care: Nain has a large, modern health centre (4 beds, one incubator), averaging 1000 outpatient visits per month. Staffing is 1 Nursing Supervisor, 5 Regional Nurses, and a physician that visits every three weeks. Basic trauma services are provided, with emergency patients medivaced to Goose Bay. The Health Labrador Corporation partners with the Labrador Inuit Health Care (LIHC) in the provision of community health services, with 3 Public Health Nurses, 2 TB Workers and mental health, community service, and child care workers. The Director of Nursing for the LIHC provides regional administrative services from Nain.

Requirements: As a remote community with limited communications infrastructure, Nain's requirements covered the full spectrum of network-enabled services, with the priorities being in the areas of health services and education. Given the remote and isolated nature of Nain (transport by air and sea only, as well as by snowmobile in the winter) the delivery of heath care services and the attraction/retention of health care professionals were key issues to be addressed. Nain currently functions with a full-time nursing staff of 5-6 positions, but without a permanent physician (the physician is in the community on a part-time basis). A core medical priority is to establish a remote consultation facility to the regional site in Goose Bay to provide continuity in physician access. Another key health requirement is enhanced access to professional development and medical reference materials for the health care staff to enhance the overall operation of the facility.

Current distance education offerings in Nain are limited to standalone courses (i.e. CD-ROM) or low-bandwidth audio graphic-based delivery. There is a requirement to increase the range of

educational programming available, through the ability to provide access to web or hybrid web-CD course offerings, as well as providing access to video conferencing-based educational course delivery. With the proximity to the Voisey's Bay mining development, the provision of high-speed Internet access and teleconferencing services would also facilitate the ongoing environmental assessment process as well as providing enhanced communications facilities for the businesses involved in the development.

Champions: Health Labrador Corporation , LIHC, College of the North Atlantic

3. Forteau

Location: Southern Labrador (Labrador Straights). This region consists of the communities of L'Anse au Claire, Forteau, English Point, L'Anse Amour, L'Anse au Loup, Capstan Island, West St. Modeste, Pinware and Red Bay, along an 80km stretch of coastline.

Population: Population of all communities in Southern Labrador is approximately 2500. Forteau's population is 510.

Economy: Mixed economy, with a primary focus on resources (fishing) and tourism. The fishing industry in the area has been severely impacted by the collapse of the Northern Cod stocks, through there has been a gradual shift to other species (though not with the same employment levels). Tourism is a growing industry, based on the natural resources in the area and the high concentration of historic sites (including a 16th century Basques whaling station in Red Bay). Information technology is starting to make in-roads within the region based on the influence of the Enterprise Network Telecentre, with several small start-ups and IT teleworkers.

Transportation: Year round scheduled air service (through airport at Blanc Sablon). Road access is available via ferry connection from Northern Newfoundland from May – December depending on ice conditions. All communities in the local region are connected by road year-round with extensions ongoing to provide further connectivity to other communities (Mary's Harbour, Charlottetown, St. Louis, and eventually Cartwright)..

Education: K-12 facilities in several communities, as well as a Career Information Resource Centre in Forteau and Computerized Adult Education Centres in L'Anse au Loup and West St. Modeste.

Health care: The Labrador South Health Centre is located in Forteau and serves all the communities in the Labrador Straights region, operating under the direction of the Grenfell Regional Health Services Board. There are 3 inpatient holding beds and one crib, with patients medivaced to St. Anthony if the projected stay is over 48 hours. The facility has a number of Regional Nurses (RN's with advanced nursing skills) as well as two physicians (these are designated as permanent positions, but are being filled on a locum basis). There is also a radiology technician and an in-house pharmacy. Services include nursing and medical care, health education, public health services, short-term inpatient care, and an attached long-term care facility.

Requirements: The community of Forteau was the site of one of the original telecentres ('Enterprise Centres') established by the Enterprise Network in the early 1990's. This centre

serves the communities in the Southern Labrador region, primarily as a centre for business and economic development support, and as a focal point for introducing information technology into the region. The requirements for the RCST facility in Forteau (integrated into the existing telecentre facilities) was to provide enhanced access to information resources and communication services (in particular high-speed Internet access and video conferencing) to serve a number of sectors within the community. There is a particular requirement for business support for the Forteau RCST, through the provision for enhanced communication services for the local business community and the exposure of the business community to advanced network technologies and applications.

Forteau faces many of the same issues as Nain in terms of its existing telecommunications environment and the impact on the delivery of distance education courses. The RCST facility was expected to extend the current distance education options available (CD-ROM and audiographic based courses) to allow for video-conference based education delivery as well as access to Internet-based multi-media training resources.

While there is a requirement for telehealth services in Forteau, provision of those services was not to be implemented until a service arrangement could be worked out with the regional health care board that serves Forteau (due to the geography of Labrador the southern communities are actually served by the Grenfell Regional Board in Northern Newfoundland, which was not in a position to offer telehealth services at this time). While telehealth services will not be immediately available there is an expectation on the part of health care practitioners in the

Southern Labrador region that they were be able to utilize the RCSIT facilities for access to medical information resources and continuing medical education.

Champions: There is a strong tradition of community support for technology initiatives within the region, and many of these local champions played key role in the successful implementation of the Enterprise Network facility. Key local champions (most of whom will serve on the local advisory group) include: Chamber of Commerce; Eagle River Credit Union Municipal Representation; Zone Economic Board Regional College; Labrador IT Initiative

4. Twillingate

Location: Located in Notre Dame Bay in North Western Newfoundland

Population: 5000

Economy: Twillingate has been a major fishing centre since the 1700's, acting as the northern capital of the province and as the center of trade for the Labrador and shore fisheries. Prior to the collapse of the northern cod stocks Twillingate (and the surrounding communities) were focused on the fisheries and the fish plant on Twillingate was a major local employer. Like all communities in Newfoundland dependant on the cod fishery, Twillingate's economy has been severely affected, with significant increases in unemployment.

Transportation: Twillingate has direct road connections with the rest of the province, as well as access to an international airport in Gander (approximately 150km away).

Education: K-12 facilities

Health care: Twillingate is the site of the Notre Dame Bay Memorial Health Centre. This is a 49 bed facility comprised of 31 long-term care bed and 18 acute care beds. The hospital provides long-term care, acute care, outpatient and emergency services to the communities in the Twillingate-Fogo region. As part of the Central East Health Care Institutions Board, Twillingate is linked to the regional facility in Gander (James Paton Memorial Hospital). The Twillingate facility also supports clinics in New World Island and Change Island.

Requirements: The requirements for the Twillingate facility draw from the standard service mix developed for the PHEP pilot project, with a primary focus on telehealth services and health-related telelearning. While Twillingate offered the full range of RCST services (information access, education) to the community and an agreement to allow public access to the RCST facility within the hospital, the primary objectives and requirements for the facility were based on the standard TEACH facility model that was developed to support the PHEP project. These included a set of common TEACH telehealth applications, as well as a suite of health-related telelearning applications including: Professional Development; Continuing Medical Education; Community Health Information; and Patient Information.

Champions: Central East Health Care Institutions Board

5. Port aux Basques

Location: Located in Western Newfoundland

Population: population 5,243 (region)

Economy: The region has experienced an economical decline, as is common to other areas in NF. Port aux Basques was first of all a fishing community, later a railway town, and because of its location became the main gateway to and from the province for people, goods and services

Transportation: Port aux Basques has direct road connections with the rest of the province via the Trans Canada Highway, 365 day access to marine ferry service to N.S., and an airstrip at St. Andrews (20 kms away) as well as Stephenville International Airport (175 km away).

Education: K-12 facilities

Health care: As part of the Western Health Board the Dr. Charles L. Legrow Health Centre located in Port aux Basques supports a 50 bed facility which serves a catchment population of 12 -13,000. The regional hospital is located in Corner Brook.

Requirements: The requirements for the Port aux Basque facility derive from the standard service mix developed for the PHEP pilot, with a primary focus on telehealth services and health-related telelearning. While Port aux Basque offers the full range of RCST services (information access, education) to the community and an agreement to allow public access to the RCST facility within the hospital, the primary objectives and requirements for the facility are based on the standard TEACH facility model that was developed to support the MDSTU project. These will include a set of common TEACH telehealth applications, as well as a suite of health-

related telelearning applications including: Professional Development; Continuing Medical Education; Community Health Information; and Patient Information.

Champions: Western Health Care Institutions Board and Economic Zonal Board.

APPENDIX C: DATA COLLECTION TOOLS

Instruments Designed to Track RCST Utilization

- Internet Access Tracking Log
- *RCST Satellite Time Request Form*

Instruments Developed Elicit User Feedback Regarding Accessibility, Quality and Effectiveness of the Technology

- *Health Professional Evaluation Form*
- *Patient Evaluation Form*
- *Telecentre Evaluation Form*

Instruments Designed to Elicit Overall Satisfaction with the RCST Services

- I*nterview Guide For Key Informant Interviews with Health Education Application Users*
- I*nterview Guide For Key Informant Interviews with Health Education Session Facilitators, Primary Health Enhancement Project Managers, Coordinators and Assistant*
- Interview Guide For Key Informant Interviews with Health Professionals Involved In Patient Consultations Via Video-Conferencing or Store and Forward Technology
- Technical Support: Key Informant Questionnaire
- RCST Key Informant Questionnaire (Cover Letter)

RCST SATELLITE TIME REQUEST FORM

Contact scheduler - Wendy Ennis
email: wendye@mun.ca.
Tel: (709) 758-8303
Fax: (709) 737-7054

Required scheduling information:

Date:_____ Time: Start:_____
End: _____

Local site: _____ Connecting site:_____
Expected number in attendance: _____ Expected number in attendance: _____

Contact person local site:
Name: _____
Tel: _____
Email: _____
Fax: _____

Contact person connecting site:
Name: _____
Tel: _____
Email: _____
Fax: _____

Format of session: videoconference ☐ netmeeting ☐ internet ☐ visitran
Other: ----------
Objective/Purpose (for data tracking. ie: business, health, internet, teaching etc.):
_____

Equipment required: overhead projector ☐ slide projector ☐
Power point ☐ attendant/technical assistance ☐
other: _____

The individual requesting the session is responsible for:

- contacting the participating site/s (Scheduler will provide appropriate contact name upon confirmation)
- confirming satellite time has been booked
- coordinating room booking and equipment set up if needed at each site
- informing participants that they will be asked to complete an evaluation form at the end of the session.

Comments: _____
_____
_____

How did you learn about the telecentre: _____

Form completed by: Name: _____
Tel: _____
Fax: _____

Satellite Confirmation: Yes ☐ No ☐ Date: _____

Authorized by: _____
Please retain a copy for your files.

Health Professional Evaluation Form
Telehealth - Client Consultation

Data collected will be used for research purposes by the evaluation team at the Telemedicine Centre, Memorial University of Newfoundland. All responses, given on this form, will be kept confidential.

Site:_____ **Date:** _____

1. What is your profession: _____

2. Please indicate if you are the: Referring Professional Consulting Professional

On a scale to 1 to 6, circle the number that best indicates how much you agree or disagree with each statement below regarding the video-conference system.

	Strongly agree						**Strongly disagree**
3. The audio quality was excellent.	1	2	3	4	5	6	N/A
4. The video quality was excellent.	1	2	3	4	5	6	N/A
5. The equipment was easy to use.	1	2	3	4	5	6	N/A
6. I was comfortable with using the equipment.	1	2	3	4	5	6	N/A
7. The video-conferencing system allowed me to adequately assess the client.	1	2	3	4	5	6	N/A
8. Overall, I was satisfied with my ability to assess the client using the video-conferencing system.	1	2	3	4	5	6	N/A

9. In the absence of telemedicine, how would this client have been managed for the current problem?
   - treat in home community
   - refer to a visiting specialist
   - admit to hospital in client's community
   - have client travel to the consultant
   - other _____

10. How will follow-up care be provided after this telemedicine consult?
   - in-person in the client's community
   - in-person in the client's community by a specialist
   - in-person in another community
   - in-person in another community by a specialist
   - via telemedicine
   - other _____

11. Were any of the following peripheral devices used during the consultation? (Please choose all that apply)
   - document camera
   - General Patient Exam camera
   - ENT probe set
   - other _____

12. What did you **like** about the video-conferencing system?

13. What did you **dislike** about the video-conferencing system?

14. Would you recommend any changes to improve the video-conferencing system?

15. Other comments/suggestions:

Thank you for taking the time to complete this questionnaire!

Please return to the Telemedicine Site Coordinator
or
P. Dwyer
Fax: 709-737-7054
or c/o Telemedicine/TETRA
MUN
St. John's, NF
A1B 3V6

****

For evaluation purposes, would you be willing to be contacted for an interview regarding your experiences with the telemedicine system? If so, please complete & detach this portion of the evaluation form and return to the Telemedicine Site Coordinator or the address given above. Thank you!

*Name:*_____ *e-mail:*_____
Postal Address: _____

Patient Evaluation Form
Telehealth - Patient Consultation

Data collection will be used for research purposes by the Telemedicine Centre, Memorial University of Newfoundland. This questionnaire is to be completed by the patient, (or the patient's parent or guardian if the patient is a minor), involved in the videoconference consultation. All answers given on this form will be kept confidential.

Site:_____

Consult Date:_____

Health Care Provider(s) Name:_____

1. Have you ever used the telecenter before?
   ☐ yes ☐ no

2. Were you provided with a satisfactory explanation of what to expect before the session began?
   ☐ yes ☐ no

3. Were you comfortable with the use of the videoconference system?
   ☐ yes ☐ no
   If No, what made you uncomfortable?

_____

4. Did the use of the videoconference equipment inconvenience you in any way?
   ☐ yes ☐ no
   If Yes, how did it inconvenience you?

_____

5. Were you able to communicate with the health care professional to your satisfaction?
   ☐ yes ☐ no
   If No, please explain:

_____

6. Were you satisfied with the quality of care you received today?
   ☐ yes ☐ no
   If No, why not?

_____

Please turn over K

7. How do you think your interview using the television (video-conference) compares to an interview done by a doctor in-person?

Much better
A bit better
Same as in-person
Not as good as in-person
Not acceptable

8. About how far would you have to travel if telemedicine was not available?

0-50 kilometers 101-200 kilometers 500-1000 kilometers
51-100 kilometers 200-500 kilometers not applicable

9. If you had to travel to see the physician/specialist, which of the following would cost you money? (Please check all that apply)

Travel to and from your home town.
Travel to and from the hospital/clinic
Accommodations during your trip.
Food during your trip
Babysitter
Unpaid time off from work
Other: _____

10. Would you be reimbursed for any of your expenses?

yes no
If Yes, who would reimburse you? _____

11. Would you use Telemedicine again?

yes no unsure
Why or Why not? _____

12. Other comments/suggestions:

_____
_____
_____

Thank you for taking the time to complete this questionnaire!

Please return to your Telemedicine Site Coordinator or
mail or fax to: P. Dwyer
c/o Telemedicine/TETRA, MUN
St. John's, NF
A1B 3V6
fax: 709 737-7054

Please see following page A

****

For evaluation purposes, would you be willing to be contacted for any interview regarding your experiences with the telemedicine system? If so, please complete & detached this portion of the evaluation form and return to the Telemedicine Site Coordinator or the address given above. Thank you!

*Name:*_____ *e-mail:*_____

Postal Address: _____

_____

_____

****

REMOTE COMMUNITY SERVICES TELECENTRE
TELECENTRE EVALUATION FORM

The Remote Community Services Telecentre (RCST) is a shared-use facility (telecentre) implemented in remote communities to provide telelearning, telehealth, and access to communications and information services. RCST's have been established in the communities of Port aux Basques, Nain, Forteau, Happy Valley - Goose Bay, St. John's, and Twillingate.

It is important for us to monitor and evaluate the Telecentre. By completing the following questions, you are providing us with valuable information to help evaluate usage and feedback on an overall basis in order to enhance your communities' telecentre.

DATE: _____ **TIME:** _____ **LOCATION:** _____

1. This was the 1st / 2nd - 3rd / 4th - 8th / more than 8th time that I've used the centre

2. This time I used the telecentre for the following type of application: (select more than one if appropriate.)
   Health Education
   Small Business Other _____

3. The type of service that I used in the telecentre was: (select more than on if appropriate)
   Videoconference Internet Access
   Email Access Information
   Other communications - please describe: _____

4. a) Did using the telecentre save you a trip? If yes, how much do you estimate are the cost savings?

   b) Did using the telecentre for this service allow you to participate in an activity that cost or distance would not have allowed you to participate in? Yes No

5. Would you use the telecentre again? Yes No Don't Know

6. Would you recommend use of the telecentre to a colleague or friend? Yes No Don't Know

7. What I liked most about using the telecentre was: _____

8. What I like least about using the telecentre was: _____

9. How would you rate the facilities? Excellent Very Good Good Poor
   Please explain: _____

10. Overall, on a scale of 1 to 10 (10 being hightest), I would say that the telecentres' usefulness should be given a rating of _____

11. An appropriate additional service that the telecentre should offer is: _____

12. Would you be willing to be interviewed about the telecentre as a part of our evaluation? If yes, your contact information is:
    Name: _____ Email address: _____
    Postal address: _____ Telephone #: _____
    _____

Thank you for taking the time to complete this evaluation. **PLEASE LEAVE THIS FORM AT THE TELECENTRE.**

INTERVIEW GUIDE:
Health Education Application Users

1. **Opening:**
   - ✓ **Introduce self**
   - ✓ **Purpose of interview**
   - ✓ **Answers will be confidential.**
   - ✓ **Taping the session however, only used for transcribing and will be destroyed after.**

2. **Approximately, how many times was the RCST facilities used for your program?_____**

3. **What applications were used during your session (s)? (Internet, videoconf, ...)**

4. **How did this facility/equipment affect access to your program?**

5. **Did using this system allow participants to avail of a service/activity that cost or distance would not allow?**

   YES NO

6. **If this was not available, how would your session have been conducted (participants join via audio, travel to site, rural people would not have been included, ...)**

7. **Can you estimate the cost savings your program experienced from using this system? (Travel, number of persons, accommodations, ...)**

8. **In your opinion, do you think this system is:**
   - ❑ **better than face-to-face programs**
   - ❑ **same as face-to-face programs**
   - ❑ **not as good as face-to-face programs**

   Please explain:

9. **Do you think the RCST facility has developed an effective information technology platform to support continuing health education?**

   YES NO

   Please explain?

10. **Do you plan to use this system in the future? (How do you see this technology integrated into your work in the future?)**

    YES NO

    IF yes how? If NO, why not?

11. **Did you experience any difficulties with your program? (technical - audio, video, etc)**

    YES NO

    If yes, please explain:

12. **What are some aspects of this technology that you like?**

13. **What do you see as the <u>advantages</u> of using this technology?**

14. **Do you have any suggestions for <u>improving</u> the system?**

INTERVIEW GUIDE FOR:
(Health Education Session Facilitators, PHEP Manager, PHEP Coordinators, PHEP Assistant, Physicians)

Opening:

a. Who am I

b. Purpose of Interview: Evaluate the TEACH project - project built upon the basic model developed by the RCST project but TEACH creates a specialized model for health care and health education.. Implemented at each of the PHEP sites (Goose Bay, Port aux Basques, Twillingate). One of the TEACH/RCST objectives was to provide information and communications infrastructure for PHEP. Focussed on the technologies , applications, and services needed to support 3 primary areas:

- Primary Health Care Delivery
- Health Education
- Health Oriented Community Information Services.

c. Interview is being taped for purpose of transcribing.

d. Confidentiality of responses

e. Summary of basic questions to be covered

PHEP
Community
Barriers and successes.
Consultations (physicians only)

General

1. What is your title? _____

2. What has been your involvement with TEACH/RCST facilities?

3.a. TEACH/RCST facilities offers various applications to deliver health information. For what applications have you/your site used the TEACH/RCST centre? (videoconferencing, Visitran (store and forward), Internet, Proshare, General Patient Exam Camera, ENT probe)

b. For what purposes? (Multidisciplinary meetings, continuing medical/health education, community meetings, patient consultations)

Community Needs

4. **One of the objectives of the TEACH/RCST project is to provide information and communication infrastructure for the PHEP. Has the TEACH/RCST program been effective in supporting the PHEP 's activities?**

   YES NO

   Please explain:

5. **Has the TEACH/RCST facility been an effective way to reach the PHEP goals?**

   YES NO

   Please explain:

6. **Has the TEACH/RCST facility adapted to meeting the needs of the community(s)?**

   YES NO

   Please explain:

7. **Has the TEACH/RCST facility effected the access to services in the communities?**

   YES NO

   Please explain:

8. **Has the TEACH/RCST facility affected the <u>quality of care</u> for people in your community?**

   YES NO

   If yes, please explain?

9. **We know that the TEACH/RCST facility has integrated with other services in the community. How has this happened in your community?**

<u>Cost effective</u>

10. **Do you believe the TEACH/RCST model is a cost effective way to support activities at the community level?**

YES NO

Please explain:

Success and Challenges

11. What are the challenges faced with regards to using TEACH/RCST platform in your community?

12. What do you feel are some barriers to success for continuing a model like the TEACH/RCST?

13. What do you feel have been positive results with the TEACH/RCST project?

14. Realistically, how do you see this facility/equipment being used in the future?

15. Do you have any thoughts on how the system could be improved?

Interview Guide
Health Professionals Involved in Patient Consultations

1. **Opening:**
- ✓ **Introduce self**
- ✓ **Purpose of interview**
- ✓ **Answers will be confidential.**
- ✓ **Taping the session however, only used for transcribing and will be destroyed after.**

2. **Approximately, how many patient consultations have you conducted using the videoconferencing equipment?** _____-

3. **During any of these consultations did you experience any problems related to the equipment?**

YES **NO**

IF yes, please explain:

4. **From you experience using this system do you feel this is an effective method for conducting patient consultations?**

YES **NO**

Please explain:

5. **Do you believe patient care is affected by using the videoconferencing system instead of a face-to-face consultation?**

YES **NO**

If yes, please explain.

6. **What are the advantages of using the facilities for patient consultations?**

7. **What are some disadvantages of using the facilities for patient consultations?**

8. **Do you have any ethical concerns when using this technology for patient consultations?**

   YES NO

   If yes, what are they?

9. **Does this facility meets the needs of the your community?**

   YES NO

   Please explain:

10. **In your opinion, do you think other physicians will use this system for patient consultations?**

    YES NO

    If no, why?

11. **Do you see reimbursement issues being a barrier?**

    YES NO

    IF yes, how can this be resolved?

12. **Do you have any recommendations for improving this system?**

Remote Community Services Telecentre (RCST)
Technical Support: Key Informant Questionnaire

The RCST Evaluation Committee is conducting a study on the effectiveness of the telehealth component of the RCST project. Results from this survey will help determine measures that can be taken to further improve the telehealth projects available to health professionals and the general public.

Your help is essential. We are contacting all individuals who are involved in the delivery of telehealth applications to participate in this survey. Your experiences and thoughts on the subject are very important.

Enclosed is a copy of the questionnaire that includes questions about:

- your satisfaction with telehealth applications
- the amount and quality of training you have received
- information on telehealth applications at your site

Please take the time to complete the questionnaire and return it in the enclosed self-addressed envelope. Do not put your name or return address on this envelope. It would be helpful to have your completed questionnaire returned as soon as possible. **Your responses are strictly confidential.** No individual information from this survey will be shown to your employer.

If you have any questions or concerns, please feel free to contact me at 758-8311. A copy of the final report, on this evaluation, is available to you on request at the above number.

Thank you very much for your help.

_____

Sandra Goobie RN., BSc.
Research Assistant II

Technical Support: Key Informant Questionnaire

*For the purpose of this survey, **telehealth** refers to the use of telecommunications, including satellite technology, to provide health services at a distance.*

1. **What is your title? (optional)** _____

2. **How long have you been involved with telehealth projects? (months/years)** _____

3. **Apart from this project, have you had any previous experience with distance telecommunications?**
   Yes ☐ **No** ☐
   If yes, specify:
   _____
   _____
   _____

TRAINING

4. **Did you attend any telemedicine training session? Yes** ☐ **No** ☐
   If no, why not?
   _____
   _____
   _____

   If yes, how would you rate the telemedicine training you received?
   Poor ☐ **Fair** ☐ **Good** ☐ **Very Good** ☐ **Excellent** ☐

5. **Do you feel you have received sufficient training to work with telemedicine?**
   Yes ☐ **No** ☐ **N/A** ☐

6. **Do you feel you could use more training?**
   Yes ☐ **No** ☐ **Don't know** ☐ **N/A** ☐
   If yes, given your experience to date, what training would be beneficial?
   _____
   _____
   _____
   _____
   _____

General Telehealth

7a. **At your site, what telehealth applications have been used? (Please choose all that apply).**
   ☐ **Videoconferencing** ☐ **Internet**
   ☐ **Visitran (store and forward)** ☐ **Teleradiology**
   ☐ **General Patient Exam Camera** ☐ **Other** _____

7b. **Do you find these applications user friendly?**
   Yes ☐ **No** ☐ **N/A** ☐
   If no please comment:

8. **What percentage of your time is spent on telehealth applications?**

☐ 75% ☐ 60%
☐ 50% ☐ 30%
☐ 20% ☐ less than 10%

9. **What are some of the challenges you face on a day-to-day basis related to telehealth applications?**

10. **Are you aware of any protocols/guidelines established at your site related to telehealth communications?**

Yes ☐ **No** ☐ **Don't Know** ☐

If no, do you feel there is a need to develop protocols/guidelines?

Yes ☐ **No** ☐

Please explain:

11. **What do you like <u>most</u> about the telehealth system?**

12. **What do you like <u>least</u> about the telehealth system?**

13. **Can you see a demand for telehealth services in your community in the future?**

Yes ☐ **No** ☐ **Don't Know** ☐ **N/A** ☐

If yes, how?

14. **Do you get acceptable support from your institution?**
Yes ☐ **No** ☐ **Not applicable** ☐
Please explain:

15. **Do you get acceptable support from the St. John's site?**
Yes ☐ **No** ☐ **Not applicable** ☐
Please explain:

16. **What would you recommend to improve the telehealth system?**

17. **Other comments/suggestions:**