Information and Communication Technologies
and Continuing Health Professional Education in Canada

A Survey of Providers Final Report

March 2003

Acknowledgments

Table of Contents

List of Tables and Figures

Executive Summary

One of the distinguishing characteristics of a profession is the commitment by its members to lifelong learning. In order to provide high-quality health care services, health professionals require access to effective ongoing professional development and continuing education programs. With the rapid advances which are occurring in the health sciences, it is becoming increasingly challenging for health care professionals to stay abreast of the latest health research information. Knowledge in the health sciences is constantly expanding as new information is published, disseminated, and quickly updated or revised. In this context, the health care practitioner is placed in the unenviable position of having to provide the best health care to the public while trying to use and apply a rapidly changing body of knowledge.

The provision of an equitable and sustainable level of health care in rural communities is challenged because of problems in recruiting and retaining rural health care providers. Rural health care delivery is a demanding and challenging form of practice regardless of the profession. As an example, the rural physician or nurse practitioner frequently practices in an isolated environment with inadequate resources and limited or distant specialist back-up resources. This isolation necessitates a level of clinical competence beyond that of their urban health care peers. It has been reported that rural health care providers perceive their opportunities for participation in traditional continuing health professional education as inadequate. The sense of professional isolation which results from a lack of continuing education opportunities also influences feelings of job dissatisfaction with rural practice.

In Canada, the trend appears to be towards greater use of information and communication technologies (ICTs) in the health care system and in the continuing education of health professionals. ICTs have an important role to play in addressing recruitment and retention challenges, facilitating the maintenance of competencies among rural health care providers, and enhancing the quality of care provided to rural and remote communities. The objectives

of the study described in this report were twofold. First, we were interested in identifying the extent and level of ICT usage among Canadian continuing health professional education (CHPE) providers. Second, we were also interested in assessing the type of ICT-related training and educational programming which is being provided by Canadian CHPE providers. A greater understanding of efforts to educate health professionals in the integration and usage of ICTs in health care practices and how Canadian CHPE providers are utilizing ICTs to deliver continuing professional education will contribute to effective decision and policy-making that impacts the health and health care of all Canadians.

A national questionnaire-survey of Canadian CHPE providers was conducted to meet the project goals. The survey was designed by the research team and validated by an advisory committee. The questionnaire-survey items were developed from a review of relevant and available literature. The survey was designed to collect information concerning: the technologies being used to deliver distance education programs; factors which influence decisions to offer technology-based distance education; source(s) of support and available resources for technology-based distance education programs; and the type(s) of CHPE programs being offered in the areas of ICT-related training and education.

A total of N = 3,044 surveys were distributed between September and December 2002. The target CHPE provider audience included schools of medicine (N = 16), nursing (N = 135), and pharmacy (N = 9). It also included national/provincial health professional associations and non-profit health advocacy organizations (N =101), the pharmaceutical industry (N = 56), and hospital/health care authority organizations (N = 2,727). Six hundred and seventy-seven (N = 677) surveys were returned. School of Medicine and School of Pharmacy organizational respondents provided the highest response rates, 62.5% and 55.6% respectively. Fifty-eight (N = 58) of 135 School of Nursing questionnaire-surveys were returned for a response rate of 43%. Forty-seven (N = 47) of 101 surveys were completed by national/provincial health professional associations for a response rate of 46.5%. The response rates for the pharmaceutical industry and the hospital/health care management board organizational categories were less than expected. Only 15 of 56 pharmaceutical industry organizational respondents completed and returned surveys; a response rate of 26.8%. The lowest response rate (19.9%) was received from hospital/health care management board organizational respondents.

The main findings of the survey include:

- Canadian schools of medicine and nursing are responsible for a significant amount of the technology-based distance education programs which are offered as CHPE to health professionals.

- Canadian schools of medicine and nursing report the highest level of experience in technology-based distance education programs which are offered as CHPE to health professionals.

- Existing educational technology resources and expertise (human, technical and infrastructure) within an organization are important factors influencing the likelihood of a CHPE organizational unit being a provider of technology-based distance education programs.

- Factors related to 'financial gain' do not influence an academic CHPE organizational unit's decision to provide technology-based distance education. Academic CHPE providers are more likely to provide technology-based distance education as a means for addressing needs of rural/remote health professionals; to increase opportunities for flexible CHPE access; and to fulfill an organization's mission.

- Hospital/health care management boards favor technology-based distance education as a more 'cost-effective' means for addressing mandatory CHPE needs of health professionals.

- Schools of medicine report a high level of dependency on 'industry' funding as a means of support for technology-based distance education program development and delivery.

- Partnering, whether that be with other organizations and institutions or other internal departments, appears to be a significant characteristic of technology-based distance education program development and delivery by Canadian CHPE providers.

- Schools of medicine reported a lower level of importance on forming partnerships with other internal departments in the parent institution when compared to other academic organizations.

- Partnerships with provincial and federal government organizations and community-

based agencies were not identified as significant partnership types.

- Internet-based technologies (e.g. E-mail and the World Wide Web) and videoconferencing are the most common educational technologies used by CHPE providers in technology-based distance education programming.

- Technology-based Canadian CHPE providers are mostly targeting 'regional' and 'provincial' audiences; not international.

- Participants in technology-based CHPE programs are varied and include experienced health professionals.

- School of medicine and hospital/health care management board respondents are addressing the needs of a predominantly rural practitioner audience. Schools of nursing are addressing the needs of both urban and rural practitioners through their technology-based CHPE programs.

- The most common ICT-related CHPE topics being provided to Canadian health professionals include: using computers; e-mail applications; using the Internet; presentation software; and hospital computer systems.

- Providers of technology-based CHPE distance education programs are more likely to report a positive perception of: supportive organizational factors; technological infrastructure, access to equipment and Internet services; and level of computer experience, enthusiasm and commitment among their distance education programming target audience.

The main recommendations which stem from the study findings include:

1. ICTs play a significant role in the delivery of CHPE programming which addresses the mandatory continuing professional education and lifelong learning needs of rural, remote and northern health professionals. These technologies are essential in facilitating effective distance education programming which maintains the competencies of these practitioners and reduces the level of professional isolation they experience. Access to and use of ICTs in CHPE delivery are vital components of any effective strategy to enhance retention and recruitment of rural health care providers.

2. Academic institutions are responsible for providing the majority of CHPE programming via technology-based distance education. Academic institutions view this programming as an important part of their mission and commitment to addressing and supporting the lifelong learning needs of health professionals, particularly those practicing in rural and remote regions of Canada.

3. The Internet and videoconferencing are the main educational technologies which are being used by Canadian CHPE providers in the delivery of technology-based continuing professional education.

4. Organizational support is a critical factor in the development and expansion of resources for the successful and sustainable delivery of technology-based distance education to rural and remote health professionals.

5. The use of ICTs in the delivery of CHPE places unique and special demands on instructors and subject matter experts (SMEs) who are unfamiliar with these technologies in training and educational delivery. Faculty and instructional development support are key services to assist instructors and trainers in the effective use of ICTs in continuing professional education.

6. Health professionals require a fundamental understanding of ICTs so they are able to utilize these technologies in pursuing lifelong and continuing professional education opportunities. Appropriate stakeholders need to ensure that optimal efforts are made to provide CHPE opportunities so health care practitioners are able to develop the skills needed for optimal use of ICT systems.

7. Technology-based CHPE development and delivery costs are generally higher than those associated with face-to-face CHPE delivery. Many organizations undertake these programs as a means for addressing the mission of their institution or for addressing the mandatory CHPE requirements of rural, remote and northern health professionals. External funding to support such initiatives is essential to offset those costs which are normally not covered in institutional operating budgets.

8. Partnerships involve the combining of expertise and resources. Partnerships are essential in the development and delivery of technology-based CHPE. Partnering

enables the avoidance of duplication and allows organizations to share limited resources, equipment and infrastructure. CHPE providers need to partner with other organizations and communities in the development and delivery of technology-based CHPE programs to ensure program sustainability and acceptance. Municipal, provincial and federal levels of government have a role to play in encouraging, facilitating and supporting such partnerships.

9. Governments have an important role to play in stimulating efforts in the development and delivery of technology-based CHPE. Apart from funding to support the development and delivery of technology-based CHPE and appropriate technological infrastructure networks, there is a role for government to play in facilitating partnerships between institutions and organizations.

Sommaire

Une des caractéristiques distinctives d'une profession est l'engagement de ses membres envers l'apprentissage à vie. Pour être en mesure d'offrir des services de santé de grande qualité, les professionnels de la santé doivent pouvoir accéder à des programmes soutenus et efficaces de perfectionnement professionnel et de formation continue. Face aux développements rapides dans le domaine des sciences de la santé, il devient de plus en plus difficile pour les professionnels de la santé de se tenir à la fine pointe de l'information en matière de recherche sur la santé. Les connaissances dans le domaine des sciences de la santé prennent sans cesse de l'ampleur à mesure que les nouveaux renseignements sont publiés, diffusés, puis rapidement mis à jour ou révisés. Dans ce contexte, le prestateur de soins de santé est mis dans la position peu enviable d'avoir à offrir les meilleurs soins de santé au public tout en essayant d'utiliser et de mettre en application un ensemble de connaissances qui évolue rapidement.

La prestation d'un degré équitable et soutenable de soins de santé dans les communautés rurales est chose difficile à cause des problèmes de recrutement et de maintien de prestateurs ruraux de soins de santé. La prestation de soins de santé en milieu rural est une forme de pratique à la fois exigeante et pleine de défis, peu importe la profession. Par exemple, le médecin rural ou l'infirmière praticienne rurale exerce souvent dans un milieu isolé et dépourvu de ressources adéquates, disposant de ressources spécialisées d'appoint limitées ou éloignées. Cet isolement nécessite un degré de compétence clinique dépassant celui de leurs pairs urbains dans les mêmes domaines. Il a été signalé que les prestateurs ruraux de soins de santé perçoivent leurs possibilités de participer à une formation continue traditionnelle comme étant inadéquates. Le sentiment d'isolement professionnel résultant du manque de possibilités de formation continue influence également les sentiments d'insatisfaction professionnelle à l'égard de la pratique rurale.

Au Canada, la tendance semble pencher vers une utilisation plus répandue de technologies de l'information et des communications (TIC) dans le système de soins de santé et pour la formation continue des professionnels de la santé. Les TIC jouent un rôle important vis-à-vis des défis du recrutement et du maintien de l'effectif, de la facilitation du maintien des compétences chez les prestateurs ruraux de soins de santé, et de l'amélioration de la qualité des soins offerts dans les collectivités rurales et éloignées. Les objectifs de l'étude décrite dans le présent rapport étaient doubles. D'abord, nous voulions identifier l'étendue et le degré d'utilisation des TIC chez les fournisseurs canadiens de FCPS. Ensuite, nous voulions

également évaluer les types de programmes d'apprentissage et de formation axés sur les TIC offerts actuellement par les fournisseurs canadiens de FCPS. Une meilleure compréhension des efforts déployés pour éduquer les professionnels de la santé à l'égard de l'intégration et de l'utilisation des TIC dans les pratiques de soins de santé et des méthodes employées à cet égard par les fournisseurs canadiens de FCPS pour dispenser la formation professionnelle continue contribuera à des prises de décisions et à l'adoption de politiques efficientes qui auront des incidences sur la santé et les soins de santé de tous les Canadiens.

Un sondage par questionnaire national a été mené auprès de fournisseurs canadiens de FCPS afin de réaliser les objectifs du projet. Le sondage a été élaboré par l'équipe de recherche et a été validé par un comité consultatif. Les questions du sondage ont été fondées sur l'examen de la littérature pertinente disponible. Le sondage a été conçu en vue de recueillir de l'information relativement: aux technologies employées pour offrir les programmes de formation à distance; aux facteurs qui influencent les décisions d'offrir une formation à distance technicisée; aux sources d'appui et aux ressources disponibles aux programmes technicisés de formation à distance; et aux types de programmes de FCPS offerts dans les domaines d'apprentissage et de formation fondés sur les TIC.

Un total de N = 3044 questionnaires ont été distribués de septembre à décembre 2002. Les fournisseurs de FCPS ciblés comprenaient des écoles de médecine (N = 16), de sciences infirmières (N = 135) et de pharmacie (N = 9). On s'est également adressé à des répondants d'associations nationales ou provinciales de professionnels de la santé et d'organisations de défense sans but lucratif en matière de santé (N =101), de l'industrie pharmaceutique (N = 56) et d'organisations hospitalières ou de soins de santé (N = 2727). Six cent soixante dix-sept (N = 677) questionnaires ont été retournés. Les répondants d'écoles de médecine et de pharmacie ont donné le taux de réponse le plus élevé, soit de 62.5% et 55.6% respectivement. Cinquante-huit (N = 58) des 135 questionnaires distribués aux écoles de sciences infirmières ont été retournés, donnant un taux de réponse de 43.0%. Quarante-sept (N = 47) des 101 questionnaires distribués aux associations nationales ou provinciales de professionnels de la santé ont été retournés, pour un taux de réponse de 46.5%. Les taux de réponse pour l'industrie pharmaceutique et des organisations hospitalières ou de soins de santé étaient inférieurs aux prévisions. Seulement 15 des 56 répondants de l'industrie pharmaceutique ont rempli et retourné leurs questionnaires, donnant un taux de réponse de 26.8%. Le plus faible taux de réponse (19.9%) a été affiché par les répondants d'organisations hospitalières ou de soins de santé.

Voici quelques-unes des principales conclusions du sondage:

- Les écoles canadiennes de médecine et de sciences infirmières se chargent d'un nombre considérable de programmes technicisés de formation à distance offerts sous forme de FCPS aux professionnels de la santé.

- Les écoles canadiennes de médecine et de sciences infirmières affichent le degré d'expérience le plus élevé en matière de programmes technicisés de formation à distance offerts sous forme de FCPS aux professionnels de la santé.

- Les ressources et expertises existantes (humaines, techniques et infrastructure) en matière de technologie éducative au sein d'une organisation sont des facteurs importants qui influencent la probabilité qu'une unité organisationnelle chargée de la FCPS devienne un fournisseur de programmes technicisés de formation à distance.

- Les facteurs associés au profit financier n'influencent pas la décision d'une unité organisationnelle universitaire chargée de la FCPS d'offrir une formation à distance technicisée. Il est plus probable que les fournisseurs universitaires de FCPS offriront une formation technicisée à distance afin de répondre aux besoins de professionnels de la santé en régions rurales ou éloignées; afin d'accroître et d'assouplir les possibilités d'accès à la FCPS; et afin de réaliser la mission d'une organisation.

- Les conseils de gestion d'organisations hospitalières ou de soins de santé préfèrent la formation technicisée à distance comme moyen plus rentable de répondre aux besoins obligatoires des professionnels de la santé en matière de FCPS.

- Les écoles de médecine signalent une grande dépendance envers le financement par l'industrie pour appuyer l'élaboration et la prestation de programmes de formation technicisée à distance.

- Les partenariat, que ce soit avec d'autres organisations ou institutions ou d'autres services internes, semble caractériser beaucoup l'élaboration et la prestation de programmes de formation technicisée à distance par les fournisseurs canadiens de FCPS.

- Les écoles de médecine ont indiqué qu'elles accordent une moindre importance à la formation de partenariats avec d'autres services internes au sein du même

établissement contrairement à d'autres organisations universitaires.

- Les partenariats avec des organismes gouvernementaux provinciaux ou fédéraux ou les organismes communautaires ne figuraient pas parmi les types de partenariats importants.

- Les technologies axées sur Internet (p. ex. le courriel et le Web) et la vidéoconférence sont les technologies éducatives les plus couramment employées par les fournisseurs de FCPS pour

  leurs programmes de formation technicisée à distance.

- Les fournisseurs canadiens de FCPS technicisée ciblent surtout les publics régionaux et provinciaux, non pas les marchés internationaux.

- Les participants aux programmes technicisés de FCPS sont divers et comprennent des professionnels de la santé d'expérience.

- Les répondants de conseils de gestion d'écoles de médecine ou d'hôpitaux ou d'établissements de soins de santé cherchent à répondre aux besoins d'un public composé en grande partie de praticiens ruraux. Les écoles de sciences infirmières répondent aux besoins à la fois des praticiens urbains et ruraux par leurs programmes de FCPS technicisée.

- Parmi les sujets de FCPS associés aux TIC le plus souvent offerts aux professionnels canadiens de la santé, notons: l'utilisation de l'ordinateur; les logiciels de courrier électronique; l'utilisation d'Internet; les logiciels de présentation; et les systèmes informatiques en milieu hospitalier.

- Les fournisseurs de programmes FCPS technicisés de formation à distance signaleront plus probablement une perception positive: de facteurs organisationnels positifs; de l'infrastructure technologique, de l'accès à l'équipement et des services Internet; et du degré d'expérience informatique, d'enthousiasme et d'engagement chez le public ciblé par leurs programmes de formation à distance.

Parmi les principales recommandations émanant des conclusions de l'étude, notons :

1. Les technologies de l'information et des communications (TIC) jouent un rôle significatif dans la prestation de programmes de formation continue pour les professionnels de la santé (FCPS) qui répondent aux besoins fondamentaux en formation professionnelle continue et an apprentissage à vie des professionnels de la santé exerçant dans les régions rurales, éloignées et septentrionales. Ces technologies sont essentielles à la facilitation de programmes efficaces de formation à distance visant à maintenir les compétences de ces praticiens et à réduire le degré isolement professionnel qu'ils ressentent. L'accès aux TIC et leur utilisation dans la prestation de FCPS sont des composantes vitales de toute stratégie efficace visant à accroître le maintien et le recrutement de prestateurs ruraux de soins de santé.

2. Les établissements universitaires sont chargés de fournir la plupart des programmes de

    formation continue pour les professionnels de la santé (FCPS) par le biais d'une formation à distance technicisée. Les établissements universitaires considèrent que ces programmes constituent une importante partie de leur mission et de leur engagement à répondre aux besoins en matière d'apprentissage à vie des professionnels de la santé et à les appuyer, et particulièrement ceux exerçant dans les régions rurales et éloignées du Canada.

3. Internet et la vidéoconférence sont les principales technologies éducatives utilisées par les fournisseurs canadiens de formation continue pour les professionnels de la santé (FCPS) dans la prestation de la formation professionnelle continue technicisée.

4. L'appui organisationnel est un facteur fondamental au développement et à l'expansion des ressources nécessaires à la prestation réussie et soutenue de la formation à distance technicisée aux professionnels de la santé des régions rurales et éloignées.

5. L'utilisation des technologies de l'information et des communications (TIC) dans la prestation de formation continue pour les professionnels de la santé (FCPS) impose des fardeaux à la fois uniques et particuliers aux instructeurs et aux experts en la matière (EM) qui ne sont pas familiers avec ces technologies dans la prestation de programmes d'apprentissage et de formation. L'appui du corps professoral et du développement pédagogique est un service clé pour aider les instructeurs et formateurs à utiliser efficacement les TIC en formation professionnelle continue.

6.   Les professionnels de la santé nécessitent une compréhension fondamentale des technologies de l'information et des communications (TIC) afin d'être en mesure d'utiliser ces technologies pour tirer profit des possibilités d'apprentissage à vie et de formation professionnelle continue. Les intervenants appropriés doivent veiller à ce que tous les efforts possibles soient déployés afin d'offrir des possibilités de formation continue pour les professionnels de la santé (FCPS) de sorte que les praticiens des soins de santé soient en mesure d'acquérir les compétences voulues pour tirer pleinement avantage des TIC.

7.   Les coûts d'élaboration et de prestation des programmes technicisés de formation continue pour les professionnels de la santé (FCPS) sont généralement plus élevés que ceux associés à une prestation FCPS face à face. Plusieurs organisations entreprennent ces programmes afin de réaliser leur propre mission ou de répondre aux besoins fondamentaux en matière de FCPS des professionnels de la santé exerçant en régions rurales, éloignées ou septentrionales. Il est essentiel d'avoir recours à un financement externe pour appuyer de telles initiatives afin de

        défrayer les coûts qui ne sont normalement pas couverts par les budgets d'exploitation des établissements.

8.   Les partenariats ont pour effet de combiner expertise et ressources. Ces partenariats sont essentiels à l'élaboration et à la prestation de programmes technicisés de formation continue pour les professionnels de la santé (FCPS). Le partenariat permet d'éviter les dédoublements d'efforts et permet aux organisations de partager des ressources, équipements et infrastructures limités. Les fournisseurs de FCPS doivent établir des partenariats avec d'autres organisations et communautés pour l'élaboration et la prestation de programmes technicisés de FCPS afin d'assurer la viabilité et l'acceptation de ces programmes. Pour leur part, les paliers municipal, provincial et fédéral de gouvernement ont un rôle à jouer pour encourager, faciliter et appuyer de tels partenariats.

9.   Les gouvernements ont un rôle important à jouer pour stimuler les efforts d'élaboration et de prestation de programmes technicisés de formation continue pour les professionnels de la santé (FCPS). Outre l'appui financier à l'élaboration et à la prestation de programmes FCPS technicisés et à l'établissement de réseaux d'infrastructure technologique appropriés, les gouvernements peuvent également faciliter les partenariats entre institutions et organisations.

Introduction

The provision of an equitable and sustainable level of health care in rural communities has been a challenge to the Canadian health care system for some time (Tepper & Rourke, 1999; Rourke, 1997; Hutten-Czapski, 1998). Rural communities have suffered from a shortage of primary care physicians and other health care providers for many years and have felt the chronic shortage longer and more severely than urban areas (Ramsey, Coombs, Hunt, Marshall & Wenrich, 2001). There are many obstacles with regard to recruiting and sustaining an adequate supply of rural health care providers. Common deterrents are usually related to a lack of time for family and leisure, lack of work and educational opportunities for family members, professional isolation, lack of professional development opportunities, low salaries, poor locum support, underfunded hospital services, and over-scheduling (Rourke, 1993; Rourke, 1994). Each rural setting has its own special challenges. In the smallest, most remote communities, help is a long time and distance away. This places immense strain on limited local resources and on the health care provider, particularly when emergencies occur.

Rural health care delivery is a demanding and challenging form of practice regardless of the profession. As an example, the rural physician or nurse practitioner frequently practices in an isolated environment with inadequate resources and limited or distant specialist back-up resources. This isolation necessitates a level of clinical competence beyond that of their urban health care peers. The rural physician, in particular, is often expected to perform a generalist role in every aspect of clinical practice. Because of this, she must develop and maintain a special base of knowledge and technical skill in a variety of clinical areas, particularly in those related to rural medicine - emergency medicine, obstetrics and anesthesia (Rourke, 1988; Woolf, 1991; Kamien & Buttfield, 1990; Gill & Game, 1994).

13

Several studies have confirmed the existence of unique continuing medical education needs among rural physicians (Rourke, 1988; Woolf, 1991; Kamien & Buttfield, 1990; Gill & Game, 1994). Some studies have also found significant differences between the continuing medical education needs of rural and urban medical practitioners (Lott, 1995; Rosenthal & Miller, 1982; Woolf, 1991). A number of authors have suggested that rural physicians perceive their opportunities for participation in traditional continuing medical education as inadequate (Lott, 1995; Gill & Game, 1994; Rosenthal & Miller, 1982; Woolf, 1991). As well, Bhatara et al. (1996) have suggested that rural physicians' sense of professional isolation, because of a lack of continuing education opportunities, influences feelings of job dissatisfaction with rural practice.

Nurses in rural communities encounter several barriers to participation in professional development and continuing nursing education programs. Some of these barriers include being far removed from library resources and the long travel distances to meetings of their professional associations. According to Treloar (1985) for many nurses it is very difficult and costly to travel to high quality continuing education programs. This is particularly true in areas where travel may be seasonally restricted due to climatic conditions or where educational resources are sparse or poorly distributed. Rural nurses often find it difficult to travel to distant sites to attend continuing education offerings because staffing and financial constraints restrict the number of nurses that health care agencies can send to outside courses (Clark & Cleveland, 1984).

Pharmacists practising in rural areas also find that access to continuing education opportunities are few and far between. DeMuth (1996) has reported that the major barriers for pharmacists' participation in continuing professional education were related to time constraints, job constraints (such as lack of relief staff), the scheduling and location of group learning, and family commitments. One of the greatest barriers for rural pharmacists was the centralized location of most face-to-face continuing education programs. This was a major problem for practising pharmacists because it required them to travel long distances from their community in order to participate.

Continuing Health Professional Education (CHPE) & Information and Communication Technologies (ICTs)

One of the distinguishing characteristics of a profession is the commitment by its members to the promotion of continued study and lifelong learning (Buchholz, 1979). This commitment

14

is vital to the health professional because with the constant acceleration of change in health sciences information, no amount of formal education, no matter how complete or excellent, can totally prepare him for a lifetime of learning (Herman & Buerki, 1977). Health professionals, regardless of their practice location, require access to effective professional development and continuing education programs.

With the rapid advances which are occurring in the health sciences, it is becoming increasingly challenging for health care professionals to stay abreast of the latest health research information (Whitten, Ford, Davis, Speicher, & Collins, 1998). Knowledge in the health sciences is constantly expanding as new information is published, disseminated, and quickly updated or revised. In this context, the health care practitioner is placed in the unenviable position of having to provide the best health care to the public while trying to use and apply a rapidly changing body of knowledge (Lorenzi, Kues, & Anthony, 1984). For the rural health care provider, gaining access to this timely information is an even greater challenge because of isolation and distance from the larger tertiary

care and teaching hospitals where this information exists.

ICTs have been used for supporting the delivery of educational and clinical support to health and medical professionals (Walker et al., 1998). Historically, audio teleconferencing, videoconferencing, slow scan imaging, and videotape programs have been used to deliver continuing health professional education at a distance (Black & Dunikowski, 1985; Dunn et al., 1980; Lindsay et al., 1987; McDowell et al., 1987; Oeffinger et al., 1992; Moore & Hartman, 1992). In recent years, Internet-based technologies have been adopted as a means for delivering information that can be linked to patient care issues in a timely and interactive fashion (Peterson et al., 1999). The use of ICTs in this manner, to bridge the distance of geography and professional isolation, is referred to as 'distance education.'

Distance education occurs when an instructor and adult learner(s) are separated by geography and time, and instruction is mediated through either print, information and/or communication technologies. Distance education delivery modes are distinguished according to the technologies and medium used to carry the learning materials and/or facilitate the two-way communication between participants and instructors. The four main categories of distance learning technologies are audio, video, computer (data), and print. Dating back to the late 1800s and early 1900s, correspondence study appears as the first format which was used for providing educational programming to adult learners residing and studying at a distance from an educational institution or an instructor. Beginning in the 1920s, the means of

communication slowly shifted from the medium of print to the mass media of radio. The 1940s and 50s saw another shift in distance education to educational television, and the resulting 'one-to-many' patterns of communication offered by the broadcast technologies.

The next technological breakthrough was around 1970 with the advent of two-way audio systems. Interaction between instructor and the adult learner was now possible. Then, satellite courses, implemented in educational settings during the mid 1970s, using one-way video and two-way audio, allowed for interaction at a verbal level and to some extent at the visual level. In the mid 1980s, the advent of two-way audio and video systems, also known as two-way interactive video systems, revolutionized distance learning and allowed instructors and learners at distant sites to communicate with one another at both a visual and verbal level.

In the 1990s the landscape of the distance education field was transformed yet again. Significant advances in ICTs have enabled the rapid movement of information to almost anywhere in the world. Computer capacities and speeds have advanced to levels previously unimaginable, and present day

innovations in multimedia and data compression capabilities are enabling the integration of voice, data, and images over computer networks. Delivery systems that use fiber optics or regular telephone lines are also making use of advanced telecommunication technologies (e.g., Integrated Services Digital Network) and these are revolutionizing the technologies used for delivering distance education programming.

Information and Communication Technologies (ICTs) and the Health Professions

The increased capacities of these ICTs have contributed to a movement away from traditional continuing health professional education (Moore et al., 1994). In Canada, the trend appears to be towards greater use of information and communication technologies in the health care system and in the continuing education of health professionals. ICTs are useful tools for health professionals because they can provide greater access to clinical and health information, continuing health professional education and an enormous range online resources which normally would not be available to them. The availability of these resources is believed to strengthen the communication and networking capabilities of health professionals (Miller et al., 1997; Robinson et al., 1998; Manske et al, 2000). Robinson et al. (1998) report that the advantages of using ICTs include: improved opportunities to find information which meets the specific needs of individuals; improved capabilities to combine various media to meet the learning styles of users; increased access to information and support on demand; and

the ability for widespread information dissemination.

Internet and e-mail use has been reported as high among health professionals (Kaczorowski, 2000; Pereira, 2001; Manske et al., 2000). Eighty percent (80%) of health professionals have reported using e-mail (Pereira, 2001; Manske et al., 2000). The Canadian Medical Association (CMA) indicates that in 2001, 83.6% of physicians were using the Internet and 80.6% were using e-mail (CMA, 2001). At least 67% use the Internet for MEDLINE searching and 23% of physicians (21% rural; 24% urban) use the Internet to participate in online CME courses (CMA, 2001). Yung, Foy, and MacCara (2001) surveyed all licensed pharmacists (N = 1,637) within the three Maritime provinces. The majority of respondents (56.2%) used e-mail daily. Some respondents also indicated the weekly collection of disease information (18.8%), therapeutic/treatment information (17.6%), information for patients (17%) and information on new drugs (17%).

While these data suggest that a large number of health professionals are using the Internet, they do not indicate whether the technologies are being used in an appropriate and efficient manner. According to Buckeridge and Goel (2001) the use of informatics or ICTs by Canadian health professionals, and promotion of their use by institutions, is limited. After conducting interviews with

26 leading Canadian health informatics researchers and practitioners, Buckeridge and Goel concluded that health informatics education in Canada is not being integrated into the curriculum as quickly as it is in other G-7 countries. An awareness and understanding of the benefits of using health informatics is one of the major issues challenging the development of health informatics in Canada.

Barriers to Information and Communication Technology (ICT) Adoption and Use

A number of barriers to the use and adoption of ICTs among health professionals and health institutions have been attributed to concerns about security, reliability and the confidentiality of information (Bigsby & Moehr, 1995; Robinson et al., 1998; Leeseberg Stamler et al., 1999; Lacher et al., 2000; Ferguson et al., 2000; Delaney, 2001). Ferguson et al. (2000), for example, report that general practitioners are wary of e-mail for receiving patient discharge summaries or drug information. Also reported as barriers are finding the time necessary to use, and learn how to use, these technologies, as well as the difficulty of locating relevant and useful information on the Internet (Bigsby & Moehr, 1995; Rowe et al., 1995; Lacher et al., 2000; Lawton et al., 2001). Inadequate funding has been reported as another major barrier to

the use of ICTs in the health professions (Rowe et al., 1995; Cameron, 1998; Hebert, 2000; Jerant & Lloyd, 2000). Forty nine percent (49%) of respondents in Rowe et al.'s study identified the high cost of computers as a major barrier.

Lack of access to new technologies, rather than a lack of preference for them, has also been identified as a primary barrier in discouraging their use (Mamary & Charles, 2000). Royle et al. (1997) conducted a survey of nursing administrators in hospitals in Central and North West Ontario and found that the larger the hospital the more likely that electronic databases and other information resources were available. Of the 32 respondents who worked in hospitals with less than 100 beds, 90.6% had access to a library, but only 6.2% had access to MEDLINE and 3.1% had access to CINAHL. Manske et al. (2000) also report that a higher percentage of health units serving large versus small populations have greater access to ICT resources, such as e-mail (91% vs. 69%) and the Internet (72% vs. 43%). Health units in smaller regions were less likely to have the infrastructure in place to use the technology (Manske et al., 2000).

The level of comfort, experience and skill which health professionals have with ICTs are also important factors influencing adoption and usage. Rowe et al. (1995) surveyed first-year family medicine residents from Canadian university-affiliated programs and found that only 13% reported being very or extremely comfortable with computers; while 29% reported being somewhat comfortable and 24% not at all comfortable. They also found that 30% of Canadian family medicine

residents felt they were not exposed to enough computer training during their education. Five years later, Jerant and Lloyd (2000) again identified lack of suitable training as a barrier to computer use.

Enhancing Information and Communication Technology (ICT) Adoption and Use

It is believed that the benefits of the adoption and usage of ICTs have not been realized because individuals and organizations are unable to use these resources to their full capabilities (Hebert, 2000). According to Moehr and Grant (2000) Canadian health professionals and students need a basic knowledge of the capabilities and limitations of information systems. Saranto and Leino-Kilpi (1997) report that nurses need to know how to access and use hospital/management information systems, including those which address clinical and patient care. Staggers, Gassert, and Curran (2001) have identified competencies for both the beginning and experienced nurse. Beginning nurses should possess basic

18

information management and computer technology skills, while experienced nurses should be highly skilled in these areas.

Many family physicians now identify 'improving computer skills' as a core CME area more frequently than most clinical areas (McClaran et al., 2000). Cameron (1998) has suggested that the informatics skills required by Canadian physicians should include an ability to use various word processing and presentation software, Internet and e-mail, Internet databases, and office management systems. Other medical informatic areas include: knowledge of computer-based information sources for patient care; knowledge of electronic medical records (EMR); office-based and hospital-based management systems; and an increased knowledge of computer-based continuing medical education, telecommunications and telemedicine (Lacher et al., 2000; Candy, 2000).

Like other health professionals, pharmacists do not need to become informatics specialists, but they need to understand how informatics works (Felkey & Barker, 1995). Balen, Miller, and Malyuk (2000) suggest that the informatics skills for pharmacists need to include the use of computers to collect, store, retrieve and send drug and patient related data for both administrative and clinical purposes. Pharmacists also require knowledge of personal and network computing; hospital information systems; personal digital assistants; the Internet; word processing; and presentation, statistical analysis, and database management software. However, Balen et al. (2000) believe that students are not necessarily receiving the instruction they require as pharmacy has not taken the lead in developing informatics which meets the profession's needs.

The literature identifies a number of strategies and methodologies which can be used to introduce

ICTs into health professional education. Carty and Rosenfeld (1998) have identified a number of criteria related to how nursing education programs could achieve technological excellence. Their criteria includes: providing students and faculty with adequate access to computers; making informatics courses available; and providing the necessary infrastructure (ie. technical support, computer labs, Internet and e-mail access, allocation of financial and personnel resources, etc.). Other authors discuss the development of specific programs or workshops designed to improve the ICT skills of health professionals. From 1996 to 1997 three rural Northwest Ohio hospitals, along with the state's Medical college, co-sponsored sessions which addressed the medical application of computers for rural physicians (Hartmann, 1998). Program topics included medical databases, medical CD-ROMS, the Internet and e-mail.

Allan et al. (2000) discuss a series of workshops which were held for physicians related to computer basics, introduction to computers in medicine, introduction to the Internet and computer-aided learning (CAL) and information retrieval. Through follow-up surveys they discovered that more physicians reported increased use of computers as a result of participation in the workshops (Allan et al., 2000).

Patel & Arocha (2000) describe a meeting held among a group of scholars from the fields of cognitive science, medicine, ethics, medical technologies and intelligent tutoring systems to explore issues relevant to the education of the health professions in an information age. One of the research agendas suggested for future development was information technology-related research (Patel & Arocha, 2000). According to this agenda, there were a number of important questions which needed to be examined. Who uses information technologies in health care settings and how? Are such technologies integrated into clinical practice? Are they being used successfully? According to the scholars participating in this meeting, there was a need for improved studies of how best to educate health professionals for the challenging practice environment of the future (Patel & Arocha, 2000).

In 1999, a Health Canada report entitled 'Canada Health Info*way*: Paths to Better Health' was prepared by the Advisory Council on Health Infostructure for the Office of Health and the Information Highway. According to the Council's report, health care was an information and communication-intensive activity and as a result most health care professionals needed training in how to use these new ICTs. A number of recommendations concerning the need for health professional training to adopt and apply information systems in their work were suggested:

> *Recommendation 3.2*
> Federal, provincial and territorial governments, in collaboration with associations representing health care professionals and providers, should provide funding for: (a)
>
> professional education and development opportunities for health care professionals and providers across the spectrum of health care to acquire the skills needed for optimal use of health information and communications systems.
>
> *Recommendation 3.7 (d)*
> Support training for health care professionals and providers so that they can fully exploit the potential of telehealth (Health Canada, 1999).

The report went on to suggest that governments, in collaboration with associations of health care professionals, should also fund training to help these groups acquire the necessary digital skills, as well as to participate in developing, piloting and evaluating tools to support clinical decision making.   Further, in the Council's view, it was also prudent to put in place a labour force strategy to address the impact of these changes upon health care professionals, providers and workers, and to make sure that the necessary skills and knowledge were in place.

Study Purpose

The purpose of this study was twofold. First, the project team was interested in identifying the extent and level of ICT usage among Canadian CHPE providers. Second, they were also interested in assessing the type and nature of ICT training and educational programming which is being provided by Canadian CHPE providers. CHPE was defined as continuing health professional educational courses and/or programs which are directed to a health practitioner audience. For purposes of this project, these programs may or may not be approved for continuing education credit as required by a licensure board, professional organization, or the workplace to maintain competence, retain licensure, certification, and/or employment.

A national questionnaire-survey of CHPE providers was conducted to identify the type of ICTs being used to deliver CHPE; to identify 'best practices' pertaining to the planning, development, delivery and evaluation of distance learning programs for CHPE; and to identify programs and/or services which have been established to provide CHPE on the use, adoption, integration, and application of ICTs among health professional groups. The CHPE provider audience included academic respondents (schools of Medicine, Nursing and Pharmacy), national/provincial health professional associations and non-governmental organizations, pharmaceutical industry, and hospital/health care authority organizational respondents.

In Canada, there is a trend towards greater usage of ICTs in the health care system and in the

continuing education of health professionals. Canada faces unique difficulties in delivering health care, particularly among its many rural and remote communities. Telehealth applications have been shown to be effective in enabling teleconsultations, supporting rural and remote health professionals in the provision of care, decreasing the costs of health care delivery, and providing greater access to health care services for geographically isolated populations. Some of the main barriers to the adoption, integration and usage of these applications among health professionals have included negative attitudes, lack of awareness

and understanding of the technologies and particular applications, and lack of knowledge and skills in ICT usage. ICTs have been used for many years to provide CHPE to rural and remote health professionals and as a result have addressed recruitment and retention challenges, allowed for the maintenance of competencies among rural health care providers, and enhanced the quality of care provided to rural and remote communities. A greater understanding of efforts to educate health professionals in the integration and usage of ICTs in their practices, as well as a better understanding of how Canadian CHPE providers are applying best practices in their use of ICTs to deliver continuing education, will contribute to effective decision-making and policy-making that impacts the health and health care of all Canadians.

Methodology

A questionnaire-survey was designed by the research team to collect information on the extent to which information and communication technologies (ICTs) have been adopted by continuing health professional education (CHPE) providers in Canada. Information about existing programming initiatives to enhance the knowledge, skills and attitudes of health professionals towards the adoption and use of ICT's in their professional work was also collected from the survey respondents. The survey was validated by an advisory committee comprising national experts in the field of continuing professional education and information and communication technology usage. These individuals reviewed several drafts of the questionnaire-survey and were consulted on the composition of the respondent population for the study. A draft of the questionnaire-survey was piloted with several health professional educators and these individuals were asked to critically review the survey and provide feedback on the readability and clarity of the questionnaire items. Finally, two epidemiologists reviewed formatting aspects of the survey and survey items. A final version of the survey and accompanying cover letters were submitted to the Human Investigation Committee, Faculty of Medicine, Memorial University and full ethical approval was received in August 2002.

A total of N = 3,044 surveys were distributed to a variety of CHPE providers in Canada between September and December 2002. If the names of the appropriate contacts were known, surveys were directed towards specific individuals (ie. Dean, Director, Manager) or departments (ie. CME, Professional Development, Human Resources). Six hundred and seventy-seven (N = 677) surveys were returned (the return and response rates per CHPE provider category are presented in the "Results" section). The following CHPE providers were included in the survey population:

▸ One hundred and thirty five (N = 135) School of Nursing respondents were forwarded the questionnaire-survey for completion. This organizational respondent category encompassed all accredited schools of nursing in Canada. The address list was compiled from an Internet search and the Canadian Association of Schools of Nursing (CASN) Website (http://www.causn.org). It was compared and validated against the nursing education programs listed on the Canadian Nurses Association (CNA) Website (http://www.cna-nurses.ca).

▸ Sixteen (N = 16) School of Medicine respondents, which included CME Deans, Associate Deans, or Directors, were forwarded the survey. This group included all

accredited School of Medicine respondents in Canada. The list was compiled and validated from the Association of Canadian Medical Colleges (ACMC) Website (http://www.acmc.ca).

▸ Nine (N = 9) School of Pharmacy respondents were forwarded the questionnaire-survey. This group included all accredited School of Pharmacy respondents in Canada. The address list was compiled from an Internet search and was compared and validated against the programs listed on the Canadian Pharmacists Association (CPhA) Website (http://www.cdnpharm.ca).

▸ One hundred and one (N = 101) National/Provincial Health Professional Associations were forwarded the questionnaire-survey. This organizational respondent category included national and provincial professional associations for nursing, medicine, and pharmacy practitioners and professional societies representing medical specialities. This category also included non-profit health organizations which address the diverse health issues of the Canadian population, such as the Canadian Diabetes Association and the Canadian Mental Health Association. The listing of respondents for this organizational category was compiled by an Internet search and through a mailing address list prepared by the Canadian Healthcare Association (CHA) (http://www.canadian-healthcare.org/publishing.htm).

▸ Fifty-six (N = 56) pharmaceutical industry organizational respondents (Directors) were forwarded the survey. This group was compiled from the listing of Canada's Research-Based Pharmaceutical Companies (Rx&D) on the Rx&D Website (http://www.canadapharma.org).

▸ Hospital/Health Care Management Boards comprised the final organizational category which was included in the survey respondent population. This organizational category was comprised of N = 2727 potential respondents and included hospitals, regional district health authorities and boards, retirement, nursing, and long-term care facilities, and various health centres (e.g. rehabilitation, children, mental health, etc.). If possible, surveys were directed towards each organization's CEO/Director or a specific department such as Human Resources, Communications, Information Services/Technology, or Staff Development. The address listings for this category were compiled through the Canadian Healthcare Association.

A number of methods were used in an attempt to increase the survey response rate. First, a cover letter was included with each survey which detailed the study's purpose and the deadline for submission. After the first submission deadline had passed, a second copy of the survey was mailed to non-respondents. Included with this survey was a follow-up letter and a new submission deadline. After the second deadline had passed, reminder letters (without copies of the survey) were

sent to a stratified sample of non-respondents (N = 965). The stratified sample included non-respondents from each province and territory, as well as each CHPE provider category. In most cases, there was a period of three to four weeks between respondents' receipt of the survey/reminder letter and the submission deadline. The survey was also made available for download in .pdf file format from the Office of Professional Development's website (http://www.med.mun.ca/pdmed).

The questionnaire survey items were developed from a review of relevant and available literature. A number of the survey items were adapted and modified with permission from the American Association of Colleges of Nursing (AACN) Technology Survey (AACN, 1999). The questionnaire-survey included items which were designed to collect information in the following areas:

▸ the type of organization to which respondents belonged;

▸ the organization's commitment to the provision of continuing professional education programming by technology-based distance education programming;

▸ experience in technology-based distance education delivery to health professionals;

▸ factors influencing decision to offer technology-based distance education;

▸ source(s) of support for technology-based distance education program delivery and access to internal resources to support distance education program development and delivery;

▸ type(s) and nature of partnerships formed for the purpose of sharing resources for technology-based distance education program development and delivery;

▸ type(s) of technologies used in delivering distance education programs to health

professionals;

▸ type(s) of faculty development provided to support instructors and faculty in distance education program development and delivery;

▸ composition of target audience/participants in distance education programs;

▸ factors influencing likelihood of use of information and communication technologies for technology-based continuing professional education;

▸ types of continuing professional education programs offered in the areas of information and communication technologies.

The questions concerning 'factors' influencing the likelihood of ICT usage in CHPE delivery were adopted and modified from the work of Collis, Peters, and Pals (2000). According to Collis et al. (2000) telematic applications are not being used regularly as instructional tools in educational settings. In their work, Collis and colleagues developed a model for predicting an individual's likelihood of using a telematics application in teaching practices. The '4-E Model' hypothesises that the likelihood of using a telematics application in teaching practices can be expressed as the sum of four factors: 'environmental aspects' in the institution in which one works; 'educational effectiveness' or perceived educational payoff; 'ease of use' or level of difficulty in making use of the application; and 'personal engagement' or subjective personal interest in the application. According to the 4-E Model, when the sum of these factors approaches a certain threshold, usage is likely to occur, otherwise not.

Items comprising the three scales of 'organizational' and 'professional influences' and 'strengths and resources' were adopted and modified from Collis et al. (2000) 4-E Model questionnaire. Table 1 lists the items included within each of these scales. The organizational influences scale encompasses items which are intended to measure the influence of organizational factors on the likelihood of information and communication technology adoption in continuing professional education delivery. Each item (N = 7) is responded to via a five-point scale, where the most negative option is coded as having a value "1" and the most positive option is coded as having a value "5". The professional influences scale comprises items (N = 6) which are intended to measure the influence of professional factors. These include items such as: 'My peers and colleagues believe the Internet is an important tool', 'In the professional field in which I work, many people are Internet users', 'In the professional

field in which I work, most people think that technology-based distance education is important', 'Soon everyone will be using the Internet', 'Distance learning is likely to contribute to the solution of learning-related problems relevant to the professional field in which I work', 'It is my personal opinion that technology-based distance education will improve teaching and learning.' Response possibilities are: Strongly Disagree = 1, Disagree = 2, I can't say = 3, Agree = 4, Strongly Agree = 5.

Table 1   Survey Scales for Factors Influencing ICT Adoption & Usage

Organizational Influences
• The vision within my organization for technology-based distance education is..
• The support from the leaders in my organization for technology-based distance education is..
• The readiness to change among the people in my organization when it comes to the use of technology-based distance education is..
• The adequacy of my organization's technical infrastructure for technology-based distance education is..
• The day-to-day support of technology-based distance education in my organization is..
• The funding and incentives for technology-based distance education that are available in my organization are..
• The experiences in the past that my organization has had with technology-based distance education have been..
Professional Influences
• My peers and colleagues believe the Internet is an important tool.
• In the professional field in which I work, many people are Internet users.
• In the professional field in which I work, most people think that technology-based distance education is important.
• Soon everyone will be using the Internet.

• Distance learning is likely to contribute to the solution of learning-related problems relevant to the professional field in which I work.
• It is my personal opinion that technology-based distance education will improve teaching and learning.

Strengths & Resources
• A priority of my unit.
• A priority of my organization.
• Administration supportive of the idea.
• Sufficient administrative/clerical support staff.

• Specialized staff to design the courses.
• Experience in technology-based distance education.
• Adequate budget for technology-based distance education programs.
• Telecommunication costs are reasonable.
• Adequate telecommunication infrastructure (eg. bandwidth availability)
• Adequate facilities/equipment for supporting distance education development and delivery.
• Adequate faculty/subject matter expert support.
• Convenient personal Internet access among target audience.
• Convenient personal computer access among target audience.
• Adequate level of computer experience among target audience.
• Enthusiasm among target audience.
• Organizational support from employers of target audience.
• Sufficient time commitment for participation among target audience.

The range (minimum to maximum) of sum scores which respondents could have received for each scale were as follows: organizational influences, range of 7 to 35; professional influences, range of 6 to 30; strengths and resources, range of 17 to 85. According to Collis et al. (2000) each factor's sum, or vector sum as they call it, can be either positive or negative. When the positive vector is large enough so that the vector approaches a threshold level

described as a "likelihood-of-use" line, an individual is likely to use a telematics application in his/her teaching and learning (Collis et al., 2000). Therefore, using the 4-E Model as a template, an analysis of the sums of respondents' scores for the scales of organizational and professional influences, and strengths and resources were hypothesized as being indicative of when information and communication technology adoption and usage is likely to occur.

Surveys were coded and analyzed using the Statistical Package for the Social Science (SPSS 11.0 for Windows). Methods of analysis included: cross-tabulation analyses to determine and compare the responses of organizational category respondents to individual survey items; and Mann-Whitney and Kruskal-Wallis tests to analyze the differences and relationships between organizational, professional, and strengths and resources factors and the actual reported usage of information and

communication technologies by the organizational respondents.

This project report provides a large amount of survey data and information, much of which is presented in table format. To facilitate reading of the report, discussion of the findings is found in the text accompanying the tables. Discussion of the major findings and conclusions from the study follow the presentation of the results. The results of this survey provide a national overview of the use of ICTs for CHPE delivery. The results also provide a national summary of CHPE programs which are being offered by CHPE providers to develop the ICT-related knowledge, skills, and attitudes of health professionals. The results provide important information for future policy and decision-making related to the effective use of ICTs in CHPE delivery. The findings also provide a better understanding of the type and nature of CHPE programs which are being offered to enhance ICT-related skills among the health professions.

Results

Table 2 and Figure 1 present the results pertaining to the response rate for each CHPE provider category. School of Medicine and School of Pharmacy organizational respondents provided the highest response rates, 62.5% and 55.6% respectively; surveys were received from 10 of 16 schools of medicine and 5 of 9 schools of pharmacy. Fifty-eight (N=58) of 135 School of Nursing questionnaire-surveys were returned for a response rate of 43.0%. Forty-seven (N=47) of 101 surveys were completed by organizations comprising the National/Provincial Health Professional Associations category, for a response rate of 46.5%. The response rates for the Pharmaceutical Industry and the Hospital/Health Care Management Board organizational categories were less than expected. Only 15 of 56 pharmaceutical industry organizational respondents completed and returned the survey, for a response rate of 26.8%. The lowest response rate (19.9%) was received from Hospital/Health Care Management Board organizational respondents. Only 542 of 2,727 potential respondents completed and returned the survey.

Table 2   **Summary of Potential/Actual Respondents and Response Rate**

Type of Organization	# of Potential Respondents	# of Actual Respondents	Response Rate
School of Nursing	135	58	43.0%
School of Medicine	16	10	62.5%
School of Pharmacy	9	5	55.6%
National/Provincial Health Professional Association	101	47	46.5%
Pharmaceutical Industry	56	15	26.8%
Hospital/Health Care Management Board	2727	542	19.9%
TOTAL	3044	677	

Response Rate By Organization
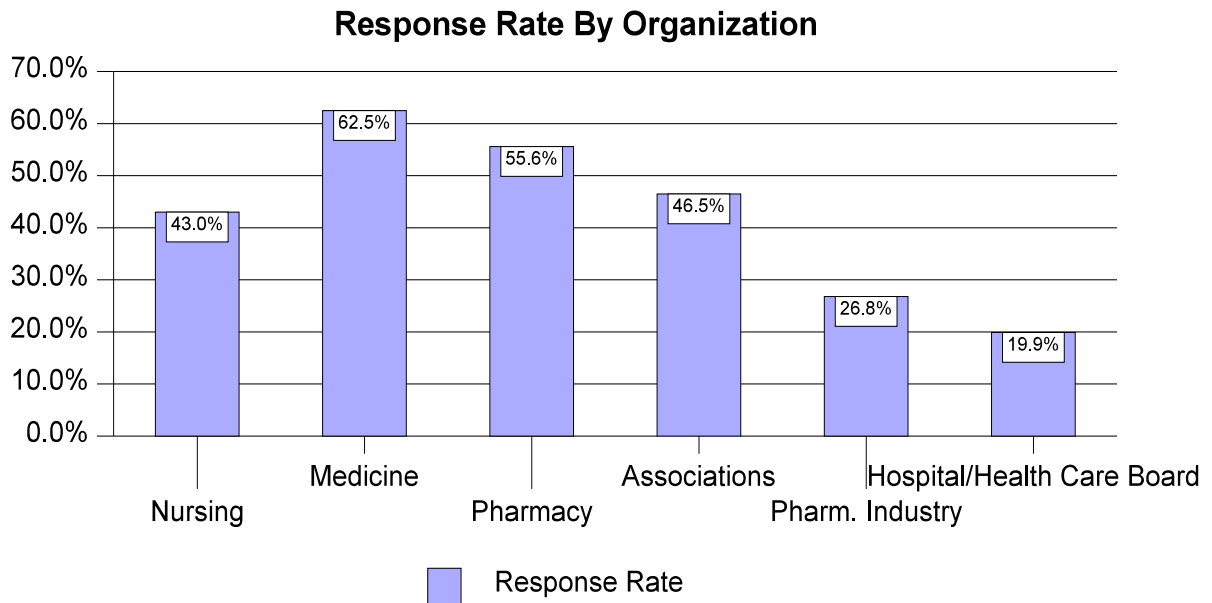
Figure 1

Table 3 presents the results pertaining to the provision of technology-based distance education programming among the survey respondents. The majority of School of Nursing (55.2%) and School of Medicine (70.0%) organizational respondents reported that they provide technology-based distance education programming to health professionals. The majority of School of Pharmacy respondents (80.0%) reported that they were not providing distance CHPE programming. As well, the majority of national/provincial health professional associations (65.2%), pharmaceutical industry respondents (73.3%), and hospital/health care management boards (78.9%) indicated that they were not providing distance CHPE programming. Overall, 74.2% of survey respondents indicated that they were not providing technology-based distance education programming to address the continuing professional education needs of health care practitioners. Figures 2 through 6 present pie charts representing the organizational respondent categories and their reports of technology-based distance education program delivery.

Table 3   **Summary of Providers of Technology-based Distance Education Programming to Health Professionals**

Type of Organization	Yes		No		
	N	%	N	%	TOTAL
School of Nursing	32	55.2%	26	44.8%	58
School of Medicine	7	70.0%	3	30.0%	10
School of Pharmacy	1	20.0%	4	80.0%	5
National/Provincial Health Professional Association	16	34.8%	30	65.2%	46
Pharmaceutical Industry	4	26.7%	11	73.3%	15
Hospital/Health Care Management Board	114	21.1%	426	78.9%	540
TOTAL	174		500		674

School of Medicine

70.0%

30.0%

☐ Yes   ■ No
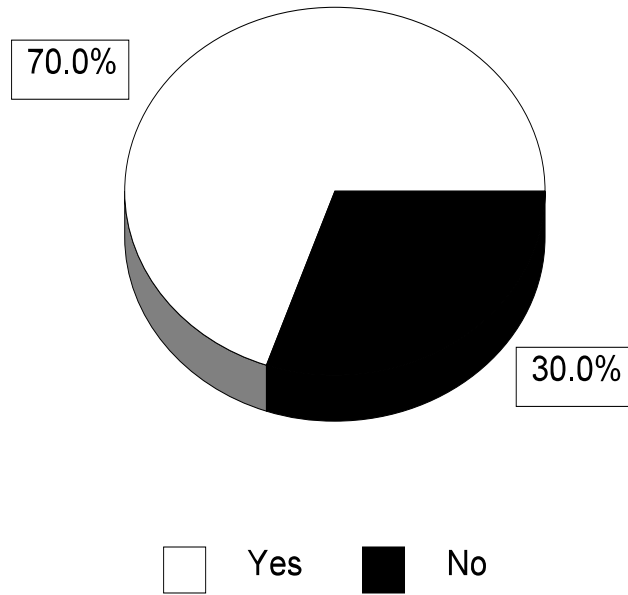
Figure 3

School of Nursing

55.2%

44.8%

☐ Yes   ■ No
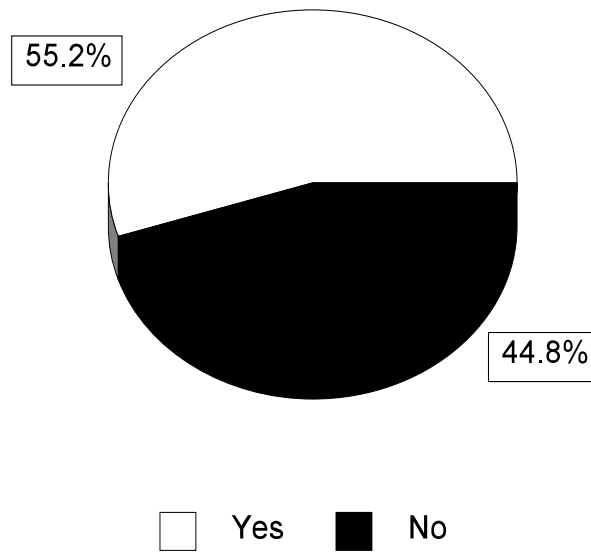
Figure 2

Pharmaceutical Industry

26.7%

73.3%

☐ Yes ■ No
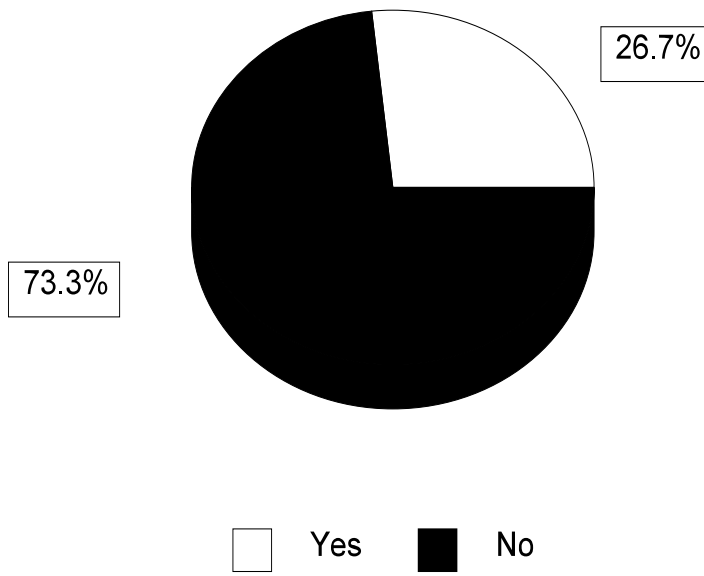
Figure 5

School of Pharmacy

20.0%

80.0%

☐ Yes ■ No
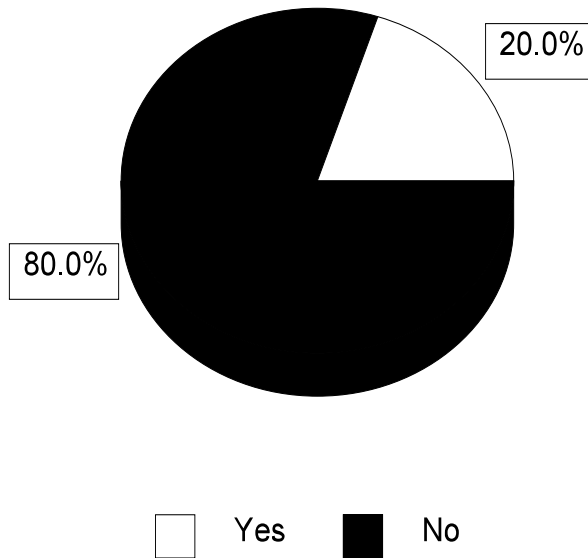
Figure 4

Table 4 provides the results pertaining to the number of years that respondents have been offering CHPE programming via technology-based distance education. These results only reflect the responses of those organizations who had indicated that they were providing technology-based distance education programming to health professionals. The results indicate that Schools of Nursing and Medicine reported the greatest level of experience in the delivery of continuing professional education programming by technology-based distance education. The majority of School of Nursing respondents (59.4%) reported that they had been offering distance education programs for six years or greater. Forty-three percent (42.9%) of School of Medicine respondents indicated that they had been offering
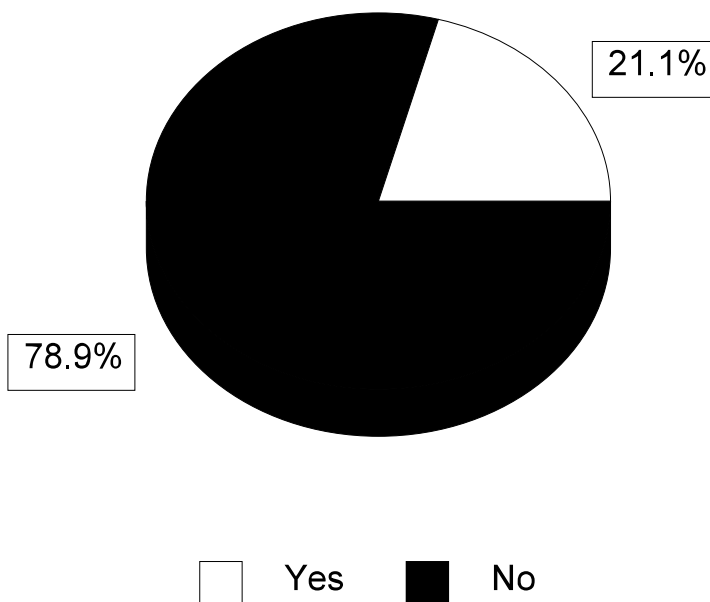
Hospital/Health Care Management Board

21.1%

78.9%

☐ Yes   ■ No

Figure 6

continuing professional education programs by distance education for six years or greater.

Thirty-one percent (31.3%) of national/provincial associations reported offering continuing professional education programming by technology-based distance education for six years or greater, and 19.3% of hospital/health care management organizational respondents indicated that they had been offering programs by distance education for six years or more. The pharmaceutical industry respondents reported the least experience in CHPE delivery by technology-based distance education. Only two (N = 2) respondents reported between one and five years of experience. The majority of hospital/health care management board respondents (58.8%) indicated that they had been offering CHPE programming by technology-based distance education between one and five years.

Table 5 presents the results pertaining to respondents' reports of factors which had influenced organizational decision-making in the area of technology-based distance education program delivery. These results only reflect the responses of those organizations who had indicated that they were providing technology-based distance education programming to health professionals. The results indicate a consistent level of responses across the organizational respondent categories. The majority of School of Nursing respondents reported that the factors which had the greatest influence on their decision to offer technology-based distance education included 'addressing CHPE needs of rural/remote health professionals' (78.8%), 'increasing opportunities for flexible CHPE access' (70.6%), and it was 'part of the organization's mission' (53.1%). The majority of School of Medicine respondents also indicated similar factors including 'addressing CHPE needs of rural/remote health professionals' (85.7%), 'increasing opportunities for flexible CHPE access' (71.4%), and it was 'part of the organization's mission' (57.1%).

Interestingly, only a minority of respondents across the organizational categories indicated that 'increasing revenue' was a factor which influenced the decision to offer technology-based distance education. As well, only a minority of the academic organizational respondents indicated that 'less expensive delivery modality' was a significant factor which had influenced their decision to offer technology-based distance education. Only 15.6% of School of Nursing respondents and 14.3% of

School of Medicine respondents reported that this factor had influenced their decision to offer distance education. However, a majority of hospital/health care management board organizational respondents indicated that 'less expensive delivery modality' was a significant factor which influenced their decision to offer continuing professional education by technology-based distance education (60.5%). As well, hospital/health care management board respondents also reported that 'addressing mandatory CE needs of health professionals' was an important factor (43.0%). This result was considerably higher than other scores. Respondents were also

provided with an option to identify 'other' factors which may have influenced their organization's decision to offer technology-based distance education. The 'availability of funding' (N = 5) and 'being able to research the effectiveness of the technology' (N = 1) were other factors identified by the respondents.

Table 4　　Summary of Years of Experience in Offering Technology-based Distance Education Programming

| Type of Organization | Number of Years | | | | | | | | | | | | TOTAL |
| | < 1 | | 1 - 5 years | | 6 - 10 years | | 11 - 15 years | | 16 - 20 years | | > 20 years | | |
	N	%	N	%	N	%	N	%	N	%	N	%	
School of Nursing	2	6.3%	11	34.4%	5	15.6%	5	15.6%	6	18.8%	3	9.4%	32
School of Medicine	2	28.6%	2	28.6%	1	14.3%	1	14.3%	0	0.0%	1	14.3%	7
School of Pharmacy	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	100%	1
National/Provincial Health Professional Association	4	25.0%	7	43.8%	3	18.8%	1	6.3%	0	0.0%	1	6.3%	16
Pharmaceutical Industry	2	50.0%	2	50.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4
Hospital/Health Care Management Board	25	21.9%	67	58.8%	13	11.4%	4	3.5%	4	3.5%	1	0.9%	114
TOTAL	35		89		22		11		10		7		174

Table 5　　　　**Factors Influencing Organizational Decision to offer Technology-based Distance Education Programming**

Organizations		Part of organization's mission		Increase revenue		Address CHPE needs of rural/ remote health professionals		Increase opportunity for CHPE access		Address mandatory CE needs		Less expensive CHPE modality		Don't know	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
School of Nursing	Yes	17	53.1%	7	21.2%	26	78.8%	24	70.6%	5	15.6%	5	15.6%	0	0.0%
	No	15	46.9%	26	78.8%	7	21.2%	10	29.4%	27	8.4%	27	8.4%	32	100%
School of Medicine	Yes	4	57.1%	1	14.3%	6	85.7%	5	71.4%	2	28.6%	1	14.3%	0	0.0%
	No	3	42.9%	6	85.7%	1	14.3%	2	28.6%	5	71.4%	6	85.7%	7	100%
School of Pharmacy	Yes	0	0.0%	0	0.0%	1	100%	1	100%	1	100%	0	0.0%	0	0.0%
	No	1	100%	1	100%	0	0.0%	0	0.0%	0	0.0%	1	100%	1	100%
National/Prov. Health Professional Association	Yes	5	31.3%	1	6.3%	14	87.5%	16	94.1%	5	31.3%	8	50.0%	0	0.0%
	No	11	68.8%	15	93.8%	2	12.5%	1	5.9%	11	68.8%	8	50.0%	16	100%
Pharm. Industry	Yes	2	50.0%	0	0.0%	2	50.0%	4	100%	1	25.0%	2	50.0%	0	0.0%
	No	2	50.0%	4	100%	2	50.0%	0	0.0%	3	75.0%	2	50.0%	4	100%

Hospital/ Health Care Management Board	Yes	49	43.0%	6	5.3%	70	61.4%	66	57.4%	49	43.0%	69	60.5%	3	2.6%
	No	65	57.0%	108	94.7%	44	38.6%	49	42.6%	65	57.0%	45	39.5%	111	97.4%
TOTAL		174		175		175		178		174		174		174	

Table 6 presents the results pertaining to respondents' reports of sources of support for continuing professional education by technology-based distance education programming. These results only reflect the responses of those organizations who had indicated that they were providing technology-based distance education programming to health professionals. The majority of School of Nursing respondents reported that 'tuition/registration fees' (78.1%) and 'provincial government grants' (50.0%) were main sources of support for their distance education programming. Seventy one percent (71.4%) of School of Medicine respondents reported that 'industry educational grants' were a main source of support for their distance education programs, while 57.1% also indicated that 'tuition/registration fees' were a source of support. National/provincial health professional association respondents indicated that the main sources of support for their distance education program offerings were from 'provincial government grants' (37.5%), 'industry educational grants' (37.5%), and 'tuition/registration fees' (37.5%). Forty-five percent (45.0%) of hospital/health care management board organizational respondents reported that a main source of support for their distance education programming was from a 'parent institution grant/subsidy', while 31.6% reported support from 'provincial government grants', and 24.6% indicated support from 'tuition/registration fees'. Respondents were also provided with an option to identify any other sources of support for continuing professional education by technology-based distance education programming. 'Bursary programs' (N =1), 'membership of a telehealth organization or network' (N =2), and 'research funding support' (N = 1) were identified as other sources of support.

Table 7 presents the results pertaining to the relationship between the responding organizational unit and its parent institution regarding distance education. As an example, within academic institutions, responsibility for continuing professional education program organization and management may be based within a unit which is separate and distinct from a distance education unit which is responsible for development and delivery of undergraduate and graduate level distance education courses. The responses to this item only reflect those organizations who had reported that they were providing technology-based distance education programming to health professionals. A majority of the academic organizational respondents (Nursing and Medicine) reported that their parent organization offered distance education courses and that they had access to distance education resources within the parent institution. Seventy-eight percent (78.0%) of School of Nursing and 100% of School of Medicine respondents indicated that their parent institution offered distance education courses. Seventy-eight percent (78.1%) of School of Nursing and 71.4% of School of Medicine respondents also reported that they had access to distance education resources within their parent institution.

Table 6   **Sources of Support for Technology-based Distance Education Programming**

Organizations		Foundation/ philanthropic grant		Federal Gov. grant		Provincial Gov. grant		Professional association grant/ subsidy		Industry educational grant		Parent institution grant/ sub.		Tuition/ registration fees		Alumni donation		Don't know	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
School of Nursing	Yes	1	3.1%	1	3.1%	16	50.0%	1	3.1%	1	3.1%	11	32.4%	25	78.1%	1	3.0%	2	6.3%
	No	31	96.9%	31	96.9%	16	50.0%	31	96.9%	31	96.9%	23	67.6%	7	21.9%	32	97.0%	30	93.8%
School of Medicine	Yes	0	0.0%	1	14.3%	1	14.3%	2	28.6%	5	71.4%	1	14.3%	4	57.1%	2	28.6%	0	0.0%
	No	7	100%	6	85.7%	6	85.7%	5	71.4%	2	28.6%	6	85.7%	3	42.9%	5	71.4%	7	100%
School of Pharmacy	Yes	0	0.0%	0	0.0%	0	0.0%	1	100%	1	100%	0	0.0%	1	100%	0	0.0%	0	0.0%
	No	1	100%	1	100%	1	100%	0	0.0%	0	0.0%	1	100%	0	0.0%	1	100%	1	100%
Health Prof. Association	Yes	1	6.3%	1	6.3%	6	37.5%	3	18.8%	6	37.5%	4	23.5%	6	37.5%	0	0.0%	1	6.3%
	No	15	93.8%	15	93.8%	10	62.5%	13	81.3%	10	62.5%	13	76.5%	10	62.5%	16	100%	15	93.8%
Pharm. Industry	Yes	0	0.0%	0	0.0%	2	66.7%	0	0.0%	0	0.0%	0	0.0%	2	66.7%	0	0.0%	0	0.0%
	No	3	100%	3	100%	1	33.3%	3	100%	3	100%	3	100%	1	33.3%	3	100%	3	100%
Hospital/ Health Care Management Board	Yes	7	6.1%	11	9.6%	36	31.6%	9	7.9%	5	4.4%	68	45.0%	28	24.6%	1	0.9%	8	7.0%
	No	107	93.9%	103	90.4%	78	68.4%	105	92.1%	109	95.6%	83	55.0%	86	75.4%	113	99.1%	106	93.0%

Table 7   Summary of Relationship Between Organizational Respondent and Parent Institution

Type of Organization	Parent Institution Offers Distance Education Courses						Total	Access to Distance Education Resources Within Parent Institution						Total
	Yes		No		N/A			Yes		No		N/A		
	N	%	N	%	N	%		N	%	N	%	N	%	
School of Nursing	25	78.0%	1	3.1%	6	18.8%	32	25	78.1%	3	9.4%	4	12.5%	32
School of Medicine	7	100%	0	0.0%	0	0.0%	7	5	71.4%	2	28.6%	0	0.0%	7
School of Pharmacy	1	100%	0	0.0%	0	0.0%	1	1	100%	0	0.0%	0	0.0%	1
National/Provincial Health Professional Association	3	20.0%	4	26.7%	8	53.3%	15	1	6.7%	8	53.3%	6	40.0%	15
Pharmaceutical Industry	4	100%	0	0.0%	0	0.0%	4	4	100%	0	0.0%	0	0.0%	4
Hospital/Health Care Management Board	41	38.0%	33	30.6%	34	31.5%	108	41	37.3%	34	30.9%	35	31.8%	110
TOTAL	81		38		48		167	77		47		45		169

Table 8 presents the results pertaining to respondent's report of partnerships. These results only reflect the responses of those organizations who had indicated that they were providing technology-based distance education programming to health professionals. The majority of respondents from the organizational categories of schools of nursing, schools of medicine and hospital/health care management boards reported that they had formed partnerships for the purpose of sharing financial, human and/or technical resources. Sixty-two percent (62.5%) of School of Nursing respondents, 85.7% of School of Medicine respondents, and 67.9% of hospital/health care management board respondents indicated that they had formed partnerships.

Table 8   Summary of Partnering Relationships

Type of Organization	Yes		No		TOTAL
	N	%	N	%	
School of Nursing	20	62.5%	12	37.5%	32
School of Medicine	6	85.7%	1	14.3%	7
School of Pharmacy	1	100%	0	0.0%	1
National/Provincial Health Professional Association	6	42.9%	8	57.1%	14
Pharmaceutical Industry	3	75.0%	1	25.0%	4
Hospital/Health Care Management Board	74	67.9%	35	32.1%	109
TOTAL	110		57		167

Table 9 provides the results pertaining to the types of partnerships which organizational respondents reported that they had formed. The responses to this item only reflect those organizations who had reported that they were providing technology-based distance education programming to health professionals. Across organizational categories, the most significant type of partnership was that which was formed with other educational institutions. Fifty-nine percent of schools of nursing (59.1%), 66.7% of School of Medicine respondents, 66.7% of health professional association respondents, and 67.1% of hospital/health care management board respondents indicated that partnerships with other educational institutions was a major type of partnership. Partnerships with other departments in the parent institution was also a major type

of partnership across organizational categories. Sixty-three (63.6%) of schools of nursing and 75.0% of pharmaceutical industry respondents indicated that partnerships with other departments in their parent institution was a major type of partnership.

However, only 33.3% of Schools of Medicine indicated this type of partnership. A majority of health professional association respondents reported that partnerships with business/industry (83.3%) and professional associations/societies (50.0%) were also important. Partnerships with provincial and federal government organizations and community-based agencies were not identified as significant partnership types by the majority of respondents nor across the organizational respondent categories. Respondents were also invited to identify any other partnership types. Partnerships with health regions/authorities (N = 5) and telehealth networks/projects (N = 2) were reported.

Table 9   Types of Partnerships Formed by Organizational Respondents

Organizations		Other department(s) in parent institution		Other educational institution(s)		With business industry		With professional associations/ societies		With Provincial Government		With Federal Government		With community-based agencies	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
School of Nursing	Yes	14	63.6%	13	59.1%	5	22.7%	4	18.2%	5	22.7%	0	0.0%	1	4.5%
	No	8	36.4%	9	40.9%	17	77.3%	18	81.8%	17	77.3%	22	100%	21	95.5%
School of Medicine	Yes	2	33.3%	4	66.7%	2	33.3%	2	33.3%	1	16.7%	1	16.7%	0	0.0%
	No	4	66.7%	2	33.3%	4	66.7%	4	66.7%	5	83.3%	5	83.3%	6	100%
School of Pharmacy	Yes	1	100%	0	0.0%	0	0.0%	1	100%	0	0.0%	0	0.0%	0	0.0%
	No	0	0.0%	1	100%	1	100%	0	0.0%	1	100%	1	100%	1	100%
Health Professional Association	Yes	3	50.0%	4	66.7%	5	83.3%	3	50.0%	2	33.3%	0	0.0%	3	50.0%
	No	3	50.0%	2	33.3%	1	16.7%	3	50.0%	4	66.7%	6	100%	3	50.0%
Pharmaceutical Industry	Yes	3	75.0%	1	25.0%	0	0.0%	2	50.0%	1	25.0%	0	0.0%	0	0.0%
	No	1	25.0%	3	75.0%	4	100%	2	50.0%	3	75.0%	4	100%	4	100%

Hospital/ Health Care	Yes	25	31.3%	51	67.1%	14	18.2%	32	41.6%	30	39.0%	6	7
Management Board	No	55	68.8%	26	32.9%	63	81.8%	45	58.4%	47	61.0%	71	9
TOTAL		119		116		116		116		116		116	

Table 10 provides the results relating to the types of technologies used in distance education delivery by all organizational survey respondents. The results have been rank ordered and only reflect the responses of those respondents who had indicated that they were providing technology-based distance education programming to health professionals. The majority of respondents reported that the following technologies were used in the delivery of continuing health professional education by distance education: electronic mail (61.4%); Web-based education (59.9%); videoconferencing (59.2%); correspondence materials (57.2%); videotapes (52.0%); and audio teleconferencing (51.5%).

Table 11 presents the results pertaining to accreditation of CHPE programs delivered by technology-based distance education methods. This item asked respondents to indicate whether the distance education programs they offered were accredited by a professional body. These results only reflect the responses of those organizations who had indicated that they were providing technology-based distance education programming to health professionals. Eighty-five percent (85.7%) of School of Medicine respondents and 58.1% of Schools of Nursing reported that their programs were accredited. Thirty-six percent (36.6%) of hospital/health care management boards indicated that their distance education CPE programs were accredited.

Table 12 provides the results pertaining to respondents' reports of formal training and support services offered to faculty or instructors who teach in the continuing professional education programs offered by technology-based distance education. The responses to this item only reflect those organizations who had reported that they were providing technology-based distance education programming to health professionals. The majority of School of Nursing and School of Medicine respondents indicated that they were providing training and support to faculty and instructors who taught in their distance education programs. Eighty-seven percent (87.5%) of schools of nursing and 71.4% of schools of medicine reported that they were providing this type of support. Forty-three percent (43.9%) of hospital/health care management boards reported that they provided formal training and/or support services to instructors who taught in their distance education programs.

Table 13 provides the results pertaining to respondents' reports of the types of formal training and support which are provided to faculty and instructors of their distance education programs.

These results only reflect the responses of those organizations who had indicated that they were providing technology-based distance education programming to health professionals as well as faculty development support activities. 'Faculty development seminars/workshops', 'instructional development support materials', 'mentoring by experienced instructors', and 'one-on-one consultation with an educational specialist' were the main types of faculty development activities which were reported by the majority of respondents across the organizational categories. Eighty-nine percent (89.7%) of schools

of nursing, 80.0% of schools of medicine and 51.9% of hospital/health care management board respondents indicated that they used 'faculty development seminars and workshops' for providing support services. Sixty-five percent (65.5%) of schools of nursing, 80.0% of schools of medicine, and 57.4% of hospital/health care management board respondents indicated the use of 'instructional development support materials' for supporting faculty and instructors. Sixty-two percent (62.1%) of School of Nursing respondents indicated that 'mentoring' by experienced instructors was a strategy they provided to support instructors. Sixty-nine percent (69.0%) of School of Nursing and 80.0% of School of Medicine respondents also reported the use of 'one-on-one consultation with educational specialists' as means for supporting faculty and instructors teaching through distance education technologies. Other types of support identified by respondents included 'videoconferencing/network training' (N = 4), 'guest presenters/distance modules purchased from outside suppliers' (N = 2), and 'support programs/costs of instructor covered by parent institution' (N = 2).

Table 10   Types of Technologies Used in Distance Education

Technologies Used	N	%	Total
Electronic mail	105	61.4%	171
Web-based education	103	59.9%	172
Videoconferencing	103	59.2%	174
Correspondence materials	99	57.2%	173
Videotapes	89	52.0%	171
Audio teleconferencing	88	51.5%	171
Interactive multimedia CD-ROMS	59	34.1%	173
Fax	55	32.2%	171

Computer conferencing	44	25.7%	171
Audio cassette	36	21.1%	171
Web broadcasts	34	19.9%	171
E-mail list servs	25	14.6%	171
Interactive videodiscs	17	9.9%	171
Cable/broadcast TV	10	5.7%	174
Audiographic teleconferencing	7	4.1%	171
Radio	2	1.2%	172
TOTAL	876		

Table 11   Organizations Reporting Accredited Distance Education Programs

Type of Organization	Yes		No		TOTAL
	N	%	N	%	
School of Nursing	18	58.1%	13	41.9%	31
School of Medicine	6	85.7%	1	14.3%	7
School of Pharmacy	1	100%	0	0.0%	1
National/Prov. Health Professional Association	6	40.0%	9	60.0%	15
Pharmaceutical Industry	4	100%	0	0.0%	4
Hospital/Health Care Management Board	37	36.6%	64	63.4%	101
TOTAL	72		87		159

Table 12   Training/Support Offered to Faculty/Instructors

Type of Organization	Yes	No	
			TOTAL

	N	%	N	%	
School of Nursing	28	87.5%	4	12.5%	32
School of Medicine	5	71.4%	2	28.6%	7
School of Pharmacy	1	100%	0	0.0%	1
National/Prov. Health Professional Association	6	40.0%	9	60.0%	15
Pharmaceutical Industry	2	50.0%	2	50.0%	4
Hospital/Health Care Management Board	47	43.9%	60	56.1%	107
TOTAL	89		77		166

Table 13   Types of Formal Training/Support Offered

Organizations		Faculty dev. seminars/ workshops		Instructional dev. support materials		Instructional development website		Mentoring by experienced instructors		One-on-one consultation with ed. specialist		Fellowships		Bursaries		Teaching award /other recognition	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
School of Nursing	Yes	26	89.7%	19	65.5%	8	27.6%	18	62.1%	20	69.0%	1	3.4%	3	10.3%	3	10.3%
	No	3	10.3%	10	34.5%	21	72.4%	11	37.9%	9	31.0%	28	96.6%	26	89.7%	26	89.7%
School of Medicine	Yes	4	80.0%	4	80.0%	2	40.0%	0	0.0%	4	80.0%	0	0.0%	1	20.0%	2	40.0%
	No	1	20.0%	1	20.0%	3	60.0%	5	100%	1	20.0%	5	100%	4	80.0%	3	60.0%

School of Pharmacy	Yes	1	100%	0	0.0%	0	0.0%	1	100%	1	100%	0	0.0%
	No	0	0.0%	1	100%	1	100%	0	0.0%	0	0.0%	1	100%
National/Prov. Health Prof. Association	Yes	1	12.5%	3	37.5%	0	0.0%	3	37.5%	2	25.0%	0	0.0%
	No	7	87.5%	5	62.5%	8	100%	5	62.5%	6	75.0%	8	100%
Pharm. Industry	Yes	0	0.0%	2	100%	1	50.0%	1	50.0%	0	0.0%	0	0.0%
	No	2	100%	0	0.0%	1	50.0%	1	50.0%	2	100%	2	100%
Hospital/ Health Care Board	Yes	28	51.9%	31	57.4%	6	11.1%	25	46.3%	22	40.7%	1	1.9%
	No	26	48.1%	23	42.6%	48	88.9%	29	53.7%	32	59.3%	53	98.1%
TOTAL		99		99		99		99		99		99	

Table 14 provides the results pertaining to respondents' reports of the location of the audience to whom their distance education programs are provided. The responses to this item only reflect those organizations who had reported that they were providing technology-based distance education programming to health professionals. The main audiences identified across the organizational categories were 'regional' and 'provincial'. Thirty-one percent (31.2%) of School of Nursing respondents reported that their audience was 'provincial', while 32.5% indicated a 'regional' audience. Forty-three percent (43.8%) of School of Medicine respondents indicated that their target audience was 'provincial' in scope, while 18.8% indicated a 'regional' target audience. Twenty percent (20.8%) of School of Nursing respondents also reported a 'national' audience, while 25.0% of schools of medicine also reported a 'national' audience. Sixty-one percent (61.2%) of hospital/health care management board respondents indicated a 'regional' audience, while 28.4% reported a 'provincial' audience. An 'international' audience was identified by 15.6% of schools of nursing; and 12.5% of schools of medicine.

Forty-eight (48.0%) of School of Nursing respondents reported that at least 1 - 25% of participants in their distance education programs during the past 12 months were of a national audience. Forty-two percent (42.9%) of schools of medicine reported that 1 - 25% of their participant audience was of a national scope. The majority of health professional associations (58.3%) and hospital/health care management board respondents (59.8%) indicated that there were no participants in their distance education programs who were from a national audience. Forty-seven percent (47.4%) of schools of nursing and 50.0% of schools of medicine indicated that 1 - 25% of their participant audience during the past 12 months was of an international

scope. Fifty-two percent (52.6%) of School of Nursing respondents and 50.0% of School of Medicine respondents indicated that there were no international participants in their programs. Ninety-one percent (91.8%) of hospital/health care management board respondents indicated that there were no international participants in the distance education program offerings of their organization.

Table 14   Location of Distance Education Audience

Type of Organization	Regional		Provincial		National		International		Total
	N	%	N	%	N	%	N	%	
School of Nursing	25	32.5%	24	31.2%	16	20.8%	12	15.6%	77
School of Medicine	3	18.8%	7	43.8%	4	25.0%	2	12.5%	16
School of Pharmacy	0	0.0%	1	50.0%	1	50.0%	0	0.0%	
National/Provincial Health Professional Association	3	15.0%	11	55.0%	6	30.0%	0	0.0%	20
Pharmaceutical Industry	1	25.0%	2	50.0%	1	25.0%	0	0.0%	4
Hospital/Health Care Management Board	82	61.2%	38	28.4%	10	7.5%	4	3.0%	134
TOTAL	114		83		38		18		253

The table header spans "Location of Audience" above the Regional, Provincial, National, and International columns.

Table 15 provides an overview of the results of the general characteristics of health professionals who participate in the distance learning programs reported by respondents. The majority of respondents across all organizational categories reported that participants in their distance learning programs were not predominantly recent university graduates. Ninety-three percent (93.1%) of schools of nursing, 100% of schools of medicine, 90.9% of health professional associations, and 77.1% of hospital/health care management board respondents indicated that the participants in their distance learning programming were not predominantly recent university graduates. Sixty-six percent (66.7%) of School of Medicine respondents and 51.0% of hospital/health care management board respondents indicated that the participants in their distance learning programs were predominantly rural practitioners, while 25.0% of School of Nursing organizational respondents indicated that participants in their programs were

predominantly rural practitioners. Twenty-one percent (21.4%) of School of Nursing respondents and 32.3% of hospital/health care management board respondents reported that participants in their programs were predominantly urban practitioners. Fifty-five percent (55.2%) of School of Nursing respondents indicated that their audience encompassed an even mix of rural and urban practitioners. As well, seventy-two percent (72.7%) of health professional association organizational respondents reported that participants in their distance learning programs were an even mix of rural and urban practitioners. Eighty-five percent (85.7%) of School of Nursing respondents, 72.2% of health professional association respondents and 64.2% of hospital/health care management board respondents indicated that their participants did not require CHPE credit to maintain licensure, whereas 50.0% of School of Medicine respondents reported that their participants required CHPE credit.

Table 15   **Characteristics of Distance Education Program Participants**

Organizations		Predominantly recent university graduates (<5 years)		Predominantly rural practitioners (population <10,000)		Predominantly urban practitioners (population >10,000)		Even mix of both rural and urban		Require CHPE credit to maintain licensure	
		N	%	N	%	N	%	N	%	N	%
School of Nursing	Yes	2	6.9%	7	25.0%	6	21.4%	16	55.2%	4	14.3%
	No	27	93.1%	21	75.0%	22	78.6%	13	44.8%	24	85.7%

School of Medicine	Yes	0	0.0%	4	66.7%	0	0.0%	2	33.3%
	No	6	100%	2	33.3%	6	100%	4	66.7%
School of Pharmacy	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	No	1	100%	0	0.0%	0	0.0%	0	0.0%
Health Professional Association	Yes	1	9.1%	4	36.4%	0	0.0%	8	72.7%
	No	10	90.9%	7	63.6%	11	100%	3	27.3%
Pharm. Industry	Yes	1	50.0%	2	100%	0	0.0%	0	0.0%
	No	1	50.0%	0	0.0%	2	100%	2	100%
Hospital/ Health Care Board	Yes	22	22.9%	49	51.0%	31	32.3%	26	27.4%
	No	74	77.1%	47	49.0%	65	67.7%	69	72.6%
TOTAL		145		143		143		143	

Table 16 presents the results related to respondents' reports of the nature of topics which are provided through their CPE programs. This question item was intended to identify the type and extent of programming which is being delivered to enhance capabilities in the use and application of information and communication technologies among health care practitioners. The results are rank ordered according to frequency of responses and represent the responses of respondents from all organizational categories. Thirty-two percent (32.4%) of all organizational respondents indicated that 'using computers' was a common continuing professional education program which was offered to health care practitioners. Respondents also reported that 'E-mail applications' (29.9%), 'Using the Internet' (25.8%), 'Presentation software' (24.2%), and 'Hospital computer systems' (19.1%) were common information and communication technology-related topics which were covered in continuing professional education programming. Respondents were also provided with an opportunity to identify 'other' continuing professional education topics which were provided to health professionals. The topic areas which were identified included 'Word processing software' (N = 4), 'MDS/RUGS' Software (N = 5), 'Medicare Software' (N = 1), and 'General healthcare software' (N = 2).

Table 17 presents the results of Kruskal-Wallis Analysis of Variance of Ranks to determine the existence of relationships between 'organizational respondent category' and the organizational influences, professional influences and strengths and resources scales. A sum score was calculated for each scale by totalling the individual item ratings. There was no significant

relationship between the organizational category and the sum score on the organizational influence scale (p = 0.190) at the <.05 probability level. School of Pharmacy respondents reported the highest mean score on the organizational influence scale (24.4), followed by schools of medicine (23.2) and schools of nursing (22.3). National/provincial health professional associations reported the lowest mean score on organizational influences (19).

There was also no significant difference between the type of organizational respondent and the sum score on the professional influence scale (p = 0.302). Schools of nursing reported the highest mean score on the professional influences scale (24.7), followed by schools of medicine (24.3) and hospital/health care management boards (24). There was also no significant relationship between the type of organizational respondent and their mean score on the organizational strengths and resources scale (p = 0.053) at the <.05 probability level. Medical and nursing schools did report a higher rating on their perceptions of organizational strengths and resources as it pertained to distance education program development and delivery than other organizational respondents. Schools of nursing (57) and schools of medicine (56) reported a higher mean score on the strengths and resources scale than national/provincial health professional associations (41.9), hospital/health care management boards (52.8) and other organizational respondent categories. The individual items within the strengths and

resources scale were also examined using Kruskal-Wallis Analysis of Variance of Ranks to determine the existence of relationships between organizational respondent category and individual strengths and resources items. There were significant differences found between organizational categories and the items: 'priority of my unit' (p = 0.001); and 'adequate faculty/subject matter expert support' (p = 0.014). These differences were significant at the < .05 level of probability. Schools of medicine reported the highest mean score (4.2) as it pertained to the item 'a priority of my unit'; schools of pharmacy (2.4) and pharmaceutical industry (2.7) respondents reported the lowest mean scores. Schools of pharmacy also reported the lowest mean score on the item 'adequate faculty/subject matter expert support' (2.4), while schools of medicine reported the highest mean score (3.8). Schools of medicine also reported the highest mean score on 'enthusiasm among the target audience' (3.8).

Table 16   Continuing Professional Education Topics

Topics Provided	Yes		Total
	N	**%**	
Using computers	217	32.4%	669

E-mail applications	200	29.9%	670
Using the Internet	173	25.8%	670
Presentation software	162	24.2%	669
Hospital computer systems	129	19.1%	675
Telemedicine/telehealth	123	18.4%	669
Spreadsheet/database software	123	18.3%	671
Literature databases	122	18.2%	669
Using search engines	92	13.8%	669
Literature search strategies	89	13.3%	669
Electronic health records	85	12.7%	670
Using web browsers	83	12.4%	669
Keyboarding skills	74	11.1%	669
E-journals/text books	70	10.5%	669
Electronic drug databases	53	7.9%	669
Patient education software	38	5.6%	673
Statistics software	23	3.4%	669
Practice management programs	18	2.7%	669
Evaluating quality of Web pages for patient information referrals	16	2.4%	669
TOTAL	1767		

Table 17   Kruskal-Wallis Test of Organizational Respondent Categories by Factors of Usage Scales

	Types of Organizations	N	Mean	SD	Mean Rank	Sig.
ORGANIZATIONAL INFLUENCES	School of Nursing	58	22.3	6.3	381.5	0.190
	School of Medicine	10	23.2	5.1	395	

	School of Pharmacy	5	24.4	5.5	448.8	
	Health Professional Assoc	47	19	8.1	310	
	Pharmaceutical Industry	15	22.2	4.1	385.1	
	Hospital/Health Care Board	542	20.5	6	333.7	
TOTAL		677	20.6	6.1		
PROFESSIONAL INFLUENCES	School of Nursing	58	24.7	2.9	360.2	0.302
	School of Medicine	10	24.3	3.9	350.8	
	School of Pharmacy	5	22.8	2.7	223.3	
	Health Professional Assoc	47	23.2	6	319.7	
	Pharmaceutical Industry	15	23.1	2.4	252.3	
	Hospital/Health Care Board	542	24	4.7	341.7	
TOTAL		677	24	4.6		
STRENGTHS & RESOURCES	School of Nursing	58	57	17.8	393.2	0.053
	School of Medicine	10	56	11.2	375	
	School of Pharmacy	5	51.4	6.8	312	
	Health Professional Assoc	47	41.9	26.1	268.9	
	Pharmaceutical Industry	15	53.5	11.2	333.2	
	Hospital/Health Care Board	542	52.8	16.6	339	
TOTAL		677	52.4	17.5		

Table 18 presents the results of Mann-Whitney analyses pertaining to an organization's provision of technology-based distance education and their corresponding perception of organizational and professional influences, and the existence of strengths and resources within their organization for the delivery of distance education. A sum score was calculated for each scale by totalling the individual item ratings. The mean score for respondents reporting that their organization

provided distance education programs was 22.9 on the organizational influence scale, while the mean score of respondents reporting that their organization did not provide distance education programs was 19.9. The Mann-Whitney analysis revealed that there was a significant difference between the mean rank of these scores at the <.05 level of probability (p = 0.000). Organizational respondents indicating that they were providing distance education programs reported a higher score on the organizational factors scale.

The mean score of respondents reporting that their organization provided distance education programs was 24.2 on the professional influence scale, while the mean score of respondents reporting that their organization did not provide distance education programs was 24. The Mann-Whitney analysis revealed that there was no significant difference between the mean rank of these scores at the <.05 probability level (p = 0.796). There was no difference between organizations on their rating of professional factors and whether they did or did not provide distance education programs.

The mean score of respondents reporting that their organization provided distance education programs was 55.8 on the strengths and resources scale, while the mean score of respondents reporting that their organization did not provide distance education programs was 51.5. There was a significant difference between the mean rank of these scores at the <.05 level of probability (p = 0.000). Organizational respondents indicating that they were providing distance education programs reported a higher score on the strengths and resources scale.

Table 19 presents the results of Mann-Whitney analyses pertaining to an organization's provision of technology-based distance education and their corresponding perception of individual strengths and

resources within their organization for the delivery of distance education. There were significant differences found between organizations reporting that their organization did provide distance education
programs and those that did not on a number of the strengths and resources items. On the items 'a
priority of my unit' (p = 0.000), 'a priority of organization' (p = 0.000), 'administration supportive of the idea' (p = 0.001), and 'sufficient administrative/clerical support staff' (p = 0.020) providers of distance education reported mean scores which were significantly higher than non-providers at the < .05 probability level. All of these items were related to organizational support factors. On the items 'adequate telecommunication infrastructure' (p = 0.048), 'adequate facilities/equipment for supporting distance education development and

delivery' (p = 0.001), 'convenient personal Internet access among target audience' (p = 0.022), and 'convenient personal computer access among target audience' (p = 0.042) providers of distance education also reported mean scores which were significantly higher than non-providers at the < .05 probability level. Perception of infrastructure, access to equipment and Internet services were more positive among those organizations who were providing technology-based distance education. Providers of distance education also reported higher mean scores on items related to experience, enthusiasm and sufficient time commitment among target audience at the <.05 level of probability. Organizational respondents who were providing distance education reported that their target audience had high levels of computer, were enthusiastic about technology-based CHPE, and had sufficient time to commit to participation in CHPE.

Table 20 presents the results of Kruskal-Wallis Analysis of Variance of Ranks to determine the existence of relationships between the level of experience (length of time offering distance education programs) and corresponding perceptions of organizational and professional influences, and the existence of strengths and resources within an organization for the delivery of distance education. A sum score was calculated for each scale by totalling the individual item ratings. There was no significant relationship between the years of experience in offering distance education programs and the rating of organizational influences (p = 0.092) at the <.05 probability level. Organizational respondents reporting > 20 years of experiences did report the highest mean score on the organizational influence scale (24.6), followed by organizations reporting 16 - 20 years of experiences (24.6). However, the differences between the mean rank of these scores was not significant.

There was also no significant difference between the years of experience in offering distance education programs and the rating of professional influences (p = 0.455). Organizations reporting > 20 years of experience in distance education program delivery reported the highest mean score on professional influences (26.3), followed by organizations with 1 - 5 years of experience (24.5) and organizations with 16 - 20 years of experiences (24.4). Scores on the strengths and resources scale also revealed a similar result. There was no significant relationship between the years of experience in offering distance

education programs and the rating of organizational strengths and resources (p = 0.360) at the <.05 probability level. Respondents reporting 16 - 20 years of experience reported the highest mean score (61.8), followed by organizations with > 20 years of experience (58.3) and organizations with 1 - 5

years of experiences (57). The individual items within the strengths and resources scale were also examined using Kruskal-Wallis Analysis of Variance of Ranks to determine the existence of

relationships between the level of experience (length of time offering distance education programs) and individual strengths and resources items. There were significant differences found between the level of an organization's experience and the items: 'priority of my unit' (p = 0.021); 'experience in technology-based distance education' (p = 0.004); and 'sufficient time commitment for participation among target audience' (p = 0.021). These differences were significant at the < .05 level of probability. Organizations reporting less than 1 year of experience reported the lowest mean score (3.5) on the item 'a priority of my unit', while organizations reporting 'more than 20 years experience' reported the highest mean score (4.7). Organizations reporting less than 1 year of experience also reported the lowest mean score (2.7) on the item 'experience in technology-based distance education'.

Table 18   Mann-Whitney Tests of Organizational Respondents Providing Distance Education Programming by Factors of Usage Scales

**Does your organizational unit provide technology-based distance education programming
to health professionals?**

		N	Mean	SD	Mean Rank	Sum of Ranks	Z	Sig.
Organizational Influences	Yes	174	22.9	6.4	421.7	73368.5		
	No	500	19.9	5.8	308.2	154106.5	-6.6	0.000
TOTAL		674	20.6	6.1				
Professional Influences	Yes	174	24.2	4.4	340.8	59295		
	No	500	24	4.6	336.4	168179.99	-0.3	0.796
TOTAL		674	24	4.6				

Strengths & Resources	Yes	174	55.8	17.3	383.2	66684		
	No	500	51.5	17.2	321.6	160791	-3.6	0.000
TOTAL		674	52.4	17.5				

Table 19 **Mann-Whitney Tests of Organizational Respondents Providing Distance Education Programming by Strengths and Resources Factors**

Does your organizational unit provide technology-based distance education programming to health professionals?

		N	Mean	SD	Mean Rank	Sum of Ranks	Z	Sig.
A priority of my unit.	Yes	164	3.7	0.9	407.6	66853.5	-7.21	0.000
	No	478	3	1	291.9	139550		
A priority of organization	Yes	164	3.6	1	382.8	62778	-5.05	0.000
	No	479	3.1	1.1	301.2	144268		
Administration supportive of the idea.	Yes	165	3.9	0.9	361	59560.5	-3.38	0.001
	No	479	3.6	0.9	309.3	148130		
Sufficient administrative/clerical support staff.	Yes	166	3.1	1.2	351	58260.5	-2.33	0.020
	No	479	2.8	1.1	313.3	150075		
Specialized staff to design the courses.	Yes	165	3	1.3	342.2	56462.5	-1.75	0.080
	No	476	2.8	1.3	313.7	149299		

61

Experience in technology-based distance education.	Yes	166	3.4	1.1	366	60760.5	-3.87	0.000
	No	473	2.9	1.2	303.9	143720		
Adequate budget for technology-based distance education programs.	Yes	166	3	1.4	342.2	56812	-1.67	0.095
	No	477	2.8	1.4	315	150234		
Telecommunication costs are reasonable.	Yes	166	3.4	1	331.7	55060	-0.65	0.518
	No	481	3.3	1	321.4	154568		
Adequate telecommunication infrastructure.	Yes	165	3.5	1.1	346.4	57156	-1.98	0.048
	No	479	3.3	1.1	314.3	150534		
Adequate facilities/equipment for supporting distance education development and delivery.	Yes	166	3.5	1.1	363.1	60276.5	-3.27	0.001
	No	480	3.1	1.3	309.8	148705		
Adequate faculty/subject matter expert support.	Yes	165	3.5	1.1	375.3	61924.5	-4.46	0.000
	No	477	3.1	1.2	302.9	144479		
Convenient personal Internet access among target audience.	Yes	166	3.6	1	352	58428	-2.3	0.022
	No	482	3.3	1.2	315	151848		
Convenient personal computer access among target audience.	Yes	166	3.6	1	344.3	57158	-2.03	0.042
	No	474	3.4	1.2	312.2	147962		
Adequate level of computer experience among target audience.	Yes	166	3.4	1	342	56777.5	-1.77	0.076
	No	475	3.2	1.1	313.7	148984		
Enthusiasm among target audience.	Yes	166	3.7	0.9	346.7	57556.5	-2.12	0.034

		N	Mean	SD	Mean Rank	
	No	477	3.5	0.9	313.4	14949

Organizational support from employers of target audience.	Yes	165	3.7	0.9	349.5	57671
	No	474	3.5	1.1	309.7	14680
Sufficient time commitment for participation among target audience.	Yes	166	3.2	1.1	330.4	54842
	No	474	3.1	1.2	317	15027

Table 20   Kruskal-Wallis Test of Distance Education Programming Experience by Factors of Usage Scales

How long have distance education programs been offered by your organizational unit?

	N	Mean	SD	Mean Rank	Sig.

Organizational Influences	< 1 year	35	22.8	4.3	82.3	0.092
	1-5 years	89	22.9	6	86.7	
	6-10 years	22	23.7	7.8	96.8	
	11-15 years	11	18.9	7.5	56.1	
	16-20 years	10	24.6	6.6	104.1	
	> 20 years	7	24.6	11.2	120	
TOTAL		174	20.6	6.1		
Professional Influences	< 1 year	35	23.9	3.4	76.7	0.455
	1-5 years	89	24.5	3.9	90.1	
	6-10 years	22	23.7	6.4	90.1	
	11-15 years	11	22.2	7.7	77.9	
	16-20 years	10	24.4	2.8	86.4	
	> 20 years	7	26.3	2.9	116.5	
TOTAL		174	24	4.6		
Strengths & Resources	< 1 year	35	51.5	16.7	71.1	0.36
	1-5 years	89	57	16.7	90.6	
	6-10 years	22	53.9	20.2	87.2	
	11-15 years	11	56.8	23.1	98.8	
	16-20 years	10	61.8	14.5	101	
	> 20 years	7	58.3	11.5	94.8	
TOTAL		174	52.4	17.5		

Table 21 presents the results of Mann-Whitney analyses pertaining to respondents' reported access to organizational resources and corresponding perceptions of organizational and professional influences, and the existence of strengths and resources within an organization for the delivery of distance education. A sum score was calculated for each scale by totalling the individual item ratings. The mean score for respondents reporting access to the resources of a distance education division was 23.8 on the organizational influence scale, while the mean score

of respondents reporting that their organizational unit did not have access to the resources of a distance education division was 21.3. There was a significant difference between the mean rank of these scores at the <.05 level of probability (p = 0.020). Organizational units reporting that they had access to the resources of a distance education division reported a higher score on the organizational factor scale.

The mean score of respondents reporting access to the resources of a distance education division was 24.6 on the professional influence scale, while the mean score of respondents reporting that their organizational unit did not have access to the resources of a distance education division was 23.8. There was no significant difference between the mean rank of these scores at the <.05 probability level (p = 0.294). There was no difference between organizational units on whether they had access to the resources of a distance education division and their perception of professional factors.

The mean score of respondents reporting that they had access to the resources of a distance education division was 57.4 on the strengths and resources scale, while the mean score of respondents reporting that their organizational unit did not have access to the resources of a distance education division was 53.7. There was no significant difference between the mean rank of these scores at the <.05 level of probability (p = 0.084). There was no difference between organizational units on whether they had access to the resources of a distance education division and their perceptions of organizational strengths and resources.

Table 22 provides the results of Mann-Whitney analyses pertaining to respondents' reports of 'partnering' and corresponding perception of organizational and professional influences, and the existence of strengths and resources within an organization for the delivery of distance education. A sum score was calculated for each scale by totalling the individual item ratings. The mean score of respondents reporting that they had formed partnerships with other organizations was 23.8 on the organizational influence scale, while the mean score of respondents reporting that their organizational unit had not formed partnerships was 20.7. There was a significant difference between the mean rank of these scores at the <.05 level of probability (p = 0.005). Organizational units reporting that they had formed partnerships for the purposes of technology-based distance education development and delivery reported a higher score on the organizational factor scale.

The mean score of respondents reporting that they had formed partnerships with other organizations was 24.6 on the professional influence scale, while the mean score of respondents reporting that they had not formed partnerships with other organizations was 23.4. There was no

significant difference between the mean rank of these scores at the <.05 probability level (p = 0.179). There was no difference between organizations on whether they had formed partnerships with other organizations and their perception of professional factor influences. The mean score of respondents reporting that they had formed partnerships with other organizations was 57.8 on the strengths and resources scale, while the mean score of respondents reporting that they had not formed partnerships was 52.1. There was a significant difference between the mean rank of these scores at the <.05 level of probability (p = 0.037) Organizations reporting the formation of partnerships reported a higher score on the strengths and resources scale.

The individual items within the strengths and resources scale were also compared to respondents' reports of 'partnering'. The scores on these items were examined using Mann-Whitney analyses. There were significant differences found between organizations reporting partnering and the items: 'a priority of my unit' (p = 0.004); 'administration supportive of the idea' (p = 0.047); 'experience in technology-based distance education' (p = 0.003). These differences were significant at the < .05 level of probability. Organizations indicating partnerships reported a mean score of 3.9, while those who did not indicate partnerships reported a mean score of 3.4 on the item 'a priority of my unit'. Organizations indicating partnerships also indicated a higher mean score on items 'administration supportive of the idea' (4) and 'experience in technology-based distance education' (3.5).

Table 21   Mann-Whitney Tests of Respondents' Access to Organizational Resources by Factors of Usage Scales

Does your organizational unit have access to the resources of a distance education division within your parent institution?

		N	Mean	SD	Mean Rank	Sum of Ranks	Z	Sig.
Organizational Influences	Yes	77	23.8	6.3	68.3	5261.5		
	No	47	21.3	6.2	53	2488.5	-2	0.02
TOTAL		124	20.6	6.1				
Professional Influences	Yes	77	24.6	4	65.1	5015	-1	0.294
	No	47	23.8	5.1	58.2	2735		
TOTAL		124	24	4.6				

66

Strengths & Resources	Yes	77	57.4	16.5	66.9	5148		
	No	47	53.7	17.4	55.4	2602	-2	0.080
TOTAL		124	52.4	17.5				

Table 22   Mann-Whitney Tests of Respondents' Report of Partnering by Factors of Usage Scales

Has your organizational unit formed partnerships with other departments, schools, businesses, or organizations for the purposes of sharing financial, human, and/or technical resources for CHPE development and delivery?

		N	Mean	SD	Mean Rank	Sum of Ranks	Z	Sig.
Organizational Influences	Yes	110	23.8	5.7	91.5	10063.5		
	No	57	20.7	7.2	69.6	3964.5	-3	0.005
TOTAL		167	20.6	6.1				
Professional Influences	Yes	110	24.6	4	87.6	9636.5		
	No	57	23.4	5.3	77	4391.5	-1	0.179
TOTAL		167	24	4.6				
Strengths & Resources	Yes	110	57.8	15.2	89.6	9857		
	No	57	52.1	19.3	73.2	4171	-2	0.037
TOTAL		167	52.4	17.5				

Table 23 provides the results of Mann-Whitney analyses pertaining to respondents' reports of whether the organization's parent institution offered distance education courses and corresponding perceptions of organizational and professional influences, and the existence of strengths and resources within an organization for the delivery of distance education. A sum score was calculated for each scale by totalling the individual item ratings. The mean score of respondents reporting that their parent institution

offered distance education was 23.7 on the organizational influence scale, while the mean score of respondents reporting that their parent institution did not offer distance education courses was

20.4. There was a significant difference between the mean rank of these scores at the <.05 level of probability (p = 0.024). Organizations reporting that their parent institution offered distance education courses reported a higher organizational influence score.

The mean score of respondents reporting that their parent institution offered distance education was 24.7 on the professional influence scale, while the mean score of respondents reporting that their parent institution did not offer distance education courses was 23.2. There was no significant difference between the mean rank of these scores at the <.05 probability level (p = 0.888). There was no difference between organizations on whether their parent institution offered distance education courses and their perception of the influence of professional factors. The mean score of respondents reporting that their parent institution offered distance education was 57.7 on the strengths and resources scale, while the mean score of respondents reporting that their parent institution did not offer distance education courses was 51.9. There was no significant difference between organizations on whether their parent institution offered distance education courses and their perception of organizational strengths and resources.

The individual items within the strengths and resources scale were also compared to the respondents' report of whether the organization's parent institution offered distance education courses. The scores on these items were examined using Mann-Whitney analyses. There were significant differences found between organizations reporting that their parent institution offered distance education courses and the items: 'experience in technology-based distance education' (p = 0.042) and 'adequate facilities/ equipment for supporting distance education development and delivery' (p = 0.034). These differences were significant at the < .05 level of probability. Organizations reporting that their parent institution offered distance education courses reported a mean score of 3.4, while those respondents reporting that their organizations did not offer distance education courses scored 2.94 on the item 'experience in technology-based distance education'. As well, organizations reporting that their parent institution offered distance education courses reported a mean score of 3.6, while those respondents reporting that their organizations did not offer distance education courses scored 3.1 on the item 'adequate facilities/equipment for supporting distance education development and delivery'.

Table 23   **Mann-Whitney Tests of Respondents' Report of Institutional Experience by Factors of Usage Scales**

Does your parent institution offer distance education courses?

		N	Mean	SD	Mean Rank	Sum of Ranks	Z	Sig.
Organizational Influences	Yes	81	23.7	5.9	64.9	5255		
	No	38	20.4	7.6	49.6	1885	-2.3	0.024
TOTAL		119	20.6	6.1				
Professional Influences	Yes	81	24.7	3	59.7	4835.5		
	No	38	23.2	7.5	60.6	2304.5	-0.1	0.888
TOTAL		119	24	4.6				
Strengths & Resources	Yes	81	57.7	15.3	63.1	5109		
	No	38	51.9	20	53.5	2031	-1.4	0.156
TOTAL		119	52.4	17.5				

Conclusion/Findings

The response rate to questionnaire-survey studies is always a concern for researchers. Traditionally, questionnaire-survey research methods have resulted in lower response rates than other research methodologies. In this study, a number of strategies were used to increase the survey response rate. First, a cover letter was included with each survey that detailed the study's purpose and the submission deadline. After the first submission deadline had passed, a second copy of the survey was mailed to non-respondents. Included with this survey was a follow-up letter and a new submission deadline. After the second deadline had passed, reminder letters were sent to a stratified sample of non-respondents. The highest response rates were received from School of Medicine, School of Pharmacy, and School of Nursing organizational respondents. This was not surprising given that these organizational respondent categories represented academic institutions with a mission for developing and delivering higher educational programming. The lowest response rates were for the pharmaceutical industry and hospital/health care management board organizations. These organizations do not have a typical mandate to lead the development and delivery of continuing education and training programs which may have influenced the respondent's decision to participate in the survey study.

Physicians and nurses comprise the largest health professional groups in the country and they also comprise the largest groups in rural and remote regions of Canada. The majority of schools of nursing and schools of medicine reported that they provide technology-based distance education programming to health professionals. The majority of schools of pharmacy, national/provincial health professional associations, pharmaceutical industry respondents, and hospital/health care management boards respondents reported that they were not providing distance continuing professional education programming. The results also indicate that schools of nursing and medicine reported the greatest level of experience in the delivery of continuing professional education programming by technology-based distance education. The majority of nursing and medical schools that indicated involvement in technology-based continuing professional education delivery also reported that their parent organization offered distance education courses and that they had access to distance education resources within the parent institution. Institutional experience may also be an important characteristic of those organizational units involved in technology-based distance education delivery.

The majority of School of Nursing and School of Medicine respondents reported that the factors which had the greatest influence on their decision to offer technology-based distance

education included:

- addressing CHPE needs of rural/remote health professionals;
- increasing opportunities for flexible CHPE access;
- part of the organization's mission.

An interesting finding pertained to the factor 'less expensive delivery modality'. A majority of hospital/health care management board organizational respondents indicated that 'less expensive delivery modality' was a significant factor which influenced their decision to offer continuing professional education by technology-based distance education. However, medical and nursing schools indicated that this factor was not significant in their decision to offer technology-based distance education. The main reason for this difference between organizational respondents may be related to the significant costs which are associated with the training of rural and remote health care practitioners. Hospitals and health care organizations often have to incur travel and accommodation costs, and replacement staff salaries to provide workplace-related training and education to health professionals. Technology-based distance education enables these employers to reduce these costs by providing training and educational programs at the health professional's work location. This reduces the need for travel and accommodations and in some instances may reduce replacement salary costs. Hospital/health care management board respondents also reported that 'addressing mandatory CE needs of health professionals' was an important factor. This finding also suggests the importance of employer-related responsibilities in ensuring that health professionals have access to accredited programming to maintain professional and clinical competencies.

The costs associated with technology-based distance education are often higher during the program development stages. There are often costs associated with instructional material and media development and the need for more specialized human resources. These costs are normally higher than those that would be associated with the delivery of traditional face-to-face training or instruction. However, technology-based distance education programs normally result in lower delivery costs over the long-term when compared to costs associated with face-to-face teaching in on-campus or workplace sites. In this study, the majority of School of Nursing respondents reported that 'tuition/registration fees' and 'provincial government grants' were the main sources of support for their distance education programming. School of Medicine respondents reported that 'industry educational grants' were a main source of support for their distance education programs. The results suggest that a variety of funding sources are utilized by nursing schools to cover costs associated with the

71

development and delivery of technology-based continuing professional education. Industry sponsorship appears to be of greater importance in supporting technology-based continuing professional education programming which is delivered through the Medical School.

The majority of respondents from the organizational categories of schools of nursing, schools of medicine and hospital/health care management boards reported that they had formed partnerships for the purpose of sharing financial, human and/or technical resources. Across organizational categories, the most significant type of partnership was that which was formed with other educational institutions. Schools of nursing indicated that partnerships with other departments in the parent institution was also an important type of partnership. Schools of medicine, however, reported a much lower level of importance to forming partnerships with other departments in the parent institution. Partnerships with provincial and federal government organizations and community-based agencies were not identified as significant partnership types by the majority of respondents nor across the organizational respondent categories.

The distance education technologies which appear to be used the most by respondents in the delivery of continuing professional education by technology-based distance education are:

- electronic mail;
- Web-based education;
- videoconferencing;
- correspondence materials;
- videotapes;
- and audio teleconferencing.

Electronic mail, Web-based education technologies, and videoconferencing systems appear to be the technologies which are used to the greatest extent by the organizational respondents.

The majority of School of Nursing and School of Medicine respondents indicated that they were providing training and support to faculty and instructors who taught in their distance education programs. 'Faculty development seminars/workshops', 'instructional development support materials', 'mentoring by experienced instructors', and 'one-on-one consultation with an educational specialist' were the main types of faculty development activities which were reported by the majority of respondents across the organizational categories.

The main audiences of technology-based continuing professional education programs were

72

'regional' and 'provincial' in nature, and the majority of respondents reported that participants in their distance learning programs were not predominantly recent university graduates. A majority of School of Medicine and hospital/health care management board respondents indicated that participants were predominantly rural practitioners. The majority of School of Nursing, health

professional association and hospital/health care management board respondents indicated that participants did not require CHPE credit to maintain licensure, whereas accreditation and CHPE credit appeared to be more important for School of Medicine respondents. These findings would suggest that experienced practitioners are accessing technology-based distance education programs and CHPE programs provided through schools of medicine and hospital organizations are targeting rural practitioners. The rationale for these findings may be related to mandatory CHPE requirements for physicians and the use of technology-based distance education programs by health care organizations to address the CHPE needs of rural and remote health care practitioners. Schools of nurses appear to be providing their distance education programs to a more diverse population of health professionals, including both urban and rural health care professionals.

An important purpose of the survey was to identify the type and extent of programming which CHPE providers were delivering to enhance capabilities in the use and application of information and communication technologies among health care practitioners. The results indicate that the most common ICT-related CHPE topics being provided across all organizational respondents included:

- Using computers;
- E-mail applications;
- Using the Internet;
- Presentation software;
- Hospital computer systems.

The organizational influences scale encompassed items which were intended to measure the influence of organizational factors on the likelihood of ICT adoption in continuing professional education delivery. The results indicate that the type of organization (e.g. academic, hospital, industry, health professional association) did not influence perceptions of organizational influences, nor did years of experience in offering distance education programs. Organizations reporting that they were providing distance education programs did report a significantly higher score on the organizational factors scale. Organizational units reporting

73

that they had access to the resources of a distance education division, had formed partnerships for the purposes of technology-based distance education development and delivery, and their parent institution offered distance education courses also reported higher organizational influence scores. Organizational factors included 'vision within my organization for technology-based distance education is'; 'support from the leaders in my organization for technology-based distance education'; 'adequacy of my organization's technical infrastructure for technology-based distance education'; 'support of technology-based distance education in my organization'; 'funding and incentives for technology-based distance education that

are available in my organization'; 'experiences in the past that my organization has had with technology-based distance education'. Organizations reporting a positive perception of these organizational factors were more likely to be providers of technology-based distance education, to have access to the resources of a distance education division, and to have formed partnerships.

The professional influences scale comprised items which were intended to measure the influence of professional factors. These included items such as: 'My peers and colleagues believe the Internet is an important tool'; 'In the professional field in which I work, many people are Internet users'; 'In the professional field in which I work, most people think that technology-based distance education is important'; 'Distance learning is likely to contribute to the solution of learning-related problems relevant to the professional field in which I work'; 'It is my personal opinion that technology-based distance education will improve teaching and learning'. The results indicate that the type of organization (e.g. academic, hospital, industry, health professional association) did not influence perceptions of professional influences. Organizations reporting that they were providing distance education programs did not report a more positive perception of professional influences than providers who were not providing distance education. As well, there was also no relationship between years of experience in offering distance education programs, access to the resources of a distance education division, the formation of partnerships, whether a parent institution offered distance education or not and perceptions of the influence of professional factors. Factors of professional influence do not appear to be a major impetus to the provision of distance education.

The strengths and resources scale included items related to the availability of resources (e.g. funding, human resources, facilities/equipment, instructors), telecommunication costs and infrastructure, availability of technology access among target audience, attitudes, commitment and level of perceived computer experience among target audience, and support from employers of target audience. Perceptions of items related to infrastructure, access to

74

equipment and Internet services were more positive among those organizations who were providing technology-based distance education. Providers of distance education also reported higher mean scores on items related to experience, enthusiasm and sufficient time commitment among target audience. Organizational respondents who were providing distance education reported that their target audience had high levels of computer experience, were enthusiastic about technology-based CHPE, and had sufficient time to commit to participation in CHPE.

Main Conclusions

- Canadian schools of medicine and nursing are responsible for a significant amount of the

  technology-based distance education programs which are offered as CHPE to health professionals.

- Canadian schools of medicine and nursing report the highest level of experience in technology-based distance education programs which are offered as CHPE to health professionals.

- Existing educational technology resources and expertise (human, technical and infrastructure) within an organization are important factors influencing the likelihood of a CHPE organizational unit being a provider of technology-based distance education programs.

- Factors related to 'financial gain' do not influence an academic CHPE organizational unit's decision to provide technology-based distance education. Academic CHPE providers are more likely to provide technology-based distance education as a means for addressing needs of rural/remote health professionals; to increase opportunities for flexible CHPE access; and to fulfill an organization's mission.

- Hospital/health care management boards favor technology-based distance education as a more 'cost-effective' means for addressing mandatory CHPE needs of health professionals.

- Schools of medicine report a high level of dependency on 'industry' funding as a means of support for technology-based distance education program development and

delivery.

- Partnering, whether that be with other organizations and institutions or other internal departments, appears to be a significant characteristic of technology-based distance education program development and delivery by Canadian CHPE providers.

- Schools of medicine reported a lower level of importance on forming partnerships with other internal departments in the parent institution when compared to other academic organizations.

- Partnerships with provincial and federal government organizations and community-based agencies were not identified as significant partnership types.

- Internet-based technologies (e.g. E-mail and the World Wide Web) and videoconferencing are the most common educational technologies used by CHPE providers in technology-

  based distance education programming.

- Technology-based Canadian CHPE providers are mostly targeting 'regional' and 'provincial' audiences; not international.

- Participants in technology-based CHPE programs are varied and include experienced health professionals.

- School of Medicine and hospital/health care management board respondents are addressing the needs of a predominantly rural practitioner audience. Schools of nursing are addressing the needs of both urban and rural practitioners through their technology-based CHPE programs.
- The most common ICT-related CHPE topics being provided to Canadian health professionals include: using computers; e-mail applications; using the Internet; presentation software; and hospital computer systems.

- Providers of technology-based CHPE distance education programs are more likely to report a positive perception of: supportive organizational factors; technological infrastructure, access to equipment and Internet services; and level of computer experience, enthusiasm and commitment among their distance education programming

target audience.

Recommendations

1.   Information and communication technologies (ICT) play a significant role in the delivery of continuing health professional education (CHPE) programming which addresses the mandatory continuing professional education and lifelong learning needs of rural, remote and northern health professionals. These technologies are essential in facilitating effective distance education programming which maintains the competencies of these practitioners and reduces the level of professional isolation they experience. Access to and use of ICTs in CHPE delivery are vital components of any effective strategy to enhance retention and recruitment of rural health care providers.

One of the distinguishing characteristics of a profession is the commitment by its members to the promotion of continued study and lifelong learning (Buchholz, 1979). In order to provide high-quality health care services, health professionals require access to effective ongoing professional development and continuing education programs. With the rapid advances which are occurring in the health sciences, it is becoming increasingly challenging for health care professionals to stay abreast of the latest health research information (Whitten, Ford, Davis, Speicher, & Collins, 1998). Knowledge in the health sciences is constantly expanding as new information is published, disseminated, and quickly updated or revised. In this context, the health care practitioner is placed in the unenviable position of having to provide the best health care to the public while trying to use and apply a rapidly changing body of knowledge (Lorenzi, Kues, & Anthony, 1984).

In Canada, the trend appears to be towards greater use of ICTs in the health care system and in the continuing education of health professionals. In recent years, Internet-based technologies have been adopted as a means for delivering information that can be linked to patient care issues in a timely and interactive fashion (Peterson et al., 1999; Anderson et al., 1999). The Internet has the potential to widen continuing education access, increase flexibility for health professionals, and improve the quality of training and education they receive. The use of the Internet as a knowledge translation medium can also lead to improved cost-effectiveness by enabling new target groups to be reached and higher-quality learning outcomes to be gained at a lower marginal cost per adult learner. The use of Internet technologies and the increased capacities of ICTs are contributing to a movement away from traditional CHPE.

In this study, hospital/health care management board respondents reported that 'addressing mandatory CHPE needs of health professionals' was an important factor which influenced

their

decision to provide technology-based CHPE. This finding suggests the importance of employer-related responsibilities in ensuring that health professionals have access to accredited CHPE programming to maintain competencies. Although potential users of programs may or may not require mandatory CHPE credits for maintaining licensure, the results do suggest that employers place a high level of importance on CHPE credits.

2. ***Academic institutions are responsible for providing the majority of continuing health professional education (CHPE) programming via technology-based distance education. Academic institutions view this programming as an important part of their mission and commitment to addressing and supporting the lifelong learning needs of health professionals, particularly those practicing in rural and remote regions of Canada.***

The results from this study confirm that Canadian schools of medicine and nursing are responsible for a significant amount of the technology-based distance education programs which are offered as CHPE to health professionals. Canadian schools of medicine and nursing also report the highest level of experience in technology-based distance programs which are offered as CHPE to health professionals.

These academic CHPE providers are more likely to provide technology-based distance education as a means for addressing needs of rural/remote health professionals; to increase opportunities for flexible CHPE access; and to fulfill an organization's mission. These institutions are less likely to be providing technology-based CHPE as a way to increase revenue for the institution. Canadian CHPE providers are mostly targeting 'regional' and 'provincial' audiences and School of Medicine and hospital/health care management board respondents are addressing the needs of a predominantly rural practitioner audience. Schools of nursing appear to be addressing the needs of both urban and rural practitioners through their technology-based CHPE programs.

3. ***The Internet and videoconferencing are the main educational technologies which are being used by Canadian continuing health professional (CHPE) providers in the delivery of technology-based continuing professional education.***

Electronic mail, Web-based education, and videoconferencing systems appear to be the technologies which were reported as being used the most by the organizational respondents.

The growth of the Internet and the World Wide Web have created new opportunities for providing distance education. Proponents of the Internet suggest that it has had far greater impact on global

communications than any other previous communication technology development. Greater Internet developments in the future will include continued improvements in speed of Internet access as ISDN (Integrated Services Digital Network) line developments increase the potential for downloading large files, such as real-time video. Proponents of online CHPE suggest that more and more courses will be delivered through the World Wide Web (WWW) by accredited CHPE Web Service providers. Health professionals will be able to pay for CHPE services using digital cash or credit cards, and submit on-line evaluations using the Web.

The Internet is an excellent location for medical reference material as information is universally available, easily updated and quickly obtained (Huntley, 1998). Using the Internet, CHPE can easily be delivered to the site of clinical activity (Peterson et al., 1999). Internet-based CHPE is also advantageous because it allows the user to select the content, pace, and place of learning. It allows health care providers to obtain CHPE from regional, national, and international experts without the need to travel. The main benefits of Internet-based CHPE include easy access, low expense, interactive multimedia format, and an ability to create interactive clinical cases (Tanner et al., 2001; Richardson & Norris, 1997). The flexibility of HTML, the language in which Web pages are written, allows for high-quality video and audio to be presented (Allen, 2001). Electronic publishing can present ideas that would be impossible in printed text, using multimedia components such as sound and movies (Ruskin et al., 1996). Many Web-based materials can easily be stored on a CD-ROM and used locally within a PC with access speeds far higher than those achievable with most on-line courses. According to Turchin & Lehmann (2000) the WWW provides opportunities for the development of new educational tools and facilitates learning through interactivity and self-paced study. Publication on the Internet offers the added advantages that information can be distributed worldwide and can be easily and rapidly updated to reflect the state of the art.

Videoconferencing, also known as videoteleconferencing, and interactive television, is a presentation mode that can link an instructor and adult learners at various remote sites using a two-way audio and video connection (Havice & Knowles, 1995; Kaufman & Brock, 1998; Sen Cupta, Wallace, Clark, & Bannan, 1998; Brown, 1994). Videoconferencing technology has been rapidly emerging as an increasingly useful tool for improving patient care delivery and expanding access to CHPE. As pressure mounts to reduce health care delivery costs and to increase access to quality medical care, the efforts of many individual hospitals, regional

health care systems, and governments to install interactive videoconferencing systems has quickly been intensifying (Brown, 1994). The emergence of the relatively inexpensive compressed video systems that permit two-way video and audio interaction has increased the acceptance of this communications modality in situations where face-

to-face instruction was the established norm.

Videoconferencing systems have undergone significant growth in recent years because of increased digital transmission options at reduced costs, vast improvements in video compression technologies, and improvements in the systems with an associated decrease in their cost. The main interest in videoconferencing is based on the interactive, real-time two-way communication which it permits. This interactive communication allows participants at two or more sites to receive immediate clarification and also enables instructors to garner immediate feedback from participants which allows them to adjust their presentations accordingly (Fairbanks & Viens, 1995; Burleson & Sugimoto, 1984). Video transmissions appear on a monitor, much like a traditional television, while sound emanates through the system's speakers. The signal transmission is usually so rapid that the sender and receiver can interact in a simultaneous manner.

4. ***Organizational support is a critical factor in the development and expansion of resources for the successful and sustainable delivery of technology-based distance education to rural and remote health professionals.***

The availability of technological infrastructure and specialist support to CHPE providers are important factors which influence the likelihood of technology-based CHPE delivery. In this study, providers of technology-based CHPE distance education programs were more likely to report a positive perception of supportive organizational factors. Organizational support through the provision of human and financial resources and technical infrastructure are essential for success. According to Bates (2000) appropriate technology infrastructure is an essential requirement for technology-based education. The integration of technology in education and training places an increasing priority on an institution's technology plan. As a result, there is often a need for a systematic process in which training and education needs are identified and taken into account in technology planning (Bates, 2000).

Existing educational technology resources and expertise (human, technical and infrastructure) within an organization are important factors influencing the likelihood of a CHPE organizational unit being a provider of technology-based distance education programs. The

81

majority of nursing and medical schools that indicated involvement in technology-based CHPE delivery also reported that their parent organization offered distance education courses and that they had access to distance education resources within the parent institution. Institutional experience was an important characteristic of those organizational units involved in technology-based distance education delivery.

The development of high-quality Web-based education systems necessitates a range of specialist skills. Educational technology staff, such as graphic designers and HTML programmers will be required to support the development and application of educational materials. Educational technology specialists who provide instructional design, faculty development, project management, and evaluation support to faculty will also be required to support the use of technology for training and education (Graves et al., 1997). According to Bates (2000) the centralization of educational technology support services may be appropriate in a new institution with a commitment to make ICTs a focus of its vision and strategy. However, such a strategy is less likely to be appropriate for the old or well-established divisional universities with large and powerful faculties. In this study, medical schools were less likely to report the formation of partnerships with internal departments within the parent institution. This might suggest the existence of a certain level of concern among medical school academic units that centralization of educational technology services may weaken the school's control over the teaching process. These organizations may prefer to establish their own 'flexible learning or multimedia unit'. This type of model could contain a mix of centralization and decentralization. A small 'Center for Educational Technology' with a few highly specialized and skilled staff could coordinate and facilitate collaboration between faculty members, subject matter experts and support units.

5. *The use of information and communication technologies (ICTs) in the delivery of continuing health professional education (CHPE) places unique and special demands on instructors and subject matter experts (SMEs) who are unfamiliar with these technologies in training and educational delivery. Faculty and instructional development support are key services to assist instructors and trainers in the effective use of ICTs in continuing professional education.*

The majority of School of Nursing and School of Medicine respondents indicated that they were providing training and support to faculty and instructors who taught in their distance education programs. 'Faculty development seminars/workshops', 'instructional development support materials', 'mentoring by experienced instructors', and 'one-on-one consultation with an educational specialist' were the main types of faculty development activities which were

reported by the majority of respondents across the organizational categories. Support for instructors and SMEs in the use of information and communication technologies (ICTs) is an essential prerequisite for successful technology-based instruction. A comprehensive and systematic approach to technical and professional support for faculty is required (Bates, 2000). The establishment of an educational technology support unit to assist faculty with development activities is a necessity, as is a focus on faculty development programs and services. Faculty development is reported to work best when

the institution has "a culture pervaded by the use of technology and supported by a wide range of strategies…a strong strategic plan in which the use of technology for teaching plays a prominent role….support from senior leadership for the use of technology for teaching….support, in a wide variety of ways, for faculty members who wish to use technology for teaching" (Bates, 2000, p.99).

According to Ranstrom (1997) ample orientation efforts must be targeted at faculty and learners in order to assist them in becoming familiar with the variety of equipment they may need to use. Orientation sessions may be of particular importance for faculty, many of whom may need to alter their teaching styles in order to use the equipment most effectively (Fairbanks & Viens, 1995; Dirksen, 1993). An orientation session can provide faculty with the opportunity to learn new strategies for overcoming the challenges of facilitating learning at a distance (Kaufman & Brock, 1998).

6. *Health professionals require a fundamental understanding of information and communication technologies (ICTs) so they are able to utilize these technologies in pursuing lifelong and continuing professional education opportunities. Appropriate stakeholders need to ensure that optimal efforts are made to provide continuing health professional education (CHPE) opportunities so health care practitioners are able to develop the skills needed for optimal use of ICT systems.*

It will become increasingly difficult to accept people as being fully educated if they do not know how to use the Internet to communicate with other professionals; if they do not know how to find Web sites that will provide relevant and reliable information in their field of study (Bates, 2000). Learning in the workplace will be initiated by individuals as part of their working lives. It will be informal (that is, not leading to any formal qualification), self-directed, and piecemeal (broken into small chunks of learning, some as small as a few minutes a day) (Bates, 2000). The learning context will also need to enable people to work alone, interacting with learning material (which may be available locally or remotely); work

collaboratively (and in equal relationship) with peers at different remote sites (Bates, 2000).

According to Moehr and Grant (2000) Canadian health professional students need a basic knowledge of the capabilities and limitations of information systems. Rowe et al. (1995) surveyed all first-year family medicine residents from Canadian university-affiliated programs. Only 13% of respondents reported being very or extremely comfortable with computers, while 29% indicated they were somewhat comfortable and 24% not at all comfortable. Seventy one percent of residents (71%) believed that teaching computer use should be a mandatory component of family medicine

training programs and 42% of respondents thought that evaluation of this training should be incorporated into the College of Family Physicians of Canada program evaluation. The results of this study indicate that the most common ICT-related CHPE topics being provided to Canadian health professionals include: using computers; e-mail applications; using the Internet; presentation software; and hospital computer systems.

7.   *Technology-based continuing health professional education (CHPE) development and delivery costs are generally higher than those associated with face-to-face CHPE delivery. Many organizations undertake these programs as a means for addressing the mission of their institution or for addressing the mandatory CHPE requirements of rural, remote and northern health professionals. External funding to support such initiatives is essential to offset those costs which are normally not covered in institutional operating budgets.*

In this study, the majority of School of Nursing respondents reported that 'tuition/registration fees' and 'provincial government grants' were main sources of support for their distance education programming. School of Medicine respondents reported that 'industry educational grants' were a main source of support for their distance education programs. According to Bates (2000) if technology-based CHPE is to be a key component of the institution, then the institution has to build it into its base operating budget (Bates, 2000). Provincial and federal government departments and agencies also have an important role to play as it pertains to funding technology-based CHPE. Bates (2000) believes that 'earmarked government funding' is a good strategy to get institutions to pay attention to developing and delivering technology-based distance education.

The provision of an equitable and sustainable level of health care in rural communities is a challenge due in part to the difficulties associated with recruiting and retaining rural health

care providers. Rural health care delivery is a demanding and challenging form of practice regardless of the profession. As an example, the rural physician or nurse practitioner frequently practices in an isolated environment with inadequate resources and limited or distant specialist back-up resources. This isolation necessitates a level of clinical competence beyond that of their urban health care peers. This isolation also makes it difficult for the health care provider to maintain their professional competencies. Professional isolation is believed to be related to job dissatisfaction with rural practice. Rural health care providers are generally dissatisfied with their opportunities for participation in CHPE.

8. *Partnerships involve the combining of expertise and resources. Partnerships are essential in the development and delivery of technology-based continuing health professional education (CHPE). Partnering enables the avoidance of duplication and allows organizations to share limited resources, equipment and infrastructure. CHPE providers need to partner with other organizations and communities in the development and delivery of technology-based CHPE programs to ensure program sustainability and acceptance. Municipal, provincial and federal levels of government have a role to play in encouraging, facilitating and supporting such partnerships.*

Partnering, whether that be with other organizations and institutions or other internal departments, appears to be a significant characteristic of technology-based distance education program development and delivery by Canadian CHPE providers. Building and strengthening a collaborative approach between institutions has the advantage of avoiding duplication and accessing a higher level of infrastructure and resources than would otherwise be possible. More importantly, it enables institutions to learn and grow from the experience of working together and to leverage important qualitative improvements and economies of scale (Bates, 2001). Partnership arrangements work best when partner institutions are of roughly the same status and have complementary strengths, that is, different areas of research or subject expertise that complement the other. The main advantage, besides cost, is that learners are able to access a wider range of expertise.

One model of partnering which appears to applicable to technology-based CHPE is that of 'consortia'. In a consortium model, different institutions share common resources (such as marketing, electronic and human networks, distance education expertise and learning centres), and agree among themselves to avoid duplication and to work together wherever possible on

joint course development and delivery (Bates, 2001, p. 61). Successful consortia need funding mechanisms that reward and facilitate collaboration and they need a change of culture within organizations, from one of fierce competitiveness between institutions to one of trust and goodwill between the partner organizations.

9. ***Governments have an important role to play in stimulating efforts in the development and delivery of technology-based continuing health professional education (CHPE). Apart from funding to support the development and delivery of technology-based CHPE and appropriate technological infrastructure networks, there is a role for government to play in facilitating partnerships between institutions and organizations.***

According to Bates (2000) the roles of government in managing technological change in education and training can include the following: stimulator of 'best practices'; 'enabler, funder and broker of partnerships'; 'creator of technology networks'; and 'informer and protector of consumers'. Governments can also play a key role in articulating a collective vision with respect to the place of ICTs in health professional education and training. Information and communication technologies have a great deal of relevance in the enhancement of health care delivery in rural, remote and northern regions of Canada. Professional isolation is a key factor which influences the recruitment and retention of health professionals in these areas and a shortage of rural health care professionals is having a significant effect on the nature of health care services available in rural regions. Government can influence public policy decisions in this area by:

- enabling the delivery of cost-effective CHPE to rural and remote health professionals;
- increasing the capacity of organizations and institutions to utilize the power of technology to carry out their teaching, research, and service functions;
- enhancing a better conception of what constitutes best practice in the field of e-learning, distributed learning and distance education (Bates, 2001).

Strategies for the use of information and communications technologies in health services need to be embedded within a wider framework of government policy for health care delivery. At present, several countries are leading significant e-learning initiatives in the area of online CHPE. According to Bates (2000) governments may want to consider the establishment of different centres of excellence in different institutions, to ensure the development of programming for different market niches. Governments can also lever economies of scale, and concentrate scarce skills in developing and running e-learning programmes, by

encouraging or building strong national consortia.

Dissemination of Findings

A Web page will be developed to highlight the results of this study. This report will be located in the research section of the Office of Professional Development Web site (www.med.mun.ca/pdmed). A number of key stakeholders in the continuing health professional education field will also be forwarded copies of the report. In addition to this, dissemination through presentations and posters to national audiences are planned at annual meetings such as the Association of Canadian Medical Colleges Annual Meeting in Quebec City, April 2003 and the Canadian Association of Continuing Health Education Annual Meeting in Halifax, Sept 2003. The results will also be adapted for publication in relevant academic and professional journals.

References

Allan, M.., Kaufman, D., Barrett A., Paterson, G., Sargent, J., & McLeod, R. (2000). Self-reported effects of computer workshops on physician's computer use. *The Journal of Continuing Education in the Health Professions*, *20*, 20-6.

Allen, J.W. (2001). Surgical Internet at a glance: Continuing medical education. *The American Journal of Surgery*, *181*, 89-90.

American Association of Colleges of Nursing (1999). *Technology Survey*. Washington, DC: Author.

Anderson, J. G., Casebeer, L. L., & Kristofco, R.E. (1999). Medcast: Evaluation of an intelligent pull technology to support the information needs of physicians. *Proceedings AMIA Annual Symposium*, 466-470.

Balen, R., Miller, P., & Malyuk, D. (2000). Medical informatics: Pharmacists' needs and applications in clinical practice. *Journal of Informed Pharmacotherapy*, *2*, 306-18.

Bates, A.W. (2000). *Managing technological change: Strategies for college and university leaders*. San Francisco, CA: Jossey-Bass Inc.

Bates, A.W. (2001). *National strategies for e-learning in post-secondary education and training*. Paris: UNESCO International Institute for Educational Planning.

Bhatara, V.S., Fuller, W.C., O'Connor-Davis, L., & Misra, L.K. (1996). Improving job satisfaction of rural South Dakota mental health providers through education: A pilot study. *South Dakota Journal of Medicine*, *March*, 93-96.

Bigsby, D., & Moehr, J. (1995). Internet for teaching and learning introductory health informatics. *Proceedings: The Annual Symposium on Computer Applications in Medical Care, Journal of the American Informatics Association* (Suppl.), 532-36.

Black, D.P., & Dunikowski, L. (1985). Videotapes as continuing medical education for physicians in isolated communities. *Canadian Family Physician*, *31*, 1162-1163.

Brown, J.P. (1994). Videoconferencing in patient care delivery and medical training. *The*

Journal of Healthcare Information & Management Information Systems Society, *8*(3), 15-20.

Buchholz, L.M. (1979). Computer-assisted instruction for the self-directed professional learner? *The Journal of Continuing Education in Nursing*, *10*(1), 12-14.

Buckeridge, D., & Goel, V. (2001). Health informatics education: An opportunity for public health in Canada. *Canadian Journal of Public Health*, *92*(3), 233-36.

Burleson, S., & Sugimoto, T. (1984). Cancer education via video-teleconferencing: An assessment of participant responses. *JBC*, *August*, 5-9.

Cameron, S. (1998). Toward a national curriculum in informatics. *Canadian Family Physician*, *44*, 2044-2046.

Canadian Medical Association (2001). Results from the CMA's 2001 Physician Resource Questionnaire. *Canadian Medical Association Journal*, *165*(5).

Candy, P.C. (2000). Preventing "information overdose": Developing information-literate practitioners. *The Journal of Continuing Education in the Health Professions*, *20*, 228-237.

Carty, B., & Rosenfeld, P. (1998). From computer technology to information technology: Findings from a national study of nursing education. *Computers in Nursing*, *16*(5), 259-65.

Clark, C.E., & Cleveland, T.L. (1984). The media and the mode. *The Journal of Continuing Education in Nursing*, *15*(5), 168-172.

Collis, B., Peters, O., & Pals, N. (2000). Influences on the educational use of the WWW, e-mail, and videoconferencing. *Innovations in Education and Training International*, *37*(2), 108-119.

Delaney, C. (2001). Health informatics and oncology nursing. *Seminars in Oncology Nursing*, *17*(1), 2-6.

DeMuth, J.E. (1996). Evaluation of an in-depth pharmacy home-study program. *The Journal*

of Continuing Education in the Health Professions, *16*.

Dirksen, S.R. (1993). RN/BSN distance learning through microwave. *Nurse Educator*, *18*(2), 13-17.

Dunn, E.V., Acton, H., Conrath, D., Higgins, C., & Bain, H. (1980). The use of slow scan video for CME in a remote area. *Journal of Medical Education*, *55*, 493-495.

Fairbanks, J., & Viens, D. (1995). What's happening: Distance education for nurse practitioners: A partial solution. *Journal of the American Academy of Nurse Practitioners*, *7*(10), 499-503.

Felkey, B., & Barker, B. (1995). The power of information in an integrated health care system. A*merican Journal of Health-System Pharmacy*, *52*, 537-40.

Ferguson, S., Neville, R., McCowan, G., Hoskins, G., Warner, F., & Smith, B. (2000). Which method of communication do general practitioners prefer to use? *British Journal of General Practice*, *50*(454), 404-405.

Gill, D., & Game, D. (1994). Continuing medical education needs of rural GPs in South Australia. *Australian Family Physician*, *23*(4), 663-667.

Graves, W.H., Henshaw, R.G., Oberlin, J.L., & Parker, A.S. (1997). Infusing information technology into the academic process. In M.W. Peterson, D.D. Dill, L.A. Mets, & Associates (eds.), *Planning and management for a changing environment* (pp.432-452). San Francisco, CA: Jossey-Bass.

Hartmann, J. (1998). An educational program in the medical uses of computers for rural physicians. *Medical Reference Services Quarterly*, *17*(3), 25-34.

Havice, P.A., & Knowles, M.H. (1995). Two-way interactive video: Maximizing distance learning. *The Journal of Continuing Education in Nursing*, *26*(1), 28-30.

Health Canada, Advisory Council on Health Infostructure (1999). *Canada health infoway: Paths to better health*. Ottawa, ON: Office of Health and the Information Highway, Health Canada.

Hebert, M. (2000). A national education strategy to develop nursing informatics
        competencies. *Canadian Journal of Nursing Leadership*, *13*(2), 11-14.

Herman, C.M. & Buerki, R.A. (1977). Continuing professional education via radio: A review of
        the literature. *American Journal of Pharmaceutical Education*, *41*(2), 192-95.

Huntley, A.C. (1998). Dermatology and the Internet. *MD Computing*, *15*(4), 246-48.

Hutten-Czapski, P. (1998). Rural incentive programs: A failing report card. *Canadian Journal of*
        Rural Medicine, *3*(4), 242-247.

Jerant, A., & Lloyd, A. (2000). Applied medical informatics and computing skills of students,
        residents and faculty. *Family Medicine*, *32*(4), 267-72.

Kaczorowski, J., Walsh, A., Chan, D., & Trim, K. (2000). Short report: Medical informatics:
        How do family medicine educators at McMaster University use it and teach it?
        Canadian Family Physician, *46*, 1310-12.

Kamien, M., & Buttfield, I.H. (1990). Some solutions to the shortage of general practitioners
        in rural Australia. *The Medical Journal of Australia*, *53*, 168-171.

Kaufman, D.M., & Brock, H. (1998). Enhancing interaction using videoconferencing in
        continuing health education. *The Journal of Continuing Education in the Health*
        Professions, *18*, 81-85.

Lacher, D., Nelson, E., Bylsma, W., & Spena, R. (2000). Computer use and needs of Internists: A
        survey of members of the American College of Physicians - American Society of
        Internal Medicine. In J.M. Overhage (ed.), *Proceedings of the 2000 AMIA Annual*
        Symposium (pp. 453-6). Bethesda, MD: American Medical Informatics Association.

Lawton, S., Montgomery, L., & Farmer, J. (2001). Survey and workshop initiative on
        community nurses' knowledge of the Internet. *Computers in Nursing*, *19*(1), 118-21.

Leeseberg Stamler, L., Thomas, B., & McMahon, S. (1999). Nursing students respond to a

computer assignment. *Journal of Professional Nursing*, *15*(1), 52-58.

Lindsay, E.A., Davis, D.A., Fallis, F., Willison, D.B., & Biggar, J. (1987). Continuing education through Telemedicine for Ontario. *Canadian Medical Association Journal*, *137*, 503-506.

Lorenzi, N.M, Kues, J.R., & Anthony, S.S. (1984). Beyond the library walls. *Bulletin of the Medical Library Association*, *72*(1), 1-5.

Lott, D.R. (1995). Obstacles to self-paced learning. *The Journal of Continuing Education in the Health Professions*, *15*, 203-208.

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.

McClaran, J., Snell, L., & Duarte-Franco, E. (2000). Continuing educational needs in computers and informatics. *Canadian Family Physician*, *46*(4), 839-47.

McDowell, C.A., Challis, E.B., Lockyer, J.M., White, L., Adams, K., & Parboosingh, I.J. (1987). Teleconferencing CME programs to rural physicians: The University of Calgary teleconference program. *Canadian Family Physician*, *33*, 1705-1708.

Miller, J., Piper, L., & Tucker, D. (1997). Strategies for getting students on the information superhighway. *Nurse Educator*, *22*(5), 40-43.

Moehr, J. & Grant, A. (2000). Medical informatics and medical education in Canada in the 21st Century. *Clinical and Investigative Medicine*, *23*(4), 275-280.

Moore, D.E., Green, J.S., Jay, S.J., Leist, J.C., & Maitland, F.M. (1994). Creating a new paradigm for CME: Seizing opportunities within the health care revolution. *The Journal of Continuing Education in the Health Professions*, *14*, 4-31.

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

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

Patel, V., & Arocha, J. (2000). Introduction to the workshop on medical education and
training in the information age. *Clinical and Investigative Medicine*, *23*(4), 251-55.

Pereira, J., Bruera, E., & Quan, H. (2001). Palliative care on the Net: An online survey of
health care professionals. *Journal of Palliative Care*, *17*(1), 41-5.

Peterson, M.W., Galvin, J. R., Dayton, C., & D'Alessandro, M. P. (1999). Delivering
pulmonary continuing medical education over the Internet. *Chest, 115*(5), 1429-1436.

Ramsey, P.G., Coombs, J.B., Hunt, D.D., Marshall, S.G., & Wenrich, M.D. (2001). From
concept to culture: The WWAMI program at the University of Washington School of
Medicine. *Academic Medicine*, *76*(8), 765-75.

Ranstrom, C. (1997). Restructuring interactive television: An educator's perspective. *Nurse
Educator*, *22*(1), 5.

Richardson, M.L., & Norris, T.E. (1997). Online delivery of continuing medical education
over the World Wide Web: An online needs assessment. *American Journal of
Roentgenology*, *168*, 1161-1164.

Robinson, T.N., Patrick, K., Eng, T.R., & Gustafson, D. (1998). An evidence-based approach
to
interactive health communication: A challenge to medicine in the information age.
*Journal
of the American Medical Association (JAMA)*, *280*(14), 1264-1269.

Rosenthall, J.R., & Miller, T.C. (1982). Divergent pediatric CME priorities in a rural area.
Journal of Medical Education, *57*, 193-194.

Rowe, B., Ryan, D., Therrien, S., & Molloy, J. (1995). First-year family medicine residents'

use of computers: Knowledge, skills, and attitudes. *Canadian Medical Association Journal*, *153*(3), 267-72.

Rourke, J. (1988). Rural family practice part II: Preferences in continuing medical education. *Canadian Family Physician*, *34*, 1035-1038.

Rourke, J. (1993). Politics of rural health care: Recruitment and retention of physicians. *Canadian Medical Association Journal*, *148*(8), 1281-1284.

Rourke, J. (1994). The politics of rural medical care. *Ontario Medical Review*, *August*, 17-22.

Rourke, J. (1997). In search of a definition of rural. *Canadian Journal of Rural Medicine*, *2*(3), 113-115.

Royle, J.A., Blythe, J., DiCenso, A., Baumann, A., & Fitzgerald, D. (1997). Do nurses have the information resources and skills for research utilization? *Canadian Journal of Nursing Administration*, *10*(3), 9-30.

Rubenstein, L.Z., Rubenstein, L., Elkin, P., & Elkin, S.P. (1975). Determinants of the choice of rural practice: A study of Yugoslav general practitioners. *Journal of Medical Education*, *50*, 615-623.

Ruskin, K.J., Doyle, D.J., & Engel, T.P. (1996). Development of an academic Internet resource. *The Yale Journal of Biology and Medicine*, *69*, 439-444.

Saranto, K., & Leino-Kilpi, H. (1997). Computer literacy in nursing: Developing the information
technology syllabus in nursing education. *Journal of Advanced Nursing*, *25*, 377-85.

Sen Cupta, T.K, Wallace, D.A, Clark, S.L, & Bannan G. (1998). Videoconferencing: Practical advice on implementation. *Australian Journal of Rural Health*, *6*, 2-4.

Staggers, N., Gassert, C., & Curran, C. (2001). Informatics competencies for nurses at four levels of practice. *Journal of Nursing Education*, *40*(7), 303-316.

Tanner, T.B., Metcalf, M.P., & Coulehan, M.B. (2001). Keeping sharp: Interent CE update and experience. In J.D. Westwood, H.M. Hoffman, G.T. Mogel, & D. Stredney (eds.),

Medicine meets virtual reality (pp.492-494). USA: IOS Press.

Tepper, J.D., & Rourke, J. (1999). Recruiting rural doctors: Ending a Sisyphean task. *Canadian*

    Medical Association Journal, *160*(8), 1173-1174.

Treloar, L.L. (1985). Facts about teleconferencing for staff development administrators. *The*
    Journal of Continuing Education in Nursing, *16*(2), 47-52.

Turchin, A., & Lehmann, C.U. (2000). Active learning centre: Design and evaluation of an
    education World Wide Web site. *Medical Informatics and the Internet in Medicine*,
    25(3), 195-206.

Walker, J., Thomson, A., & Smith, P. (1998). Maximizing the world wide web for high
    quality educational and clinical support to health and medical professionals in rural
    areas. *International Journal of Medical Informatics, 50*(1-3), 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.

Woolf, C.R. (1991). Comparison of the perceived CME needs of semirural and urban
    physicians. *The Journal of Continuing Education in the Health Professions*, *11*, 295-
    299.

Yung, D., Foy, E., & MacCara, M. (2001). Internet use by pharmacists: A survey of the
    Maritime provinces. *Canadian Pharmaceutical Journal*, *133*(10), 34-38.