1. TITLE PAGE - FINAL REPORT http://ikit.org/OLT.html

FOSTERING INTERPROFESSIONAL PRACTICE IN REHABILITATION AND COMPLEX CONTINUING CARE THROUGH COLLABORATION AND VIRTUAL LEARNING.

November 1, 2000 through March 31, 2002

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2. PROJECT INFORMATION

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3. EXECUTIVE SUMMARY

The goal of this project was to extend upon profession specific continuous learning initiatives mandated by the Regulated Health Care Professions Act (RHPA, 1991, 1993) by designing opportunities for interprofesssional collaboration and continuous learning at the work place. To date, professional colleges have instituted quality assurance programs aimed at monitoring continuous learning and reflective practices of their memberships. However, the way in which these programs actually foster learning or improvements in practice at the workplace is not well understood. The intention of this study was to foster opportunities for interprofessional collaboration and continuous learning among team members in a hospital practice setting using knowledge building pedagogy and technology (Bereiter & Scardamalia, 1993). Knowledge building is a theory of expert learning and its corresponding technology is called Knowledge Forum – a virtual communal intentional learning environment (database technology). Partners on this project included the Toronto Rehabilitation Institute (Toronto Rehab) and the Institute of Knowledge Innovation and Technology (IKIT) at the University of Toronto. Participants were all members of the Professional Practice Portfolio at Toronto Rehab (N=22). All participants were encouraged to submit monthly professional activity reports (notes) over 17 months (November 2000 through March 2002) to a Knowledge Forum database. As well, this interprofessional team from nursing, research, bioethics, occupational therapy and physiotherapy were encouraged to read and comment on each other's notes in Knowledge Forum. Researchers at the Institute for Knowledge Innovation and Technology provided consultative and analytic support during the design and implementation phases of the project. Results of quantitative and qualitative analyses indicate that this project succeeded at embedding opportunities for collaboration and continuous learning in health care practices at the work place using knowledge building pedagogy and technology. In our opinion, this study contributes to advancing the lifelong learning mandate of the OLT-HRDC by providing a model and evidence of interprofessional collaboration, learning and knowledge building at the work place.

RÉSUMÉ EXÉCUTIF

L'objectif de ce projet était d'éteindre le mandat de la loi qui réglemente les professions en lien avec les soins de santé (Regulated Health Care Professions Act, RHPA, 1991, 1993), plus spécifiquement, les inititatives professionnnelles continues d'apprentissage au travers le design de possibles situations menant à la collaborations interprofessionelle et l'apprentissage collaboratif en milieu de travail. À ce jour, les ordres professionnelles ont établi de programmes d'assurance de la qualité ayant pour but la surveillance de l'apprentissage continu et des pratiques réfléchies de ses membres. Cependant, la façon dont ces programmes encouragent l'apprentissage ou l'amélioration des pratiques en milieu de travail nèest pas bien comprise. Dans ce contexte, le but de cette étude était de promouvoir des opportunitées de collaboration interprofessiionnelle et l'apprentissage continu des membres des équipes travaillant dans le milieu pratique d'un hôpital, grace à la mise en oeuvre de la pédagogie d'élaboration de connaissances et de l'utilasation des nouvelles technologies (Bereiter & Scardamalia, 1993). Du point de vue théorique, l'élaboration des connaissances est fondée sur la notion de l'apprenstissage expert. Du point de vue technologique, cette théorie est outillée par Knowledge Forum, un environement collectif virtuel développé pour soutenir des actes intentionnels dèapprentissage (technologie de bases de données). Les partenaires de ce projet sont l'Institut de réhabilitation de Toronto et l'Institut d'innovation des connaissances et de technologie (IKIT) de l'Université de Toronto. Les participantes et partcipants étaient des membres du Dossier de pratique professionnelle de l'Institut de réhabilitation de Toronto (N=22). Tous les participants et toutes les partcipantes furent encouragés à contribuer à la base de donées de Knowledge Forum via la publication de bilans mensuels (des notes) de leur activité professionnelle pendant une période de 17 mois (de novembre 2000 à mars 2002). De plus, cette équipe interprofessionnelle composée par plusieur secteurs (infirmier, recherche, bioéthique, thérapie occupationnelle et physiothérapie) fut encouragée à lire et à commenter les notes écrites par leurs collègues sur Knowledge Forum. Les chercheures et les chercheurs de l'IKIT – l'Institut d'innovation des connaissances et de technologie – ont donné du soutien analytique et ont offert des servcies de consultation pendant les phases de design et de mise sur pied du projet. Les résultats des analyses quantitatives et qualitatives indiquent que le project a réussi à promouvoir des situation de collaboration et d'apprentissage continu dans un milieu de travail en santé en utilisant la pédagogie d'élaboration de connaissances et sa technologie correspondante (Knowledge Forum). À notre avis, cette étude a contribué à avancer le mandat d'apprentissage pour la vie de l'OLT (Office of Learning Technologies) grâce à la mise sur place d'un modèle et à la présentation des évidences de collaboration interprofessionnele, d'apprentissage et de l'élaboration de connaissances en milieu de travail.

2. BACKGROUND AND OBJECTIVES

- What are the overall goals of your organization?

The major goals of the Toronto Rehabilitation Institute (Toronto Rehab) are:

- To advance rehabilitation and complex continuing care using leading edge collaborative learning technologies.
- To enhance the quality of life for our patients and their families by advancing patient centred care.
- To partner with patients, their families, and supporting communities in innovative, effective adult rehabilitation and complex continuing care.
- To promote research that generates new knowledge and innovative solutions to healthcare issues specific to rehabilitation and complex continuing care.
- To serve as a model to our community partners, both local and international, of best practices in the interprofessional delivery of rehabilitation and complex continuing care.

Toronto Rehab was created on November 2, 1998 as a result of the amalgamation directed by the Health Services Restructuring Commission (HSRC) in April 1998. Currently, Toronto Rehab comprises 5 hospital sites and houses six distinct clinical inpatient and outpatient programs, including geriatrics, neurorehabilitation, spinal chord, cardiology, muskuloskeletal, and complex continuing care. Toronto Rehab, as designated by the HSRC, is a regional rehabilitation facility with sufficient critical mass to support specialized skills and expertise to direct education and research initiatives both within and between member hospital sites, affiliated universities and the community. Toronto Rehab's five hospital sites include: The Hillcrest Centre (THC) located in mid-town Toronto; The Lyndhurst Centre (TLC) located in north-east Toronto; The Queen Elizabeth Centre (TQEC) located west Toronto; and, The University Centre (TUC) located downtown Toronto. We are committed to providing integrated interprofessional healthcare services at all five hospital locations and to building the internal and external network of expertise.

The Professional Practice Portfolio at Toronto Rehab is comprised of health care professionals from the following disciplines: nursing, physiotherapy, occupational therapy, research and bioethics. All were participants in this project. The major goals of the Professional Practice Portfolio within the hospital are education, mentorship and facilitation of oganizational change. This project was an attempt to facilitate interprofessional collaboration and learning among members of the Professional Practice Portfolio such that these interprofessional practice goals would be better supported or improved.

- How did this project fit within the goals of your organisation?

Toronto Rehab, along with professional colleges, assumes responsibility to ensure employees are meeting, and hopefully exceeding, the highest standards of professional and ethical practice in health care as articulated in the Regulated Health Care Professions Act (1991, 1993). The Professional Practice Portfolio at Toronto Rehab assumes direct responsibility to ensure employees are following guidelines of continuous learning and reflective practice established in this legislation (RHPA, 1991, 1993). The goal of continuous learning and reflective practice is to ensure health care employees are engaged in ongoing professional development such that individual and collective practices are updated and improved over time. The Professional Practice Portfolio was especially interested to develop innovative methods of meeting these legislative criteria.

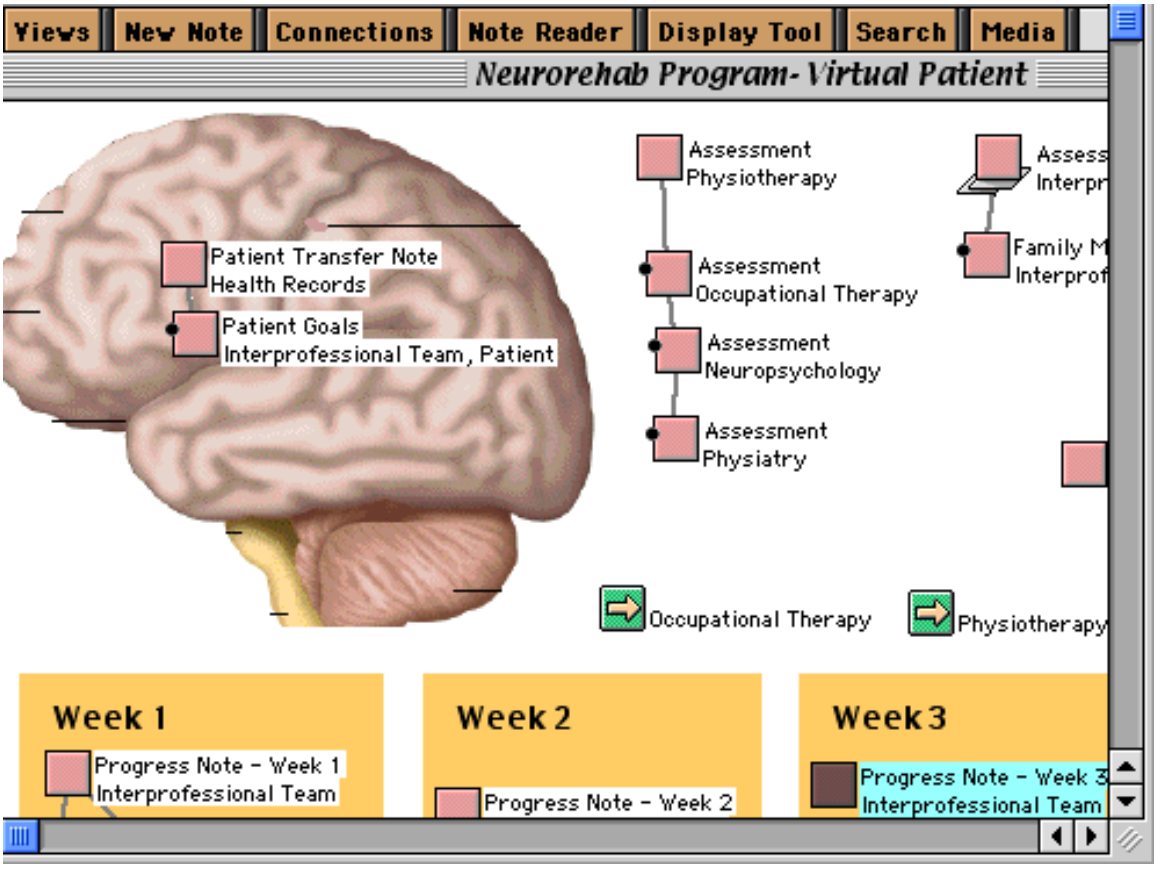
The primary goal of this project was to foster interprofessional collaboration and continuous learning using leading edge collaborative learning technologies. Toronto Rehab is actively engaged in finding new ways to cope with the rapidly changing face of rehabilitation and complex continuing care in Ontario. Designated one of Ontario's regional rehabilitation facilities by the HSRC (1993), Toronto Rehab increasingly receives patients from acute care hospitals with more complex health histories and presentations. In addition, our aging demographic is living longer, repositioning rehabilitation and complex continuing care at the forefront of health care in Ontario and Canada. In light of these challenges, healthcare service providers are faced with the additional demand of increasing their skill and education to care for increasingly complex patients. We at Toronto Rehab realize a work force committed to lifelong continuous learning will have the requisite skills to deal with the changing face of rehabilitation and complex continuing care, to ensure optimal patient care. We share responsibility with our regulatory professional colleges to provide learning opportunities, skill development and ongoing educational initiatives to our work force. This project was an attempt to meet the continuous learning and reflective practice challenge using a unique pedagogical model called knowledge building (Bereiter & Scardamalia, 1993) and corresponding technology called Knowledge Forum. Specifically, this project was aimed at embedding collaboration and continuous learning in daily practice among health care professionals in a hospital setting, who were separated by time and distance.

Our project addressed the goals identified in the Office of Learning Technologies (OLT) Theme 2 research focus. Toronto Rehab shares the OLT's commitment to understanding how learning technologies may facilitate learning and knowledge creation of our employees, present and future. Furthermore, we are committed to an integrated interprofessional healthcare delivery model that would extend beyond the standard healthcare practices of today. We believe that the healthcare professional of today and the future, is a knowledge worker. As well, knowledge work of the kind we envision at Toronto Rehab, happens in the context of interprofessional teams. Our employees then need requisite metacognitive and collaborative skills to negotiate in this new work environment. We share the responsibility, in tandem with our professional regulated and unregulated professional governing associations, to educate our staff about how to adapt traditional practice to meet the demands of the knowledge era. We believe some of the critical skills required of the healthcare practitioner today extend beyond historical benchmarks of technical competency to include metacognitive skills such as progressive problem solving, critical thinking, synthesis, and innovation, collaboration and effective team work. This project attempted to use an expert learning model and virtual technology to develop these abilities among participants.

- What led you to the idea for the project?

Graphic 1 below represents the "Virtual Patient", the original idea for this pilot study born out of practical clinical experiences of a neurorehab program employee and co-author on this report and is part of her larger doctoral research study (Russell, in press). Although patient centred care and interprofessional practice are best practice models within and between all programs at Toronto Rehab, on a practical level, these ideals are often difficult to realize in daily practice. The original idea centred on using a virtual medium in a hospital program to connect health care professionals with patients and families to ensure optimal care. Hectic schedules, increased workloads and downsizing have had a negative effect on real-time teamwork. The original idea for this project was to use virtual technologies to connect health care professionals, patients and families separated by time and distance. As well, it was hoped that collaboration in a virtual medium would lead to deepened interprofessional understanding and more effective interprofessional teamwork. Obstacles to effective interprofessional practice include lack of knowledge of the distributed network of expertise extant in the interprofessional team, lack of knowledge of how to connect with knowledge resources within the organization, and hierarchical management constraints (top-down as opposed to bottom-up or bi-directional). For example, effective interprofessional practice would require that physiotherapy, or any professional group, know enough about the role and responsibilities of the other regulated and unregulated health care professions serving the patient and family in order to collaboratively ensure optimal care. However, hospital cultures historically have tended towards profession specific knowledge and practice. Cross-pollination and collaboration within and between professions are relatively recent phenomena in health care practice settings and ideals we hoped to achieve in this project.

The graphic below is a mock-up (Russell, in press) to illustrate how teams separated by time and distance may use Knowledge Forum to collaborate, co-author notes and engage in progressive inquiry about patient care.



The pilot phase of this project (November 1999 through January 2000) was aimed at engaging a team in interprofessional patient centred assessment, diagnosis and treatment using knowledge building pedagogy and technology. Participants were all members of the Professional Practice Portfolio at Toronto Rehab. Four teams of approximately four to five persons were formed to address the following clinical themes: sensori-motor, continence and skin care, brain and cognition, pain, psychosocial and family issues. A participatory design framework was employed whereby participants in consultation with an IKIT researcher generated collective guidelines and goals regarding collaborative activity during the pilot phase. They are as follows:

Guidelines for Participants

- We are providing basic bare bones description of patient.
- Participants will provide assessments and take process to next steps by defining patient responses (based on your professional expertise, what is the likely outcome of your intervention).
- This is a design experiment whereby participants provide information to colleagues about the patient's reaction and development.
- Above all, we hope participants will use Knowledge Forum as a "work space" for collaboration and knowledge building.
- We invite you to create and innovate for the purpose of creating an interprofessional model of healthcare delivery.

Goals of Pilot Study

- To observe patterns of communication and look at how people collaborate to build interprofessional knowledge (focus on process as opposed to content).
- To observe how team designs integrated interprofessional care plans, reports, etc.
- Consensus building and collaboration (e.g., problem solving, etc.).
- To demonstrate interprofessional learning and knowledge building.
- Increase awareness and knowledgeability about professions, internal resources, and expertise.
- To observe process and thematic evidence of interprofessional patient centred care.
- For each participant to spend time each week in the database engaged in knowledge building activity.

Participant groups met weekly with an IKIT researcher to discuss the principles of knowledge building and their relevance to clinical assessment, diagnosis and treatment of the "Virtual Patient". As well, technological training was provided during these consultation meetings. The brief hypothetical patient profile generated at the onset of the pilot study by participants, presented below is reflective of the kinds of patients referred to Toronto Rehab's Neurorehab program. This hypothetical case illustrates the kinds of clinical, behavioural, ethical and psychosocial issues affecting patient centred care.

"Virtual Patient" Profile

Medical History: 47 year old French Canadian male sustained a closed head injury (CHI) during a motor vehicle accident (MVA) October 20, 1999. He received emergency care at St. Michael's Hospital (SMH).
Glasgow Coma Scale (GCS) 3/10 in emergency. Remained in ICU at SMH X 10 days. Unconscious X 5 days. Transferred to Toronto Rehab November 15, 1999 for rehabilitation subsequent to CHI/MVA.
Surgery: bilateral burr holes; queried VP shunt.
Employment: Chef X 15 years but made a career change 2 years ago to elementary school teacher French immersion.
Interests: gourmet cooking; enjoys knowing how things work; inquiring mind; technical /computer interests; Sports and physical activities including tennis, golf, cross country skiing; renovating cottage.
Family: married X 20 years, two teenage sons (14 and 16);

> highly involved family; enjoy activities together like cross country skiing; mutual interests; 2 storey house one bathroom (no main floor bathroom); Wife part time teacher faced with task of looking for full time work because husband does not have pension, etc.
> *Social*: highly socially active; extended of friends; ethanol abuse suspected (4 to 5 gin & tonics/day); smoker (1/2 pack per day).
> *Clinical*: ambulatory with right-sided weakness and decreased sensory perception sensory inattention; right sided visual inattention; right hand dominance; right handed hemiparesis which includes tingling and loss of sensation; right sided visual inattention; slight expressive aphasia with no dysphasia; attention, concentration & memory deficits; high irritability with isolated aggressive outbursts when family leaves hospital.
> *Other Considerations:*
> - Wife would like to "sign anything" to keep husband in hospital.
> - Incontinent of bowel and bladder.
> - Behavioural problems associated with CHI; impulsive; aggressive when family leaves hospital.
>
> *Patient Goal:* cross-country skiing by January.

Over the course of two months, participant groups engaged in discourse in a Knowledge Forum database concerning issues related to the "Virtual Patient". The pilot phase succeeded at introducing participants to basic pedagogical and technological issues and features of virtual collaboration. However, the pilot study was not successfully integrated at the program level, nor sustained by participants upon completion. We attribute these results to the fact the core activities and daily work practices of participants did not include patient care. Rather, the primary activities of all participants were education, mentorship and facilitation of organizational change. As previously mentioned, the "Virtual Patient" was a hypothetical construct to introduce participants to potential uses of the pedagogical model and technology. We continue to be encouraged, however, that the model itself is viable within the programs at Toronto Rehab and the pilot phase assisted in development of a method of virtual assessment, diagnosis, and generation of treatment plan. However, we also caution those interested in initiating knowledge building activities at the workplace, that they be focused on real ideas and authentic problems of practice (knowledge building principle, Scardamalia, 2001) from the outset. Based on these results, we re-designed our project to meet the practical need of the Professional Practice Portfolio at Toronto Rehab, namely how to meet the quality assurance guidelines for continuous learning and reflective practice as established by the RHPA.

- Who were your major partners and how did you form the partnership(s)?

Toronto Rehab, a regional rehabilitation and complex continuing care institute in Ontario, partnered with the Institute of Knowledge Innovation and Technology of the Ontario Institute for Studies in Education of the University of Toronto on this project (IKIT at OISE/UT, formerly the Knowledge Building/Knowledge Forum Research Project). The partnership was formed in response to the above-articulated idea. For more information about both these organizations, please visit http://torontorehab.on.ca and http://ikit.org

> The Institute for Knowledge Innovation and Technology conducts research, develops technology, and helps build communities aimed at advancing beyond "best practice" in education, knowledge work, and knowledge creation. An international community from a variety of sectors is actively engaged in pooling intellectual resources and participating in projects.

Our collaborative interest was how to use the knowledge building model in a health care practice setting to move beyond best practices in interprofessional practice. This partnership was Toronto Rehab's first

foray into using virtual collaborative technologies to support continuous professional development of employees. Likewise, it was IKIT's first foray into the practice world in the health care sector. Opportunities for reciprocal learning were anticipated and realized with this project.

- Who were the learners (target population) that participated in the project (please describe the population, and include the number who benefited where possible)?

➢ Toronto Rehab's Professional Practice Portfolio – Members of the Professional Practice Portfolio within Toronto Rehab (N=22) participated in this project. Composition of the Professional Practice Portfolio was affected by study leave, attrition, re-hiring, maternity leave and vacation. For that reason, the participant group varied in size over time with a minimum group size of 12 persons and a maximum group size of 22 persons. The learning goal for participants was to engage in continuous interprofessional learning using knowledge building pedagogy and technology. Since participants acted as educators, mentors and change agents for the organization, we anticipated opportunistic learning would also result as participants interacted with other hospital staff.

➢ Toronto Rehab's Senior Management Committee (SMC) – The SMC (N=8) is comprised of the President and Chief Executive Officer, Chief Financial Officer, and Vice Presidents of Professional Practice, Research, Medicine, Programs and Fund Raising. All participated in learning opportunities during the pilot phase of this project including two presentations and 1/2 day formal training session. The learning goals of the SMC were to understand how this project would enhance employee performance and patient care.

➢ IKIT Research Network – The IKIT research network includes members of the IKIT team located at OISE/UT (N=22) and an international network of knowledge building communities located in 12 countries and over 100 research sites ranging in size from 10 to 250 persons. The learning goal of the IKIT research network was to understand how to instantiate the knowledge building communities' model in the health care sector. Rich opportunities for cross-sectoral (education, health care, business, etc.) knowledge sharing and learning were anticipated at the onset of this research.

➢ University Affiliations – Approximately one third of the participants are cross appointed to faculties within the University of Toronto as lecturers, educators and professors including the Faculties of Nursing, Occupational Therapy, and Physiotherapy, and the Joint Centre for Bioethics. Cross-appointments offer rich opportunities for knowledge dissemination and to date we have received requests by all these faculties to either present or engage in further collaboration. As well, we have successfully implemented a Knowledge Building/Knowledge Forum Virtual Internship Program at the Faculty of Nursing/University of Toronto, Toronto Rehab and IKIT. Graduate nursing students (N=2) have successfully learned how to use knowledge building pedagogy and technology to enhance professional development and interprofessional learning and practice.

➢ Extended Health Care Community – Ontario Hospital Association (OHA) is a prime example of an organization dedicated to education and research in healthcare. The OHA, founded in 1924, is a voluntary association representing over 200 hospitals in Ontario. The Change Foundation of the OHA is specifically dedicated to innovative health related research and initiatives. Since the pilot phase of this project, we have participated in all annual conferences hosted by the OHA to disseminate results of this project to the extended health care community. Other organizations with which we have cultivated collaborative relationships include the Royal College of Physicians and Surgeons of Canada, the Order of Nurses of Quebec (OIIQ), and the Collaborative Research Network of Toronto. Our collaborative learning goal is to understand how leading edge educational models and technologies may facilitate learning and practice at the work place.

- Community Hospitals – Toronto Rehab has been directed by the HSRC to assume a leadership role in rehabilitation and complex continuing care. This project has a direct impact on other hospital and institutes that we provide leadership to, including: St. John's Rehabilitation Hospital, West Park Hospital, Bloorview Macmillan Centre, Community Care Access Centres, Sunnybrook & Women's College Health Sciences Centre, Baycrest Centre for Geriatric Care, Chedoke McMaster Hospital, Mount Sinai Hospital, North York General Hospital, Parkwood Hospital, and many more

- What were the expected outcomes of this project?

- Creation of a Toronto Rehab Knowledge Forum database – This project was the first attempt to use a virtual communal technology in a hospital setting to support real world daily practices of health care professionals separated by time and distance. Knowledge Forum is a virtual communal intentional learning environment. The functions and features of the database software support collaboration and expert learning. Views in the database are communal workspaces in which participants contribute notes (narrative text or multimedia objects) to solve problems, deepen understanding and *rise-above* individual and collective understanding to create new conceptual artifacts (Bereiter, in press). Scaffolds are within-note cognitive and metacognitive tools that are designed and selected by users. Similarly, users select which key words are significant in their text and add them to the communal key word repository. All functions and features in Knowledge Forum support intentional and purposeful knowledge activity such as reflection, complex problem solving, progressive inquiry, synthesis, and innovation. Knowledge Forum is the most thoroughly researched on-line learning environment that is commercially available. This communal database technology may be accessed using a web browser (e.g., Internet Explorer, Netscape Navigator) or using the Knowledge Forum Client (Windows or Macintosh). The Server runs on Linux, Windows and Macintosh OSes. Participants in this study used client version 3.2 for windows. The content of any Knowledge Forum database is entirely the creation of participants. We anticipated at the outset that the Toronto Rehab database would be comprised of 17 Monthly Reports views (communal workspaces), all containing at minimum approximately 16 individual source notes (average number of participants each month). This would yield a minimum of 272 notes total in the database. Ideally, we hoped that discourse during the Monthly Reports knowledge building activity would yield questions, ideas and opportunities for solving problems at more complex levels. If knowledge building pedagogy and technology were effectively supporting participants to collaborate and learn virtually, we would expect to see evidence in the form of creation of database by particpants in which shared problems of professional practice were shared, built-on, and improved. Ideally, historical knowledge artifacts in the form of notes and views would serve as the foundation for future collaborative enterprises and creation of new knowledge (e.g., innovations in practice, etc.).

- Improved Interprofessional Collaboration and Virtual Learning – Of primary concern was how to meet the RHPA (1991, 1993) quality assurance guidelines for continuous learning and reflective practice guidelines using knowledge building pedagogy and technology. For that reason, it was decided that the core activity of participants would be monthly interprofessional reflective discourse about shared problems of practice (described in activities section below). It was anticipated that interprofessional discourse would generate rich opportunities for problem solving at more complex levels. Indeed, of the expected 17 Monthly Reports views created, an additional 15 new views emerged from interprofessional discourse dealing with both simple and complex issues. For example, one view dealt with the fairly simple logistics of executing a strategic planning day while another dealt with the more complex issue of understanding how to ensure health care professionals respect ethical boundaries in therapeutic relationships with patients and families. Analyses were directed at deeply understanding the pedagogical and technological facilitators and impediments to progressive problem solving, continuous learning, reflective practices, deepened understanding and innovative

practices among an interprofessional team using Knowledge Forum. Moreover, we anticipated using historical records and knowledge resources within the database for multiple purposes. Finally, if knowledge building principles were effectively supporting interprofessional collaboration and virtual learning, we would expect to see maximal participation patterns over time by participants in the form of basic knowledge building indicators (notes created, read, modified and built-on . Most importantly, we would expect to see a shift from profession specific to interprofessional collaboration and learning.

5. ACTIVITIES

In this section, you will outline the steps you took to complete the project, as well as highlighting any difficulty that occurred.

- What were the major activities of the project?

➢ *Monthly Reports* – Each month, separate views within the database were created to collect interprofessional monthly activity reports. Participants were asked write and submit an electronic note containing their reflections on their professional activity over the month, to views within the Knowledge Forum database. There, participants read and engaged in threaded discourse about each other's activity reports with an eye to identifying shared problems of practice and opportunities to advance community knowledge and expertise. We anticipated that Knowledge Forum would provide a virtual medium in which opportunities for interprofessional collaboration and learning would be maximized. Moreover, we anticipated that the historical and hierarchical method of submitting static learning reports to the VP Professional Practice would be transformed into an opportunity for dynamic interprofessional collaboration and learning. Finally, this activity offered an opportunity to experiment with interprofessional versus traditional profession specific methods of professional development at the workplace. The difficulties we encountered with this activity largely occurred prior to the onset of funding, during the pilot and start up phases. Technological difficulties that affected the overall success of the project during that time included computer illiteracy of participants, unstable soft ware, and slow network connections between Toronto Rehab and the IKIT host server. Pedagogical difficulties included participants' lack of understanding of knowledge building as different and distinct from knowledge telling or knowledge transfer, and lack of time and interest of participants. The purpose statement below further describes the intention of the Monthly Reports knowledge building activity. This note is taken directly from the Toronto Rehab database and resides in all 17 Monthly Reports views as a reference for participants.

Purpose of Monthly Reports

Monthly reports are intended to be "reflective" narrative accounts (descriptions) about your significant activities, learning goals, accomplishments or issues over the month. Reflection is an important aspect of learning and knowledge building. Demonstration of continuous learning and reflective practice is now best practice in the health professions. Since reflection and continuous learning are difficult to standardize and operationalize, it is up to you to choose the format that suits you best when reporting on monthly activities, learning, etc

Reflection – reports offer a place for you to reflect and refine your practice by identifying issues, accomplishments and goals (continual improvement through reflection and learning). The focus is to consider what works or does not work in practice at Toronto Rehab by developing opinions, ideas, or theories about practice and balancing those against research, evidence and best practices.

Community knowledge – reports offer a way for you to keep abreast of your colleagues' activity over time and connect with them at a distance. As well, you may draw upon the collective expertise within notes and views to help you solve complex problems, or offer your expertise to help your colleagues solve problems, create knowledge, innovate and improve upon existing practice. Creation of a community of practice with your colleagues is a fundamental aspect of learning organizations.
Collaboration – technology (Knowledge Forum) offers medium for virtual communication, collaboration, and knowledge building.
Historical documentation – we can refer to views and notes time and time again simply by navigating through the database. You may track your learning over time by including all monthly reports in your learning portfolio, or follow the progress of your colleagues by going back to old views and revisiting issues with a new perspective. For example, the Interprofessional Biographies view remains an important resource for us as everyone describes their professional expertise for the community to which they belong. You may want to update your biography from time to time to reflect new developments, etc. This view serves as an important orientation tool for new staff joining the Professional Practice Portfolio. It is our collective responsibility to ensure knowledge resources (e.g., us) are accessible both inside and outside of the database.

- *Learning Portfolios* – At the outset of this research, we predicted that participants would use the Learning Portfolios View within the Knowledge Forum database as a reflective practice repository. We predicted, as a deliverable, a minimum yield of 16 notes contributed to the Learning Portfolios View monthly. Each month, participants were asked to contribute their monthly reports to their Learning Portfolios and reflect on learning over time. The main difficulty encountered was inactivity. This view was rarely visited post-creation. All participants created individual learning portfolios using the 'rise-above note' feature, but most did not copy Monthly Reports into their Learning Portfolio notes continuously. Explanations and hypotheses for these results are provided below.

- *Knowledge Forum Analysis* – At the outset of this research, we predicted as a deliverable, ongoing analysis of the discourse and patterns of activity within the Knowledge Forum database. Analyses addressed the following question: What are the pedagogical and technological facilitators and impediments to using a virtual communal learning environment to foster interprofessional practice and continuous learning in health care? IKIT researchers provided data analytic support throughout the course of this study using the Analytic Toolkit (Burtis, 1999).

- *Problem Solving* – At the outset of this research, we predicted that discourse among participants in the database would lead to problem identification and problem solving. The problems would be harvested and stored in a view repository called "Problem Solving Holding Tank". We were delighted that participants addressed many of these problems over the course of this project and are presented in Appendix 1 of this report.

- Who was involved in the project, including members of your target population?

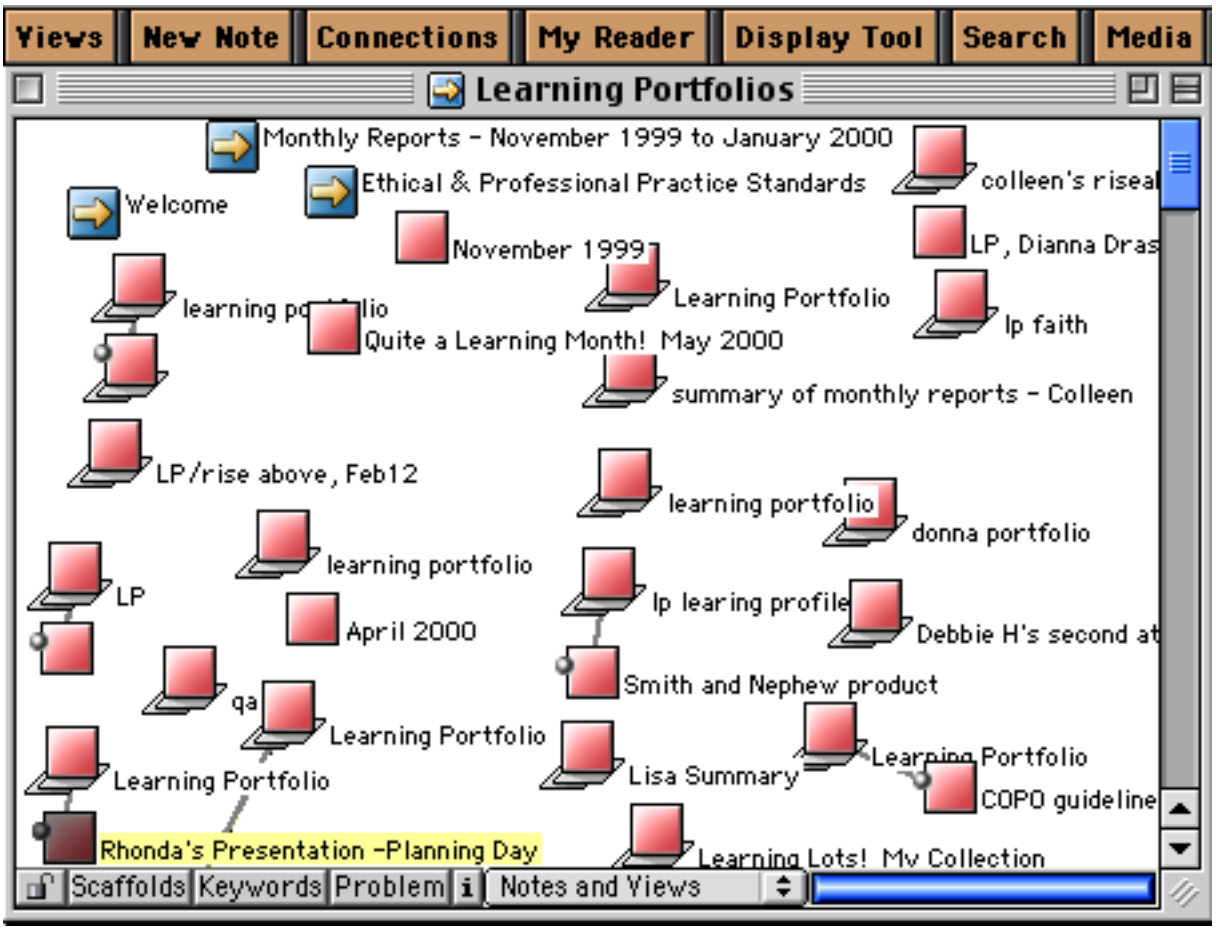
Core participants were members of the Professional Practice Portfolio at Toronto Rehab. As described previously, the size of the participant group varied in size over time due to attrition, re-hiring, maternity leave, and vacation schedules with a minimum of 12 and maximum of 22 persons. Participants came from four of the five hospital sites. This interprofessional team included clinical nurse specialists (N=11), clinical nurse educators (N=4), manager (N=1), bioethicist (N=1), researcher (N=1), physiotherapists

(N=2), and occupational therapists (N=2). All participants were university graduates holding Bachelors (N= 7), Masters (N= 13), or Ph.D. (N=1) degrees in the health and social sciences. All were females. The extended network of collaborators included the IKIT research network and members of organizations identified in *Section 4* of this report.

- Were there any planned activities you did not complete? Please explain.

➢ *Learning Portfolios* – At the outset of this research, we predicted that participants would use the Learning Portfolios View within the Knowledge Forum database as a reflective practice repository. We predicted, as a deliverable, a minimum yield of 16 notes contributed to the Learning Portfolios View monthly. Over the course of this project, the Learning Portfolios view remained dormant. Feedback from participants indicated that continuous learning and reflection were being supported in the Monthly Reports views and that the Learning Portfolio view was perceived as either redundant or 'over and above' what participants were willing to commit to. The concept of the Learning Portfolio has been well established as a tool for professional development. However, it could well be argued that the ongoing, continuous discourse each month in the Monthly Reports views has transformed a static tool (traditional learning portfolios) into a more dynamic learning activity, and for that reason is more valued by participants. This concept of a 'living' and dynamic learning portfolio is being investigated and will be reported on at a later date (Russell, in press). Of particular interest, Learning Portfolio view was designed as an individual repository of Monthly Reports using the 'rise-above note' feature in Knowledge Forum. As well, of all views reviewed, this was the only view where all notes were rise above notes. Rise-above notes contain embedded notes and require some technical sophistication to create and read. Information is more difficult to access in a rise above note (collection of notes). As well, the Learning Portfolios view was the only view in which individual activity was emphasized over and above collective activity. Lack of interest in this view may indeed speak to the dynamic nature of work place learning. Technologies to support continuous learning and reflection may do well to make knowledge explicit with simple technological structures, at least at the initial stages of participation. For our purpose, we were satisfied that Monthly Reports were not only meeting, but exceeding best practices for continuous learning and reflective practice set forth in the RHPA (1991, 1993). Learning Portfolios were abandoned as a design element in this project in favour of more active and dynamic learning and collaboration opportunities (e.g., emergent problem solving views). The graphic below copied from the Toronto Rehab database illustrates the use of the Knowledge Forum "rise-above" note feature. Each individual pink rise-above note below contains historical monthly reports written by individual participants. This view generated the least amount of threaded discourse, and had a short life span (created January 2000) as measured by readership and modification rates post-creation.

Graphic 1 – Learning Portfolios View



- What were the difficulties and obstacles encountered while implementing the project activities?

Specific difficulties encountered while implementing the project activities are described above. However, the following general obstacles are worthy of mention – computer illiteracy and oral discourse tradition.

- How were the difficulties addressed and obstacles overcome?

➢ *Computer illiteracy* – The mean age of all participants was 45 years. Of the 21 participants, approximately one-third had above average computer skills, one-third moderate computer skills and one-third below average computer skills. The majority of the group required extensive computer support to participate in this research. Much of the training provided was unrelated to the actual application in use (Knowledge Forum), but rather conceptual issues underlying computer applications and operations generally. For example, the windows version of Knowledge Forum was used in this project yet most participants did not understand how to navigate in a windows medium, how to open and close windows, or use navigational bars within windows. This proved a major obstacle. In contrast, those participants with above average computer skills were in their early to mid-twenties. The overwhelming proficiency demonstrated by younger participants made us rethink how we would 'roll out' and increase participation in future research. In the meantime, innovative ways to accommodate poor computer skills were found and also served to inspire other ideas for using Knowledge Forum within the spinal cord and Neurorehab populations where hand-eye abilities are often compromised. For example, one participant with excellent verbal ability but poor computer ability was paired with a proficient typist. She "talked aloud" her monthly reflections and the typist inputted her verbal report verbatim. Together they read and commented on notes within the view. Sometimes this same individual would include a colleague in the discussion and the typist would input their dialogue directly into the database in real-time. This served as a foundation note for further independent reflection. Transcription methods did nothing to improve participants' computer literacy but did serve to bring participants into the virtual experience in a non-threatening supportive way. Most importantly, the transcription method gave birth to a new application of Knowledge Forum in other clinical populations at Toronto Rehab. From this experience, we recommend voice recognition technologies be integrated with Knowledge Forum to make the software more accessible to all individuals. The testimonial below captures some of difficulty participants experienced learning and using the technology.

> I would like it if you could stress the point about user friendly technology and how critical it is for users to be "really comfortable" with using the technology. Change is hard enough when all the supports are in place and people are motivated to incorporate the change into practice, when there are hurdles that make using the program impossible, the high level of frustration is tremendously de-motivating! (Nurse Educator, 25 years experience)

➢ *Oral versus written discourse* – In this project, nursing was the predominant professional group. These participants most often reported difficulty, apprehension and anxiety using computer technology to share and build collective knowledge. The main opposition to using Knowledge Forum seemed to be that it represented a threat to the way that business was usually done. In other words, nurses reported more comfort with face-to-face meetings and oral discourse over and above computer mediated communication. If face-to-face meetings were not possible, voice-mail technology was preferred over and above e-mail or database technologies. Some participants did not see the value in

changing effective and familiar practices. Although Toronto Rehab is trying to find innovative solutions to connect employees across sites – using a virtual medium to address the time and distance constraints was perceived by some as too radical. As diverse technologies become embedded in the daily practices of health care professionals, we anticipate these obstacles will become less important considerations. In the meantime, understanding human behaviour and response to change is important in applied research using new technologies. The testimonial below captures some of the difficulty expressed by nurses.

> I am very busy with my "day job", and find it really difficult to find time to spend in KF, so consequently, I'm not as comfortable with the programme as I would like to be. When I have difficulty accessing parts of it, I get too frustrated to bother. My generation (or my learning style) does a lot better with face to face dialogue and immediate feedback (you probably already know that). So, not only is this technology foreign to me, it is contrary to my preferred learning style, which is where I need to be, because everything else is so busy! (Nurse Educator, 25 years experience)

➢ OUTCOMES

This section should contain the outcomes that were achieved as a result of OLT funding the project. Outcomes are benefits or changes in peoples' knowledge, skills, condition or status, following their involvement with a specific activity[1].

- What were the major expected or achieved outcomes of your project?

➢ Creation of a Toronto Rehab Knowledge Forum database

If knowledge building pedagogy and technology were effectively supporting participants to collaborate and learn virtually, we would expect to see evidence in the form of creation of database by participants in which shared problems of professional practice were shared, built-on, and improved. Ideally, historical knowledge artifacts in the form of notes and views would serve as the foundation for future collaborative enterprises and creation of new knowledge (e.g., innovations in practice, etc.).

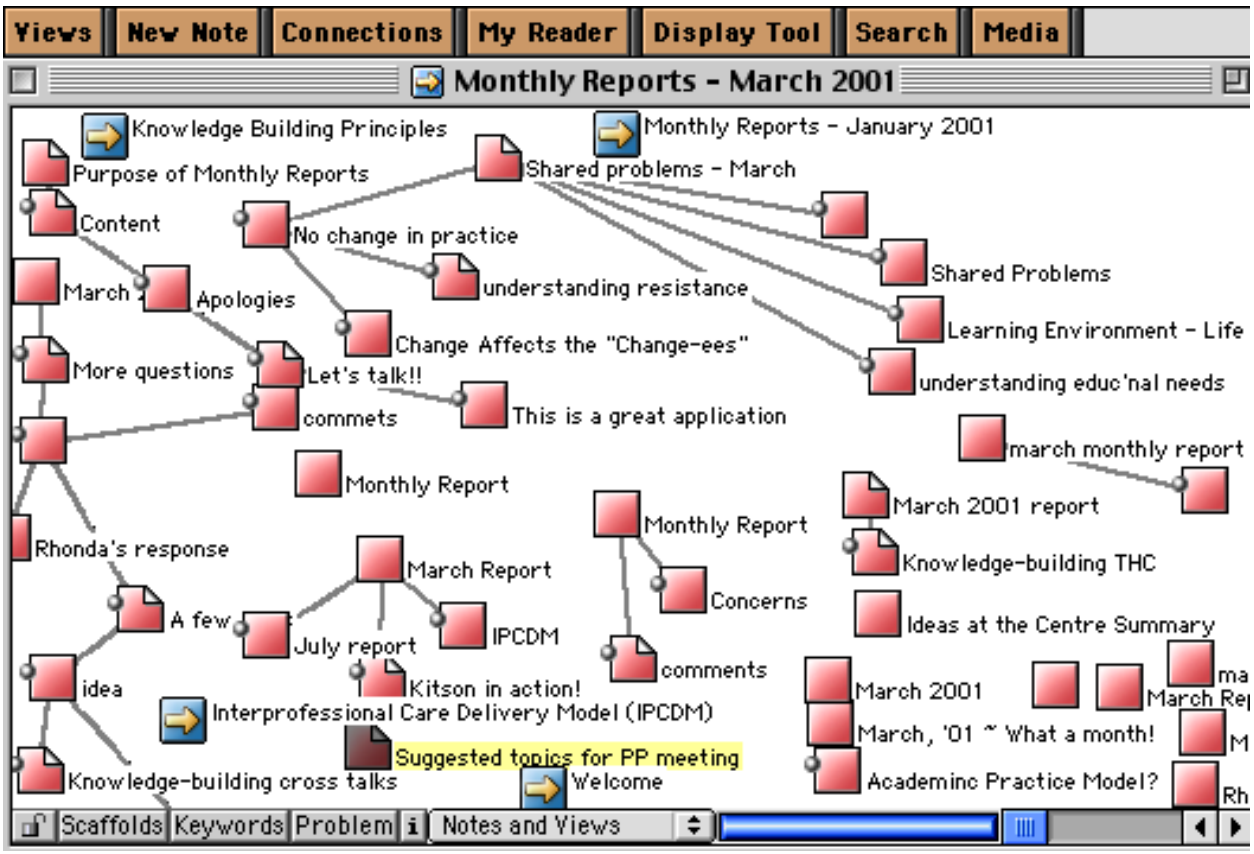
As previously described the creation of information and knowledge contained in the Toronto Rehab Knowledge Forum database was entirely the construction of participants in this project. Knowledge Forum is unique in the sense that the software provides the technical capability to construct knowledge collaboratively, but does not provide pre-packaged information-knowledge to the end user. Rather, the goal of participants in a Knowledge Forum database is to use the functionality of the software to scaffold and develop individual and collective expert learning skills and abilities leading to improvements in practice and patient care. Increased proficiency using a communal database technology (Knowledge Forum) and interprofessional collaboration were evaluated by assessing participation patterns over time as measured by basic knowledge building indicators (notes and views created).

Over a period of 17 months, participants created a total of 32 new views or communal workspaces in the Toronto Rehab Knowledge Forum database containing 688 notes. Fifteen of those views were Monthly Reports views designed to meet the RHPA (1991, 1993) quality assurance guidelines containing 549 notes. Fifteen new views emerged from discourse during Monthly Reports activity containing 139 notes. All views were linked to other views within the database, facilitating participants' navigation through knowledge resources.

Graphic 2 below depicts the Monthly Reports - March 2001 view, typical of most months' activity. This project funded creation of 17 such views beginning November 2000 through March 2002. Pink and blue icons are notes. Notes reside in views, or communal workspaces. They may be individually or collectively authored. Notes may be built-on to, to create a threaded discourse and are connected to each other with a grey line. If we were to double click on the note icon, a narrative text or graphic would appear.

In the graphic below, authors names have been removed to protect confidentiality, however, titles reveal the range of issues discussed during that particular month. As previously mentioned, this activity was designed to engage participants in interprofessional discursive inquiry about interprofessional practice to meet the RHPA quality assurance guidelines. Each participant contributed one Monthly Report source note to the view and was encouraged to read notes submitted by their colleagues. Participants' responses to their colleagues' questions, narrative accounts of practice, ideas and so on self-organized over the course of the project. Participant concerns and interests were the primary driver of the interprofessional collaborative discourse. Over time, as knowledge building principles became more embedded in the discourse, simple comments to colleagues or superficial accounting of one's professional activities over the month transformed into deep discussion about complex problems of practice. For example, the picture of the view below depicts the kind of issues the participants talked about ranging from understanding resistance to change and educational needs of employees to distinguishing between knowledge building versus knowledge telling. Arrows in the view link participants to other views in their database such as previous professional development views or emergent views (e.g., Academic Practice Model view, Knowledge Building Principles view, etc.).

Graphic 2 – Monthly Reports View – March 2001



Below, content of one note from the above view entitled "Change Affects the Change-ees" written by a Clinical Nurse Educator, is provided as an example of the kind of narratives contained in these views. This note was part of a larger thread (8 notes) in which participants in their roles as educators explored resistance to change. Deeply understanding complex issues is a hallmark characteristic of knowledge builders. The note below represents one persons reflections on resistance to change based on both experiential and theoretical (e.g., Kitson) perspectives. Collective discourse about this issue allows for interprofessional problem solving.

Change Affects the Change-ees

Change is fascinating, change causes discomfort & stress, even when it is expected and desired. Some individuals are less resistant to change, welcome it with open arms then quickly revert back to the pre-change practice.

Why does this happen? Is it because the supports that are needed to maintain the new practice are not maintained themselves? Do we move too quickly away from the "supportive stance", and believe too quickly that those who embraced (the change) will carry on and positively influence the other, slower, perhaps slightly (or significantly) resistant people to carry through on the change that was implemented? Perhaps there

> needs to be more support offered (how often do we complain that the changes that are needed are not supported by ALL of the key players ~ Kitson et al!~). I worry that we (the change agents) withdraw too quickly, or perhaps the buy-in that we think we have is superficial (is our assessment of buy-in accurate?), or the support needed to maintain the change disappears too quickly. Are we getting firm support, or, are the changes being "Yessed to death"? (Not maliciously –is there a lack of deep understanding, is the time commitment too great, do the people involved lack the energy or time to commit to the project?). We have implemented changes that have been both successful, and unsuccessful. The successes are easy to follow: the changes were desired and VALUED by the nurses, the supports for maintaining the change were already in place in concrete, and the change in practice was made for the long term. When we lack support from the majority of the stakeholders (nurses), the change often fails. I wish I had the time (could make the time) to study more on change! I do believe that we just have to keep trying (Nurse Educators, 10 years experience).

Appendix 1 describes 15 Problem Solving Views generated from Monthly Reports discourse created October 2000 through March 2002. Creation of views directed at solving real world problems of practice settings such as how to apply for grants, or evaluate best practice treatment guidelines was an unexpected positive outcome of this study. At the onset, we anticipated creating a repository or "holding tank" for problems emerging from the Monthly Reports discourse. We did not anticipate participants would have the time or interest to engage in activities beyond Monthly Reports. However, as Table 1 illustrates, a number of problems, both technical and conceptual, were worked on in the Toronto Rehab database over the course of investigation. The purpose of these views is to solve pressing problems of practice as well as serve foundations for future work. Ideally, views serve multiple purposes beyond the original intention. For example, the Chronic Non-Cancer Pain Guidelines view is in its second iteration of design. It has successfully evaluated the implementation of best practice guidelines in the geriatrics program, served as a virtual research site for a graduate nurse intern, served as the foundation view for an international conference on Chronic Pain, and finally, served as the foundation for writing a grant proposal to the Ontario Hospital Association. We highlight the affordances of using this kind of technology that saves both knowledge processes and products, thus reducing reinvention of the wheel each time a new initiative is launched. Rather, prior to initiating any project, a knowledge building team searches the existing database to determine what work has already been done, and links new initiatives to past, present and future. The social dynamic in this Knowledge Forum database was toward continually building on the best of what already exists (e.g., historical views, notes, etc.). These results were seen as positive outcomes of this project.

- Improved Interprofessional Collaboration and Virtual Learning

The most significant positive result of this project was the transformation of a hierarchical and static reporting activity into a democratic and dynamic opportunity for interprofessional collaboration and learning. Prior to using Knowledge Forum, participants individually submitted Monthly Report to the VP Professional Practice who was the arbiter of the groups' information and knowledge. The task of connecting individuals along lines of interest and mutual responsibility was a time consuming and unproductive use of the VP's time. By placing all Monthly Reports in a communal space, the burden of responsibility for everyone to keep abreast of collective issues, interests and professional responsibilities became everyone's job. Participants who worked in different locations of the hospital or in different professions were afforded the opportunity of reading about each other's monthly professional activities. Further, it was expected that upon reading these notes, participants would take the necessary steps to connect both inside and outside the database to work on collaborative projects – without relying on the

VP to direct all work activity. Basic knowledge building indicators of interprofessional collaboration and virtual learning are discussed below.

Graphs 1 through 4 below represent interprofessional participation during this project for notes created, read, modified and built-on. Overall, participation in this project exceeded expectations. Raw data may be found in Appendix 2 of this report. Contribution rates were consistent over the first 4 quarters, however, the last quarter (January 2001 through March 2002) performance was very low due to employee attrition, study leave and vacation (March break). This change in participant group size during the last quarter affected all knowledge building indicator results (notes created, read, modified and built-on). However, rather than adjusting graphs for participant group size, we believe it is important to present actual participation as affected by real-world fluctuations.

Table 1 – Notes created

On average, the majority of participants (60%) contributed monthly reports each month as measured by notes created. The content of notes shifted over time from a focus on tasks to complex problems of interprofessional practice. A total of 589 notes were contributed to 17 views (communal workspaces) over the course of this project. Professionals were able to tackle issues of profession specific and interprofessional practice at deeper levels of analysis, reflecting a shift from "reporting" learning, to actually engaging in collaborative learning. We consider this an important step towards cultivating a learning organization culture at Toronto Rehab.

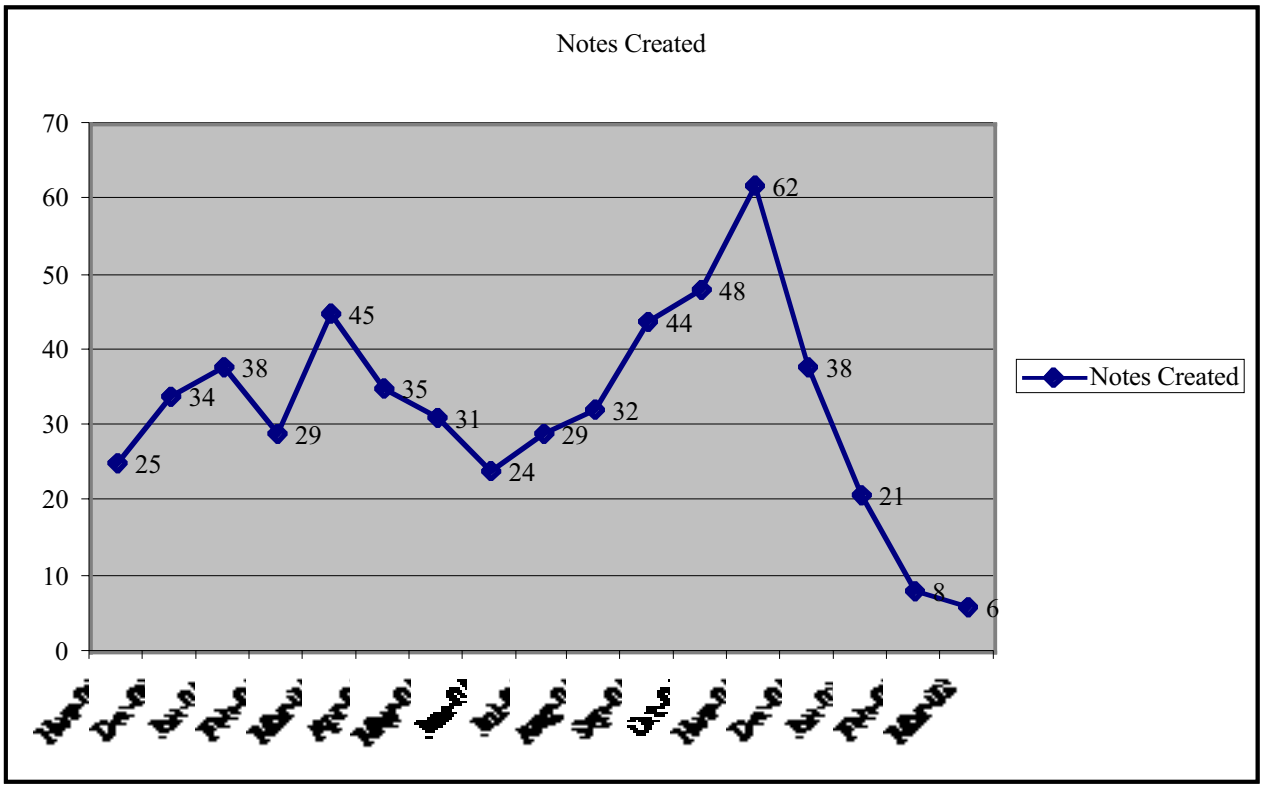


Table 2 – Notes read

As previously mentioned, historical artifacts such as notes in a Knowledge Forum database, may be revisited many times because all data is preserved. We believe the high rates of readership speak to this affordance of database technology. On average, notes in Monthly Reports views were read approximately 25 times each. Each month readership by participants varied, ranging from as low as 6 reads per person to as high as 50 reads per person. Prior to the onset of this project, only the VP of Professional Practice had access to professional activity reports – static accounts of professional activity. Readership patterns in the database suggest that this historic process was democratized and that participants made use of conceptual knowledge artifacts (notes) in the database.

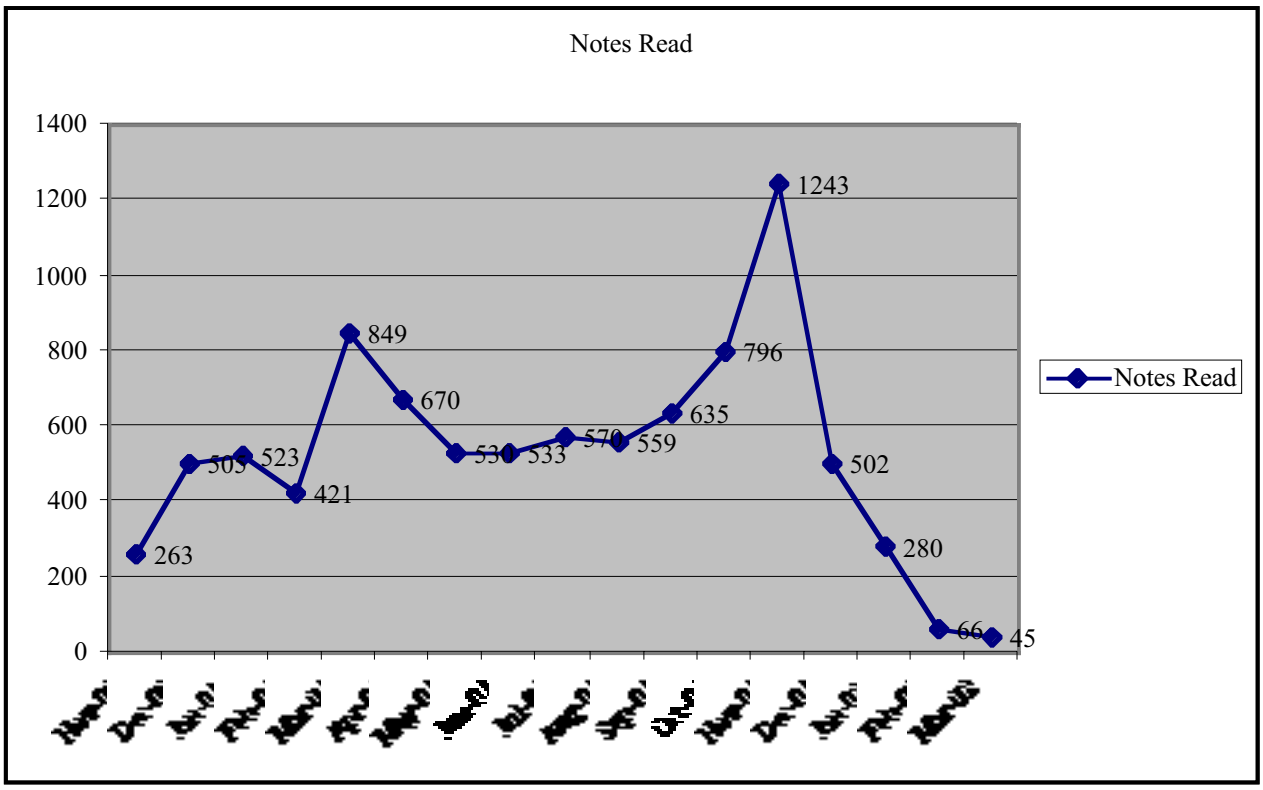


Table 3 – Notes modified

Modification and re-tooling written discourse is a characteristic of expert learners. Overall, modification rates remained low throughout the course of this project. Notes were modified on average 2 to 3 times per participant. We believe this reflects the real-world time constraints facing health care professionals who had little time for re-working textual notes. Since modification is highly correlated with the processes of knowledge creation and innovation, this result is worthy of further exploration.

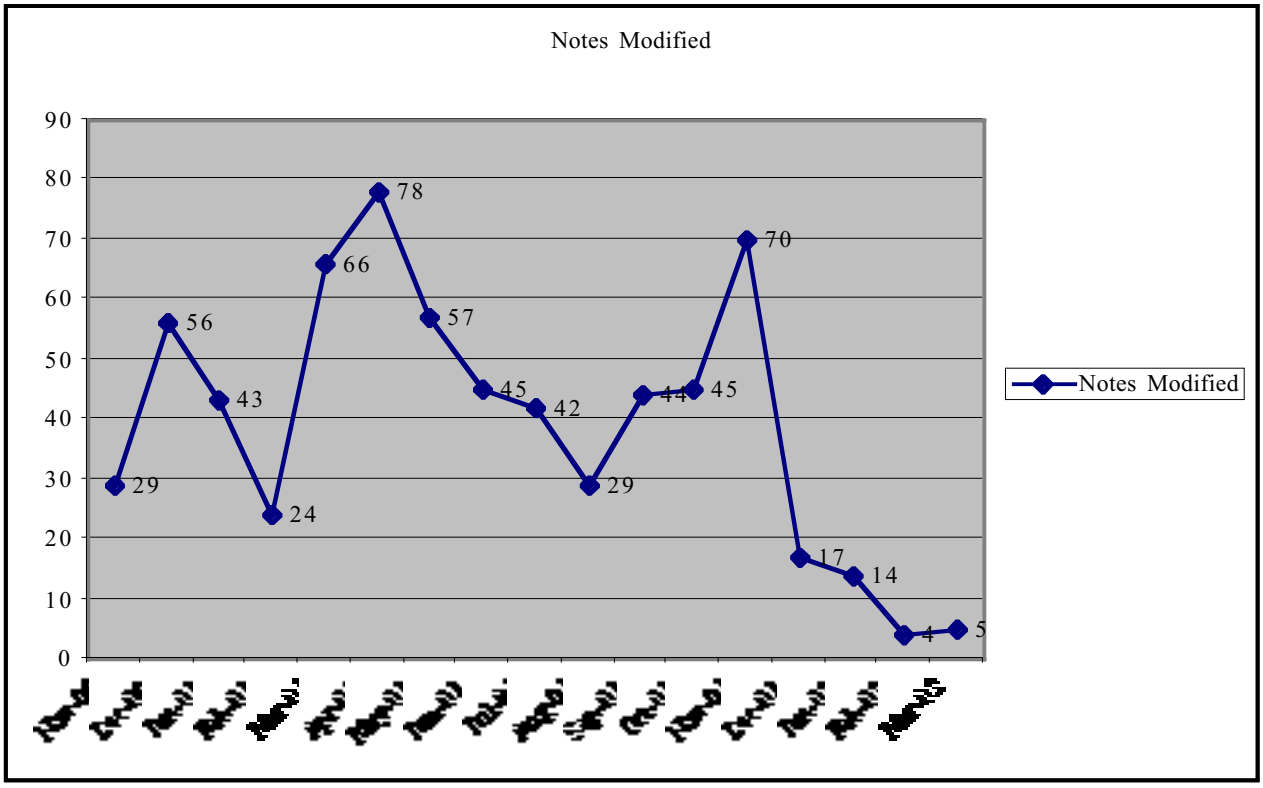
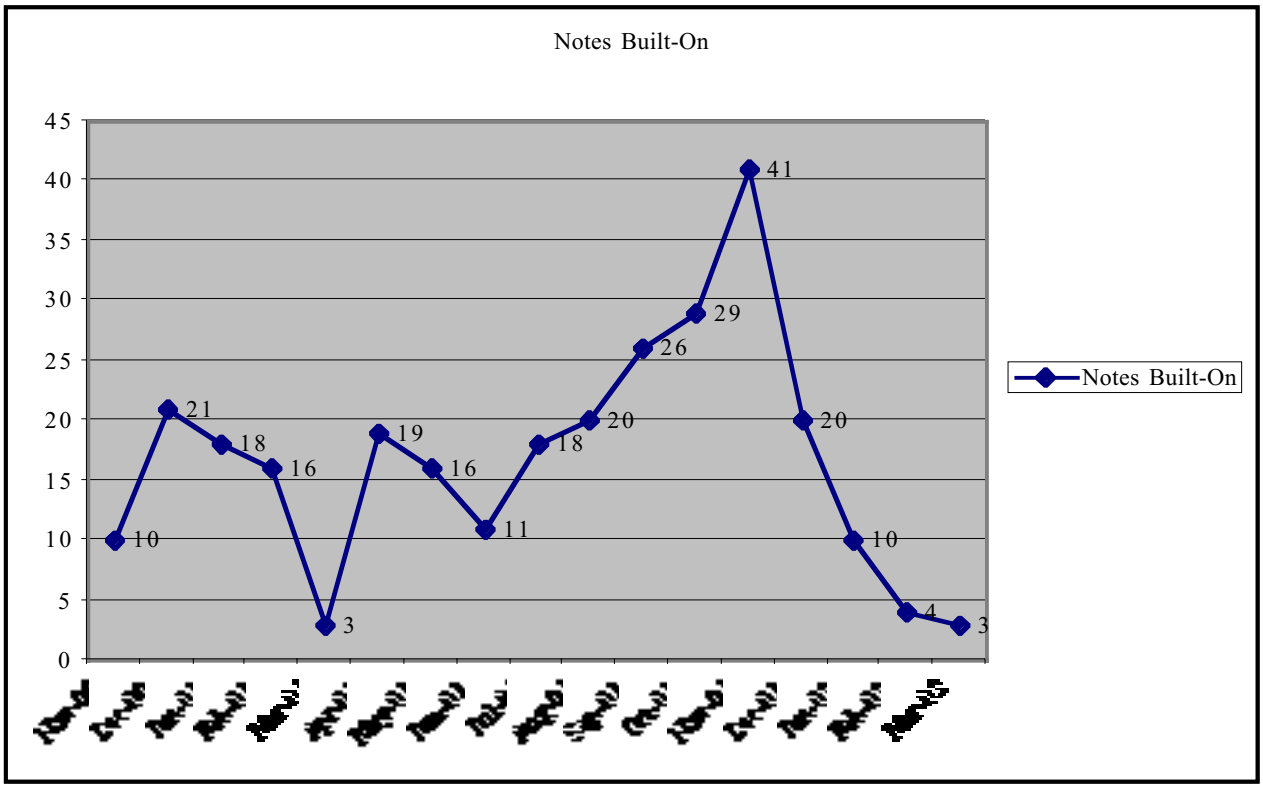


Table 4 – Notes built-on

When participants select the build-on feature in Knowledge Forum software, they do so with the intention of connecting their ideas, comments, knowledge and so on to another. The technology connects notes via a line indicating the direction of the build-on to the source note. Since our primary goal in this project was to shift profession specific learning to an interprofessional workplace context, we hoped members of the team would connect with one another and rally around shared problems of practice. Traditionally, health care professionals engage in profession specific professional development activities, usually in the form of annual conferences and the like. Our desire was to make the real world problems facing health care professionals at Toronto Rehab the object of inquiry during monthly discourse. Indeed, as reflected in the build-on results (threaded discourse), approximately 50% of all notes in Monthly Reports views were build-on, notes connected to source notes.



- Were there any expected outcomes that were not achieved? If so, could you list them and explain why.

The Learning Portfolios activity was not achieved in this project, the reasons for which are fully described in Section 5 of this report.

- Were there any unexpected negative outcomes? If so, please describe them.

The only unexpected negative outcome concerned participants heightened anxiety using virtual technologies to communicate, collaborate and share knowledge. Persons for whom computer technology has been an integral part of their education and workplace experience did not report anxiety. Psychosocial issues related to use of new technologies at the workplace need to be recognized as important aspects of this kind of applied research.

- Were there any unexpected positive outcomes? If so, please describe them.

The ability to read participant notes over time allowed for tracking of interprofessional activities in narrative descriptions contained in notes. The most positive aspect of interprofessional readership was the ability to connect virtually one's ideas to someone else's ideas. For example, in one instance a Clinical Nurse Educator who had reported significant challenges designing and implementing a catheter care program for patients living in complex continuing care over a 6 month period. When the call for poster submissions was issued by the Greater Toronto Rehabilitation Network Annual Conference, these notes were synthesized into a working draft of a poster by a participant-researcher. Most importantly, the design phase of the poster requiring a face-to-face meeting was limited to a one hour meeting between co-authors as a result of the preliminary data available and synthesized in the Knowledge Forum database. The poster entitled *Best Practices in Catheter Care* (Autry, Daniel, Kearney, Russell, 2002) may be found at http://ikit.org/OLT.html

Similarly, turn around time was significantly reduced on project work when collaborators used Knowledge Forum to write a grant proposal for the Change Foundation of the OHA. The proposal entitled *An Interprofessiional Chronic Non-Malignant Pain Initiative: Getting best Evidence Into Practice* took only 4 days to produce and no face-to-face meetings between collaborators were necessary. Although this proposal was not accepted for funding, we now have all documentation relating to production of the proposal, process accounts of the division of labour required to produce the report, and the final report in the Toronto Rehab Knowledge Forum database for future applications. The ability to use electronic data to produce knowledge work in less time is the real power of virtual collaborative environments such as Knowledge Forum.

7. EVALUATION METHODOLOGY

This section is designed to help explain the approach you took to determine if and how the expected results were achieved.

- Was the project evaluation conducted internally or by an independent evaluator?

The project evaluation was conducted by researchers at partner organizations, Toronto Rehab and IKIT.

- What methodology was used to conduct the evaluation (i.e. surveys, questionnaires, focus groups etc.)? Please explain.

The Analytic Toolkit (Burtis, 2000) was the primary evaluation methodology used in this project. This online tool provides summary statistics on activity in a Knowledge Forum database. Each of the 17 Monthly Report views generated by participants was analyzed using this tool. Results show how many notes are in the database, how connected they are, how many notes a user has created, which views a user

is working in, what percentage of the notes have been read, whether build-ons, keywords, references and other knowledge building features are being used, who has read and written new notes during a particular time period, and social interactions. It is intended to be used by database managers, researchers, and participants in the database.

- What were the key results of the project evaluation?

➢ Model Development – An interprofessional knowledge building model to support collaboration and virtual learning has been successfully designed and implemented in this project.

➢ Creation of a Toronto Rehab Knowledge Forum database – A rich resource of interprofessional knowledge and expertise generated from monthly reflection activities is now available for inter- and intra-organizational knowledge building. Participants may continue to refer to knowledge resources in the database they constructed, as well as invite visitors in for virtual visits or project work. We have successfully piloted this latter model with two graduate-nursing students at the University of Toronto. They chose views from the Toronto Rehab database to synthesize and work on during their internships, providing learning experiences to the students and help and support to health care professionals at Toronto Rehab. Sharing of knowledge bases across organizations in health care is the goal of future research.

- How were those key results used?

Results from this evaluation were ongoing and shared sporadically with participants. Future research would do more to embed continuous evaluation in the database views so participants themselves could assess individual and group collaborative processes. Results were disseminated to a larger research network via conferences and presentations.

- What were the strengths/weaknesses of the project identified during evaluation?

The strength of this project was its design methodology framework [Collins, 1999 #2]. Design experimentation is an emerging methodology in school based educational settings directed at 'designing' for change, and evaluating complex psychosocial and cultural processes in context. This methodological approach has been widely used to create and evaluate knowledge building communities in education (Aalst & Chan, 2001; Hewitt & Scardamalia, 1998; Scardamalia, 2000). However, this project was the first attempt to use the method to describe and evaluate design of a knowledge building community in a health care practice setting. As well, design experimentation is an appropriate method for understanding complex human behaviour in context, such as actual work processes in hospital practice settings. The ability to revisit work, as well as track and improve upon historical progress in one medium (Knowledge Forum), was considered a strength. However, for some participants the continual improvement cycle was an ideal to aspire to, rather than a realistic objective in practice.

- What has changed as a result of this evaluation?

As previously mentioned, the most significant change realized by this project was the ability to transform a static activity of submitting professional reports to the VP Professional Practice into a dynamic opportunity for collaborative learning. As well, participants were required to learn a new software application (Knowledge Forum) and some have expressed a desire to use this program in their roles in other contexts (e.g., university classes, etc.).

- Recognising that not every project is completely successful, would you say your project was partially or completely successful? Please explain.

We consider this project to have succeeded in accomplishing our aim – namely, to introduce knowledge building pedagogy and technology in health care to support interprofessional collaboration and continuous learning. We were not as successful embedding the approach deeply enough that it will be sustained beyond this period of funding. In part, we attribute this to the departure of key figure and champion of this research, the VP of Professional Practice. We recommend securing a broader base of organizational support in the next iteration of this research.

8. SUSTAINABILITY (LTW and CLN projects only)

- Have you taken steps (financial or non-financial) to ensure the activities of this project will be sustained after the OLT funding period is completed? Please explain.

We are in the process of making application to the Social Sciences Humanities Research Council, Initiative for the New Economy (SSHRC-INE), deadline July 15, 2002.

9. DELIVERABLES AND DISSEMINATION

- What were the deliverables that came out of the project (for example, reports, journal article, presentations, web site, learning centre, etc.)? Please explain.

All deliverables related to this project may be found at the newly created web site http://ikit.org/OLT.html

- 4 progress reports and 1 Final Report submitted to the OLT
- 5 posters presented at national and international conferences
- 2 papers
- Web Site development
- Participant Video Testimonials

- How will the project results and applicable deliverables be shared with the most relevant audience?

To date we have participated in 10 national and international conferences related to use of new technologies to support education and professional development in health care. From this, we have established a network of national collaborators with whom we hope to collaborate on future grants. The web site mentioned above will be used to disseminate information to the extended health care and research communities. We thank the OLT for funding this opportunity.

10. CONCLUSIONS

This segment of your final report should contain any final thoughts that you have regarding the project. It should answer any questions raised throughout the project and indicate which goals were met.

- What would you say were the lessons learned from this project?

- To identify real practice needs - Health care researchers, practitioners, and educators are increasingly moving towards integrated practices, often referred to as multi-disciplinary or interprofessional practices. The goal of many health care professionals is to integrate knowledge bases within and between professions, communities, and institutions. This goal dovetails nicely with the knowledge building communities' pedagogical model (Bereiter & Scardamalia, 1993). Finally, Knowledge Forum, a software to support expert learning and collaboration promises to solve some real world problems facing health care today (e.g., downsizing, virtual collaboration and consultation, distance health care delivery, etc.).

- To create the opportunity - Project-based initiatives to foster knowledge-building communities in health care need to support real-world learning goals and collaborative needs of users. Our results indicate that health care is ripe for virtual learning and education initiatives ranging from on-line courses, consultation, assessment, mentorship, coaching, and much more.

- To make theory relevant - We began our consultation efforts with participants and the extended health care community by educating our partners and allies about knowledge-building theory and practices (Scardamalia & Bereiter, 1986; Bereiter & Scardamalia, 1993) and their relevancy to health care. A common theoretical starting point has been essential to set the stage for a shared value system upon which we may co-develop collaborative knowledge projects.

- To provide technical support – Although we attempted to provide face-to-face real-time and on-line technical support as part of our consultation service, the impaired computer literacy skills of participants was an ongoing obstacle to deep knowledge work. We anticipate as our involvement in this sector expands, we will need additional human resource supports specifically for technical training.

- To understand organizational culture – We have begun to explore the differences between acute care, rehabilitation and complex continuing care in our attempt to better understand how to design projects and develop partnerships in health care. We will continue to pursue this research in more depth as the unique socio-cognitive variables extant in various health care settings play significant roles in the kind of consultation and design experimentation we hope to continue.

- What worked and what did not work?

We are satisfied with all activities to date and look forward to continuing this research in the future.

- If you were to do this project again, what would you do differently?

Assess computer literacy skills of users prior to project initiation and have more structured computer activities in which computer literacy was enhanced.

- Do you have any recommendations/suggestions for OLT?

Communal database technologies such as Knowledge Forum promise to transform learning at the work place. Perhaps the most significant contribution of this project will be the documentation and reporting of how a communal database technology may be used to enhance individual and organizational learning. Based on project results to date, we believe that sharing knowledge in a communal database expedites the learning process at both the individual and community. This project promises to contribute to the field of Telehealth. To date we have developed methodologies for online charting, virtual diagnosis and treatment, evaluation, and continuous interprofessional development using knowledge building pedagogy

and technology. As well, although telelearning initiatives have a proven track record in education and research, they are relatively new in the work place. Telelearning initiatives in health care have been restricted to Internet based (e.g., grand rounds) and computer based learning programs (e.g., CD, etc.). Knowledge Forum's® open architecture, however, allows for the design and tailoring of learning tools to support real life on-the-job learning. As well, Knowledge Forum databases, or views within databases, may be shared with other groups (e.g., Faculty of Nursing) and serve as teaching and learning tools in multiple domains of practice.

11. APPENDICES

Appendix 1 – Summary Table of Problem Solving Views

Problem Solving Views	Date Created	Notes	Problems of Inquiry
Knowledge Forum Consultations	11/29/00	4	How to track technical and pedagogical learning needs of participants?
Ethics, Privacy, and Electronic Information Technology	12/06/00	9	What do we need to understand about provincial and federal privacy legislation and use of virtual technologies in health care?
Chronic Non-Cancer Pain Guidelines	12/13/00	8	How might Knowledge Forum be used to evaluate chronic non-cancer pain guidelines with complex clinical cases?
Knowledge-Building versus Knowledge Telling	01/30/01	20	Why is knowledge-building a better pedagogical model in health care education?
Grants and Funding Cycles	02/12/01	2	How might Knowledge Forum be used for interprofessional grant writing?
Library Services	02/14/01	4	How might Knowledge Forum be integrated with library services at Toronto Rehab to ensure integration of research into practice?
Virtual Nursing Internships	02/22/01	43	How might Knowledge Forum be used to support virtual interprofessional mentorship of a graduate-nursing student?
Research Consultations	02/22/01	1	To collect documentation related to research consultations (interns).
Academic Practice Model	4/23/01	14	How might knowledge building pedagogy and Knowledge Forum technology help support development of a new model of interprofessional practice dedicated to integration of research into practice?
What's New?!	05/03/01	1	How might view backgrounds within Knowledge Forum be used as bulletin board of new interprofessional activities and events?

Patient Feedback	5/11/01	N/A	How might knowledge building and Knowledge Forum be used to integrate patient and family feedback into the design of patient goals and treatment plans? Exploratory.
KF Summer Institute	7/24/01	11	How might knowledge building and Knowledge Forum be used to plan and disseminate knowledge about the annual Summer Institute (especially for participants unable to attend the SI)?
GTA Rehab Network	8/28/01	1	How might knowledge building and Knowledge Forum be used to support the GTA Rehab Network?
Knowledge Society Network	9/25/01	11	How might knowledge building and Knowledge Forum be used to build on research initiatives identified at the Summer Institute?
Occupational Therapy Planning Space	12/05/01	10	How might a communal view support supervisor-employee in profession specific project planning.

Appendix 2 – Summary Tables of Knowledge Building Indicators

Monthly Reports Views	**Notes Created**	**Participants**	**Average**
Nov-00	25	12	2.08
Dec-00	34	12	2.83
Jan-01	38	17	2.24
Feb-01	29	12	2.42
Mar-01	45	16	2.81
Apr-01	35	14	2.50
May-01	31	14	2.21
Jun-01	24	13	1.85
Jul-01	29	13	2.23
Aug-01	32	14	2.29
Sep-01	44	17	2.59
Oct-01	48	17	2.82
Nov-01	62	19	3.26
Dec-01	38	18	2.11
Jan-02	21	11	1.91
Feb-02	8	6	1.33
Mar-02	6	3	2.00
Total	549	228	39.48

Average	32.29412	13.41176	2.322353
Monthly Reports Views	**Notes Read**	**Participants**	**Average**
Nov-00	263	15	17.53
Dec-00	505	21	24.05
Jan-01	523	20	26.15
Feb-01	421	23	18.30
Mar-01	849	22	38.59
Apr-01	670	22	30.45
May-01	530	21	25.24
Jun-01	533	22	24.23
Jul-01	570	22	25.91
Aug-01	559	22	25.41
Sep-01	635	21	30.24
Oct-01	796	21	37.90
Nov-01	1243	21	59.19
Dec-01	502	20	25.10
Jan-02	280	15	18.67
Feb-02	66	11	6.00
Mar-02	45	5	9.00
Total	8990	324	441.96
Average	528.8235	19.05882	25.99765
Monthly Reports Views	**Notes Modified**	**Participants**	**Average**
Nov-00	29	12	2.42
Dec-00	56	12	4.67
Jan-01	43	17	2.53
Feb-01	24	12	2.00
Mar-01	66	16	4.13
Apr-01	78	14	5.57
May-01	57	14	4.07
Jun-01	45	13	3.46
Jul-01	42	13	3.23
Aug-01	29	14	2.07
Sep-01	44	17	2.59
Oct-01	45	17	2.65
Nov-01	70	19	3.68
Dec-01	17	18	0.94
Jan-02	14	11	1.27
Feb-02	4	6	0.67
Mar-02	5	3	1.67
Total	668	228	47.62
Average	39.29412	13.41176	2.801176
Monthly	**Notes Built-**	**Participants**	**Average**

Reports On Views			
Nov-00	10	3	3.33
Dec-00	21	6	3.5
Jan-01	18	8	2.25
Feb-01	16	9	1.78
Mar-01	3	3	1
Apr-01	19	8	2.38
May-01	16	7	2.29
Jun-01	11	6	1.83
Jul-01	18	8	2.25
Aug-01	20	11	1.82
Sep-01	26	11	2.36
Oct-01	29	13	2.23
Nov-01	41	13	3.15
Dec-01	20	9	2.22
Jan-02	10	4	2.5
Feb-02	4	3	1.33
Mar-02	3	3	1
Total	285	125	37.22
Average	16.76471	7.352941	2.189412