

ATHABASCA UNIVERSITY

MEDICAL STUDENTS' EXPERIENCES STUDYING MEDICINE

IN A

DISTRIBUTED MEDICAL EDUCATION NETWORK

BY

CYNTHIA F. KENYON

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## Approval of Master's Thesis

The undersigned certify that they have read the Master's thesis entitled:

Submitted by  
Cynthia Kenyon

In partial fulfillment of the requirements for the degree of

Masters of Distance Education

The thesis examination committee certifies that the thesis (and the oral examination) is approved.

**Supervisor**

Dr. T. Jones  
Centre for Distance Education  
Athabasca University

**Committee members**

Dr. G. Crawford  
Centre for Distance Education  
Athabasca University

Dr. C. Ives  
Centre for Learning Design and Development  
Athabasca University

Dr. L. Lindgard  
Faculty of Health Sciences  
University of Western Ontario

05 May 2011  
*Date thesis approved*

## DEDICATION

This thesis is dedicated to my husband, George Sinclair, and my sons, Geordie and Craig.

## ABSTRACT

Video-conferencing (VC) is a well established educational tool. Using a grounded theory approach, this study explored the experience of medical students studying remotely by VC. A convenience sample of 11 students participated in semi-structured interviews. Constant comparative analysis identified three emerging themes which were refined and verified by a focus group. The key themes were: the effect of VC on the students' classroom experience, the development of a strong social cohesion between the students, and the impact on student learning. The participants adapted well to VC lectures but expressed reluctance to ask or answer questions in class. Participants felt they became more self-directed and better collaborative learners. Moore's theory of transactional distance provides a possible explanation for these observations. High transactional distance was evident with less instructor-student interaction, more student-student interaction, and greater student autonomy. Understanding the transactional dynamics in the VC classroom will inform future research and faculty development.

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# CHAPTER I

## INTRODUCTION

### Statement of Purpose

In September, 2008, the University of Western Ontario Schulich School of Medicine and Dentistry introduced a distributed medical education network with a satellite medical school in Windsor Ontario. The mode of instruction is videoconferencing (VC). Although this has been done at other Canadian medical schools, there no research reports on the effect of distance education on the experience of medical students who enroll in these programs.

The purpose of this study was to explore the experiences of medical students enrolled in medical school who learn in a distributed network using VC.

### Research question

The research questions were the following; what is the educational experience for medical students studying medicine remotely in a blended-learning environment and how is the use of VC technology perceived by the students?

### Significance

This study explored the experiences of medical students learning in a distributed medical education network. In this network, students are exposed to a blended-learning environment with a combination of VC, web-based teaching, and face-to-face teaching. There are no reports of this application of distance education to deliver an entire Medical Doctor-program (MD-program). The distributed medical education model is novel and has been widely adopted in Canada. Research in this area will make a significant



contribution to the knowledge of distance education and medical education and the impact on students.

### Limitations

Students at only one medical school participated in this study. The remote campus, where the study was done, had twenty-four students enrolled. These two limitations do not allow for a generalization of the findings.

Members of the research team are faculty members at the medical school. This could influence the data collection if the students do not feel they can comment freely. It may also be a potential source of bias.

### Delimitations

The participants in this study were medical students enrolled at the Schulich School of Medicine and Dentistry, University of Western Ontario. They were all members of the graduating class of 2012, and were studying medicine in a distributed medical education network at a site remote from the main university campus in London, Ontario.

### Definition of terms

*Undergraduate medical education* refers to the educational program that leads to the degree of Medical Doctor (MD). Most students studying medicine already have an undergraduate degree; however, in spite of this the MD is considered an undergraduate degree. The term 'undergraduate medical education' does not include or refer to any studies or courses taken in preparation for applying to medical school (i.e. premedical courses).

*Clinical clerks* are medical students completing a full year of clinical experience under the supervision of qualified physician supervisors. The clinical clerkship is usually the

third year of a four year MD-program. The clinical clerkship is the experiential learning component of medical school in which students work full-time alongside their supervisors on a daily basis.

*Postgraduate medical education* refers to a program taken following graduation with an MD-degree which leads to further qualifications. Postgraduate medical education includes the two-year family medicine program and all the multi-year specialty programs such as surgery, paediatrics, obstetrics and gynecology, and psychiatry. Completion of a postgraduate program is a requirement to practice medicine in Canada.

*Continuing medical education* refers to seminars, courses, or other educational opportunities attended by practicing physicians to maintain their skills or learn new skills, after they have completed undergraduate and postgraduate medical education. Continuing medical education covers a broad range of topics from courses to learn new surgical skills or how to use new equipment to courses designed to improve administrative or teaching skills.

*Face-to face* learning describes any educational activity in which the learner and the instructor are physically present in the same place at the same time.

*Distributed medical education* is the term used to describe MD-programs that involve a central university campus-based program with satellite or distributed sites in one or more locations distant from the main campus site. The distributed sites are linked to the central site by video-conferencing.

*Videoconferencing* (VC) in this paper is used as a blanket term for any real-time live program in which the participants are located at two or more different locations linked by audio and visual technology.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

#### Introduction

VC is well established as a tool for synchronous teaching in distance education. This technology has been used in elementary and high schools, at the college and university level, and as a tool to facilitate continuing education in business and professional education including health care and teaching. The major driving force for implementation of VC as an educational tool has been to provide access to remote learners who would otherwise be unable to benefit from certain educational programs.

VC is now being used extensively in medical education in Canada, as medical schools develop educational sites remote from the home or central medical school campus. This model of medical education is known as *distributed medical education*.

This chapter begins by reviewing the literature associated with the development of the distributed medical education model in Canada. This is followed by an historical perspective on VC in medical education. The chapter will then focus on the current state of VC in medical education, specifically reviewing those areas where there has been the most experience; continuing medical education and undergraduate medical education. The chapter concludes with an overview of some of the instructional issues related to use of VC.

#### Distributed model for medical education

It is common knowledge that Canada is short of physicians. It has been estimated that we have a deficit of at least 5,000 physicians and that we should be admitting and

educating more medical students in Canada (Busing, 2007). There is also a maldistribution of physicians with acute shortages in rural and remote communities. There are three potential solutions to these problems. The most obvious would be to enroll more students in the existing medical schools. Expansion of enrollment has already occurred at most Canadian medical schools in the past six to eight years. The result is that the existing schools are saturated and are not able to provide adequate clinical teaching for more students. Another solution would be to build a new medical school in a rural area, hoping to attract students who will stay in the community and practice after they graduate. This approach was taken by The Government of Ontario in 2001, when the Northern Ontario School of Medicine was established (Strasser et al., 2009). Opening a new medical school is a costly undertaking. Even before enrolling the first medical students, The Government of Ontario invested more than \$95 million in the development of the Northern Ontario School of Medicine (Tamburri, 2005). The third approach is to develop a distributed model with students studying at a remote campus using technology to link them with an existing medical school campus. The students at the distributed sites are enrolled as students of the central university but complete most or all their program at the remote site (Bates et al., 2005). This model was adopted by The University of British Columbia in 2004. At least seven other Canadian universities were following the same approach by 2006, with plans to have more than 250 medical students studying at 11 distributed sites by 2009 (Kondro, 2006).

The idea of a distributed model for medical education has developed and expanded over the past four to five decades. One of the earliest examples was The University of Washington in which the WWAMI program, an acronym for Washington, Wyoming,

Alaska, Montana, and Idaho, was developed in the early 1970s (Norris, et al. 2006). The program has been very successful but it is not a distance education program. Students study at their local university campus for one year and then transfer to The University of Washington to complete their program. The WWAMI program has been running now for approximately 35 years. Since that time, interest in the development of regional programs has continued to grow. In 2003, the Association of American Medical Colleges reported that 41 American medical schools had regional campuses and another 27 were planning to do so (Norris et al. 2006). However, these campuses are only used for clinical education for senior medical students. In 2007, The University of Miami Miller School of Medicine opened a regional campus in Southeast Florida (Rackleff, O'Connell, Warren, & Friedland, 2007). Their stated intention is to deliver the first 2-years of the program using distance-learning technologies but their descriptive paper does not provide details about the technologies to be used.

An example of a true distance education program in medical education is the International Virtual Medical School, known as IVIMEDS (Harden & Hart, 2002). This innovative program is a true virtual program using web-based technology. IVIMEDS students will learn through self-study using online educational modules. Their clinical education is to be provided by local physicians with whom the students make their own arrangements. Although it has been under development for several years, IVIMEDS has yet to enroll any students.

These few examples are the only published programs identified that teach medicine using a distributed model. It can be concluded that Canadian medical schools are

embarking on a truly novel approach to broadening the availability of medical education and expanding enrollment.

### Videoconferencing in Medical Education.

As VC is the medium for lecture-based instruction in the distributed medical education networks, it is useful to gain a perspective on the origins and uses of this technology in medical education.

Historical overview. There is a long history of use of VC in health care. In 1962, Dr. M. E. DeBakey, a pioneer in the field of heart transplant, used VC transmitted by satellite, to demonstrate an open-heart surgical procedure he performed in Texas to surgeons in Geneva, Switzerland (Augestad & Lindsetmo, 2009). In the decades since De Bakey's early demonstration, interest in the use of VC in health care has expanded to the point that it is now a common adjunct to clinical care in many communities. This expansion has been facilitated by improvements in technology and reductions in costs (Curran, 2006).

Interest in educational broadcasting began to expand in 1976, when the Communications Technology Satellite, Hermes, was launched ("CRC celebrates 40 years", 2009). Hermes was a joint Canadian-American project designed to test the concept that an orbiting satellite would be able to transmit signals that could be received by small satellite dishes. Hermes remained operational for three years. During this time, many experiments related to telemedicine, distance learning, and home broadcasting were conducted. For example, through a satellite link researchers at The University of Western Ontario demonstrated that x-rays could be transmitted from Moose Factory, an isolated Northern community, to the University Hospital in London, Ontario ("CRC celebrates 40 years", 2009; House, 1981a, n.d. c). This experiment demonstrated the value of

telecommunication in the provision of clinical care as well as for continuing medical education.

Faculty at Memorial University also participated in experiments using Hermes (House, n.d.). Over a 3-month period in 1977, approximately 150 hours of continuing medical education for a variety of health care professionals were broadcast. The broadcasts included transmission of x-rays and electrocardiograms. The researchers involved in the project determined that satellite communication was effective for television and interactive audio transmission, but they concluded that most of the educational material could be delivered effectively without the television component (Elford, 1998, House, n.d.). As a result, Memorial University developed a strong and highly effective teleconference system using an integrated service digital network (ISDN) and radio-based audio-conferencing (Elford, 1998). The system grew and was later formally organized into the Telemedicine Centre. In the 1990s VC was added to the facilities of the Telemedicine Centre. The centre focuses largely on clinical care, but approximately 20% of the time is used for educational programming, including delivery of educational programs to high school and college students (Elford, 1998).

Although Hermes ceased functioning in 1979, the experiments conducted using satellite technology lead to further design and testing of new communications technology with Canada as a leader in the field (“CRC Highlights 2008-2009”, 2009). The technology available for VC evolved from early educational television broadcasting to costly but more effective two-way interactive technology using ISDN (Integrated Services Digital Network) lines (Augestad & Lindsetmo, 2009; Shearer, 2007). This technology, in turn, has been replaced by internet based voice and video-over-IP (Internet Protocol) systems



allowing synchronous two-way interactivity of high quality at a much lower cost. Thus, better technology has facilitated growth in use of VC. Most large and many smaller hospitals now have sophisticated VC capabilities for health care delivery, as well as for ongoing professional education for staff (Curran, 2006). In Canada, there are many large internet and satellite based educational networks such as the Ontario Telemedicine Network, Alberta SuperNet and the Nova Scotia Telehealth Network. Similar networks exist across Canada serving education in the health care sector as well as at all levels of public education.

Video-conferencing in Continuing Medical Education. VC has been used successfully for many years in continuing medical education. The emphasis has been on providing continuing medical education opportunities for health care providers in rural and underserved areas. In 1966, The Faculty of Medicine at the University of Western Ontario initiated a 5-program series of continuing medical education lectures using a series of locally and commercially produced video-tapes covering a variety of medical topics (Hunter & Portis, 1972). The lectures were broadcast using the local commercial television station in London, Ontario. Participant surveys indicated that a significant proportion of rural physicians watched the programs regularly and felt that they were of value. In 1972, Memorial University in Newfoundland introduced continuing medical education using television, videotape, an interactive audio system, and slow scan television to transmit visual images (House, Roberts, & Canning, 1981). The system expanded quickly, adding more sites and programming, and evolved into a regular weekly Wednesday afternoon continuing medical education series. The Dalhousie University Office of Continuing Medical Education, implemented a pilot project using VC for

continuing medical education in 1995 (Allen, Sargeant, MacDougall, & Proctor-Simms, 2002). This pilot project led to the development of the Nova Scotia Telehealth Network. Use continued to grow with 38 sites participating in the network by 2000-2001 (Allen, Sargeant, & MacDougall, 2002).

VC is also used regularly in the United States. Ricci, Caputo, Callas, & Gagne (2005) reported their experience with VC for continuing medical education in Vermont where 650 sessions were given in person and by VC over a three-year period. Participants were surveyed and while most preferred the face-to-face sessions, 80% agreed that VC was at least as effective. Of note, 82% of the participants would have been unable to attend continuing medical education sessions without VC due to their remote practice location. Similarly, VC has been used with success in Arkansas where a program for delivering continuing medical education in paediatrics to rural and medically underserved areas was implemented in 2007 (González-Espada, Hall-Barrow, Hall, Burke, & Smith, 2009). When surveyed, the participants also preferred face-to-face programs but felt that VC was an effective way to ensure that rural and remote health professionals were able to participate in important educational sessions.

Augestad & Lindsetmo (2009) reviewed use of VC by surgeons. They identified a variety of applications including use of VC as an educational tool to teach dentists, paediatric surgeons and other specialists, and medical students. They identified VC as a valuable tool in clinical settings such as multidisciplinary patient care conferences and post-surgical follow-up. They also reported the use of VC to facilitate mentoring for physicians practicing in remote settings to assist them with emergency management of trauma, neurosurgical problems, and acute psychiatric problems. The value of VC was

seen to be related to the low cost of use in remote settings, the immediacy of the professional interactions, and the richness of the information exchange.

In Australia, VC is used extensively in the support and provision of clinical care. For example the telehealth project in Western Australia has been using VC to facilitate medical consultations and patient education sessions since 1999 (Dillon, Loermans, Davis, & Xu, 2005). In a 2-year period between January 2002 and December 2003, 40% of 3266 VC sessions were for educational purposes.

Young (1995) described the development of a European network, EuroTransMed, which was established to provide a free continuing medical education service across Europe. The project was started in 1988 and began broadcasting in May 1992 with interactive English-only programming. Demand for the program expanded with requests to widen the scope of topics and to broadcast medical symposia and conferences. EuroTransMed is still in existence, offering a range of continuing medical education programs as part of a larger global communications network (<http://www.comminit.com/en/node/116420/36>).

The French-speaking Virtual Medical University uses several technologies including VC to enhance education in medical schools in France, and to share resources with other Francophone communities (Dufour, Cuggia, Soula, Spector, & Kohler, 2007). In 2001, the Geneva University Hospital and the Mali University Medical School began a pilot project, Réseau Afrique Francophone de Télémedecine (RAFT) (Bagayoko, Müller, and Geissbühler, 2006). The goal of the project was to develop a low-cost telemedicine system that would take into account the local concerns and would be sustainable. Based on the

success of the pilot project, eight other Francophone African countries quickly joined the network. One of the main activities of the project was creation of educational content adapted to the realities of rural medical practice in a developing country. As well, RAFT permitted physicians to collaborate with other physicians in similar settings where the culture, health concerns, and therapeutic challenges are similar. The project facilitated development of skills in use of telemedicine and teleconsultation by local physicians, who began to develop their own courses for continuing medical education. They also began to participate in web-based medical conferences, and consult with other physicians in Francophone Africa and Europe.

Video-conferencing in Undergraduate Medical Education. Use of VC in the education of medical students has been limited. Lau and Bates (2004) carried out a literature review of the use of e-learning in medical education as part of the development process for the University of British Columbia distributed medical education program. They searched two databases, PubMed and Abstracts of Business Index, and reviewed articles specific to medical education. They found relatively few published studies related to the broad topic of distance learning in medical education and most of the publications they identified were descriptive in nature. They were only able to locate seven publications related to VC. Although their literature search was very narrowly focused, they concluded that there were few published reports on synchronous learning in medical education. A further literature search for this review identified many publications documenting use of VC in medical education for short courses, journal clubs, and demonstrations of surgical techniques but, as reported by Lau & Bates (2004), there are no reports of the use of VC or any other technology for the delivery of an entire MD-program by distance.

There are many examples of use of VC for short teaching medical courses. Furnace et al. (1996) reported on a 3-month trial of VC for tutorial teaching to medical students in peripheral hospitals in Scotland. Due to cost restraints they used low bandwidth ISDN lines which, they subsequently determined were not of sufficient technical quality for interactive teaching. Twenty tutorials involving 30 students and eight faculty were conducted using the VC system. Overall the system worked but both the students and the faculty found that the system did not facilitate interaction and discussion between the sites. The authors concluded that VC was a realistic alternative when distance and availability of specialist physicians are problems, but more robust VC systems using high-speed transmission and greater bandwidth are essential for success.

Ford, Pinder, Ovalle, and Li (2008) described the use of VC at the University of British Columbia to teach pathology to first and second year medical students. The VC system for the course they studied uses a dedicated university computer network developed specifically for the medical school, similar to that now in use at the University of Western Ontario. Three sites, Vancouver, Prince George, and Victoria, are linked through the VC system. The teaching methods described in their paper included lectures, given for the most part from the major teaching centre in Vancouver, smaller group tutorials of approximately 25 students, and self-directed learning using web-based pathology slides and cases. Students were surveyed at the end of their second year. They were generally satisfied with their educational experience. However the data presented in the report reflect the value to medical students of pathology as a subject area rather than on how they valued the teaching methods. For example the students were asked whether they thought content expertise was important in the teaching of the course and whether

they found the pathology sessions useful. The report did not discuss the students' perceptions of VC as an educational tool.

Moorman (2006) demonstrated that it was possible to use VC to assist students in a gross anatomy dissection laboratory using what he call a 'Prof-in-a-Box' system. His motivation for doing this was a projected shortage of PhD-level anatomists trained in teaching gross anatomy. He used a video-camera and screen mounted next to a prosected cadaver in the anatomy laboratory linked to his office in another part of the building. He then made himself available in his office for three hours/week. Students in the laboratory could ask questions and receive help in the identification of anatomical structures by VC. The students were invited to provide feedback on the Prof-in-a-Box system. Those who responded were very positive about their experience.

Raffelini (2006) reported the results of research evaluating the use of VC as a teaching tool for final year medical students distributed between three university hospital teaching sites in Montreal. The distance between the hospitals made travel to a single site for educational purposes impractical. Therefore, VC facilities were developed at each site. The students were enrolled in a 45-hour theoretical course that took place over approximately six months in 2002-2003. The classes were three hours each and the course instructors rotated between the three sites so all the students participated in some face-to-face and some VC sessions. Students clearly preferred the face-to-face sessions, although they acknowledged that they gained knowledge from the course and appreciated the time saved by not having to travel.

VC has also been used for assessment of learners in a medical setting. Wilkinson, Smith, Margolis, Gupta, and Prideaux (2008) describe a multi-station assessment of postgraduate trainees in rural and remote medicine in Australia. Examining these trainees in a central location would require them to be away from their work for three to five days, would deplete the physician resources during their absence, and was felt to be extremely costly. To solve this problem the commonly used objective structured clinical examination was adapted to a VC format. Each candidate was examined on eight different clinical scenarios. The candidates were individually linked by VC to one of eight examination rooms at the central location. The examiners were each assigned one of the clinical scenarios and moved from room to room to examine each candidate on their specific scenario. Although there were some technical problems, this pilot study, designed to demonstrate feasibility and reliability, was successful. The authors concluded that a VC multi-station examination was a feasible, reliable, valid, and acceptable summative evaluation tool.

A similar pilot study was conducted by Clever, Novack, Cohen, and Levinson (2003) to demonstrate that VC could enable evaluation of communication skills. The pilot study was conducted using Orthopaedic surgeons as the test subjects. The surgeons, located in Chicago, conducted an orthopaedic consultation for a standardized patient in Philadelphia via VC. The authors found that VC allowed accurate evaluation of the surgeons' communication skills and was an acceptable method of assessment to the surgeons.

These examples, of the successful use of VC in continuing medical education and undergraduate medical education, demonstrate the varied uses of VC as an educational

technology. They demonstrate that using VC for lecture-based teaching in an MD-program is feasible; however, experience is limited to brief educational interventions.

### Instructional issues

Student engagement. Most educational VC is lecture-based. While the VC environment can provide opportunities for interaction, the student perspective suggests that students may not feel engaged. Student engagement is enhanced when there is a strong element of interactivity or active learning. It is an important feature of effective teaching in any environment (Darabi, Sikorski, & Harvey, 2006). Giving interactive lectures has been a long-standing challenge to university teachers. Some of the activities shown to enhance the effectiveness of lectures and improve student engagement are encouraging audience participation through use of general questions and questions targeted to individual students, ensuring clarity of the presentation, use of advanced organizers and summaries, demonstration of command of the content, showing enthusiasm for the topic, and having the class engage in short discussion or exercises with those seated nearby (Copeland, Longworth, Hewson, & Stoller, 2000; Newman, Lown, Jones, Johansson, & Schwartzstein, 2009; Prince, 2004).

Western education places high value on the Socratic method of teaching. Questioning is seen as adding significantly to student learning by encouraging critical thinking and problem-solving (Greenholtz, 2003; Oh, 2005). Both critical thinking and problem-solving are critical aspects of 21<sup>st</sup> century medical education. The lecture format is not necessarily conducive to Socratic teaching, as lectures are primarily intended to deliver a large amount of content, usually to a large audience. This is especially true in medical



school where the curriculum is commonly regarded as being dense and overloaded. This is a challenge for those teaching by VC, as most VC uses a traditional lecture-based format.

In his review traditional lectures and active learning, Prince (2004) concluded that there is strong evidence that encouraging student engagement significantly improves recall of information. Ensuring interaction between the learners, particularly learners at remote sites, is one of the key recommendations for effective VC teaching (Darabi, Sikorski, & Harvey, 2006; Gill, Parker, & Richardson, 2005).

Having students interact with one another during an educational session is one of the activities recommended to improve student engagement. Using a survey questionnaire Gillies (2008) studied the experiences of students in a distance education course for prospective primary school teachers. He found that the students valued tutor-student interaction but felt that assigned student-student tasks were a waste of valuable on-air time. Gillies concluded that activities to promote interaction between students should to be used cautiously in the VC environment, as some of these activities could have the opposite effect and cause the students to become less engaged.

Student performance. Educational outcomes in distance education have been the subject of many studies beginning in the late 1960s and continuing to the present. Black (2007) states, “by the beginning of the 21<sup>st</sup> century, the “no significant difference” phenomenon had been firmly and repeatedly substantiated” (p.4). None the less, the topic has been the subject of more than one meta-analysis confirming that distance learning is effective with students performing as well or better than students in traditional educational

settings (Abdous & Yoshimura, 2010; Allen, Burrell, & Timmerman, 2007; Allen et al., 2004).

Considering the rapid expansion of distributed medical education in Canada, there is surprisingly little literature reporting on medical student performance and the use of VC. Most research reports of medical student performance tend to be based on a small sample size or single cohort of students in a single course with a short exposure to VC. Ford et al. (2008) evaluated the performance of medical students in a lecture-based course in Pathology delivered by VC to 48 students at two remote sites and 175 students who studied at the main campus in Vancouver. Based on examination results, the medical students at the remote sites linked to the lecturers by VC performed as well as those on the main campus. The final grades of both groups were not different from the historical student grades prior to the introduction of VC. These authors concluded that VC was a viable alternative to face-to-face lectures when there was insufficient staff to teach face-to-face at each site.

Stain et al. (2005) reported on the weekly quiz scores of third year medical students in a surgical clerkship at the Meharry Medical College in Nashville, Tennessee. Students participated in twice weekly 3-hour surgical lectures, either face-to-face at the main campus or by VC at a community-based US military hospital 75 miles from the main campus in Nashville. Over a 2-year period the mean scores on the weekly quizzes for students participating remotely were not statistically significantly different from those at the main campus. The students also had similar results on their departmental final examinations and on the National Board Examination in surgery.

Recently, Bianchi, Stobbe, and Eva (2008) reported on the academic performance of medical students from McMaster University who completed clinical clerkship rotations in distributed learning sites. They found no significant difference in the performance of the students at distributed sites as compared to those completing similar clinical rotations at the tertiary care university teaching hospital. These authors concluded that the educational outcomes for students learning at distributed sites were at least equivalent to the outcomes for students who were placed at traditional university teaching sites.

Evaluation of distributed medical education. Evaluation of student outcomes in distributed medical education programs is limited, but demonstrates equivalent or superior student performance. The WWAMI program at the University of Washington, described earlier, has been in existence for more than 25 years. Learning outcomes across the five educational sites have demonstrated equivalent learning at all the sites for the first year of medical school (Schwarz, 2004). A group of surgeons associated with the WWAMI program, demonstrated that the final examination results for third year medical students (clinical clerks) participating in clerkships in the regional sites were significantly higher than those of the students at the traditional university teaching hospital sites.

Worley, Esterman, and Prideaux (2004) reported on their experience at Flinders University in Australia. They compared the examination scores of three cohorts of medical students completing their third year clinical rotations in three different locations: the tertiary care setting, a secondary level regional hospital, and in rural general practices. The students in the secondary regional hospital and rural general practice scored significantly better than the students at the tertiary-care university teaching hospital. They concluded that fears about weaker performance for students studying in non-traditional

sites, away from the university teaching hospital, were unfounded. Prior to their publication these authors found no other similar comparisons in the medical literature.

Whether medical students receiving their entire MD-program in a distributed model, as opposed to a few teaching sessions in one course, will perform at the same level as their peers in a traditional program remains to be determined. The first cohort of students graduated from the University of British Columbia and the Northern Ontario School of Medicine in 2009. As more students graduate from these programs comparisons will certainly be made between their performance on national licensing examinations and that of their traditionally educated peer group.

Student satisfaction. Learner satisfaction has also been reviewed extensively. Overall students express only a slight preference for face-to-face teaching, particularly when traditional classroom learning is compared to high-quality video-mediated instruction (Abdous & Yoshimura, 2010; Allen, Burrell, & Timmerman, 2007). Students like the convenience of VC and other advantages can be readily appreciated. Students are not obliged to travel, so there is less disruption to family life. They may be able to take courses they would otherwise not be able to take for other personal or economic reasons. They may have opportunities to link with learners at other remote locations. VC can also offer opportunities for those at remote sites to hear and interact with experts in specialized content areas that would not be available without VC technology (Gillies, 2008; González-Espana, Hall-Barrow, Hall, Burke, & Smith, 2009; House, Roberts, & Canning, 1981; Ricci, Caputo, Callas, & Gagne, 2005).

There are, of course, disadvantages to distance learning by VC. The most common finding, supported by several studies, is that students feel remote from the instructor in the VC environment. For example, Raffelini (2006) reported on the use of VC for tutorials for final year medical students while on clinical rotations at three different hospitals in Montreal. The students in this study felt they were receiving a second rate class although they appreciated the convenience of not having to travel for a teaching session. Other authors report that students participating in VC do not feel like real students, and they do not perceive the people on the video-screen to be as real as those physically present (Gillies, 2008; Bloomberg, 2007). Bloomberg (2007) explored this issue and found that students in the VC environment did not perceive the learners at other sites to be part of an extended learning community. The VC students were less likely to interact with the students at the face-to-face site unless they were specifically asked to participate and they felt that more attention was given to the students at the face-to-face site.

Raffelini (2006) found that although the students appreciated the convenience of VC, those at the remote sites felt their educational experience was inferior. Some of the explanations for this may have included less access to instructors and other resources such as libraries. Remote students may not have had the same choices if electives were offered as part of their program. Some also felt they were missing out on the social aspects of campus life, which detracted from their overall educational experience (Gillies, 2008).

Faculty in the Department of Pathology at the University of British Columbia surveyed and conducted focus groups with medical students in their distributed program regarding their experiences with lectures in the basic science curriculum. Their results indicate that students prefer VC lectures given by someone they perceived as a more

qualified instructor over a face-to-face lecture by someone perceived to be less qualified. In this small study the students did not perceive VC technology to be a barrier to their education as long as they felt they were being taught by a highly qualified instructor (Kelly, Gaul, Huynh, Grunau, & Murphy, 2008).

VC provides more immediacy than asynchronous distance education technologies. Because VC is done in real time there are greater opportunities for students to interact with instructors. Better quality VC technology has enhanced the ability of instructors to project body language and create a personal presence that approaches face-to-face interaction. When a group of students participates in VC at a remote site, their shared experience may in some way compensate for the negative effects of the distance between the learners and the instructor (Gillies, 2008).

### Summary

In an effort to graduate more doctors, a distributed model of medical education has been introduced in many medical schools in Canada. The model is based on the use of VC to reach students in distributed learning sites remote from the main university campus and medical school. This is supported by a long history of successful use of VC for patient care and continuing medical education. More recently descriptive reports have been published demonstrating success for short courses and educational conferences.

VC presents some instructional challenges. Student performance has been shown to be comparable to other teaching methods; however students report a sense of detachment from the VC instructor. Engaging students as active participants in their own learning is one of the corner-stones of adult learning theory. There is a suggestion in the literature

that some of the activities traditionally used to involve students during lecture-based teaching may not translate well to the VC environment.

From this literature review, it is clear that VC can be successfully used for short educational interventions, however, what this experience is like for students receiving an entire MD-program by VC is unknown. Most of the studies examined are descriptive. They do not offer a broader understanding of the underlying educational theory related to distance learning and provide little insight into the lived experience of a VC-student

## **CHAPTER III**

### **METHODOLOGY**

#### Introduction

Grounded theory methodology was chosen as the method for this study because it is well suited to explore and understand social phenomena and individual experience (Bowen, 2006; Charmaz, 2006; Kennedy & Lingard, 2006). This study was an exploration of the experiences of medical students learning in a novel setting; a distributed medical education network where VC technology is used for nearly all the lecture-based teaching.

The researcher was the principal investigator. The researcher designed the interview format and questions, conducted all the interviews, and analyzed the data in collaboration with a faculty mentor.

The researcher's disciplinary perspective, as the previous the associate dean for the MD-program at the University of Western Ontario, facilitated development of the interview questions and provided insight into data analysis. The researcher has also been an active teacher in the program and is familiar with the medical education literature. As a student in a distance education program, the researcher is also familiar with some of the strengths and weakness of distance education and use of technology in teaching.

#### Background

In 2008, the University of Western Ontario Schulich School of Medicine and Dentistry opened a distributed campus for medical education in Windsor, Ontario. The first class to study at this new campus, the class of 2012, started their 4-year medical school program in September, 2008. There were 147 students enrolled at the main campus in London and



24 students enrolled at the remote campus in Windsor Ontario, 200 km from London. The criteria for being selected to medical school, grades and other assessments, were the same for all students whether they were assigned to the remote location or the main university campus. The students follow the same program and are evaluated with the same examinations. Students are free to choose which campus they wished to attend; however, once the spaces are filled at one campus all remaining students are assigned to the other campus. This research was conducted at the remote campus with students enrolled in the first iteration of the new distributed program.

All the classes, including the VC classes and small group teaching, take place in a new building constructed specifically for the remote medical class. The building is eco-friendly and is equipped with state-of-the-art technology. All the VC is done over a private VLAN on the Ontario Research and Innovation Optical Network (ORION, <http://www.orion.on.ca/>). There is a dedicated VC lecture theatre at each site. Each lecture theatre is equipped with an HD VC Codec, 4 cameras, and push-to-talk microphone-audio for all students. The microphone system is controlled by a proprietary system and is monitored via an IP network. Each classroom has three 6 ft x 8 ft projection screens with high-powered projectors to ensure adequate lighting for quality projection. The screens are mounted at the front of the classroom facing the students. The centre screen is used to display the lecture content, the left screen is used to view the lecturer and the right screen displays the remote class. In addition there are three smaller monitor panels mounted on a console at the front of the room facing the lecturer. This permits the lecturer to see all the projections without having to turn his/her back to the students. The system is supported at both sites by dedicated personnel who provide classroom support to the lecturers. There is

also an educational trainer who trains the instructors on the use of the system and advises on the educational aspects of the system. Two media specialists are responsible for the maintenance of all the equipment and for interfacing with the manufacturers and other network operators as required.

In addition to the technical support personnel, there is an administrative structure in Windsor that mirrors the support structure at the main campus. This structure is comprised of an associate dean, a designated student support person, and several administrative staff who support the educational program. Each educational block or topic area has an academic coordinator who is a local physician. The academic coordinator's role is to act as a resource person for the students and to ensure that there is integration and coordination between the two campuses.

### Participants

Interviews were conducted between the end of January and April 2010, with a convenience sample of 11 (46%) second-year medical students from the class of 2012. At the time of the interviews the participants were in the last half of their second year of medical school. There were six male and five female participants in the interview sample. The sex distribution of the sample was reflective of the sex distribution of the class as a group. Approximately three-quarters of the students at the remote campus had never lived there previously and were unfamiliar with the community. All the students had completed a 4-year undergraduate degree at a Canadian university. All the students interviewed and nearly all the 24 students in the class were assigned to the remote site rather than choosing it. They had minimal experience with distance education and none had participated in any

VC-based education. Two participants had done some e-learning using online lecture material and one had used CD-based modules as a supplement to classes.

A focus group was conducted during the orientation at the beginning of the third year of medical school to verify the data. At this point the students were finished with the majority of their classroom-based learning and had two complete years of VC-based lecture teaching. Seven students, four male and three female, participated in the focus group.

#### Data collection procedures

An interview guide was developed based on the researcher's disciplinary perspective related to medical education and distance education (Bowen, 2006). The initial guide consisted of open-ended questions and potential probing questions. The guide was revised during the study consistent with the constant comparative methods of grounded theory (Charmaz, 2006).

The participants were recruited by email and the interviews were scheduled with the assistance of the student support personnel at the remote site. The interviews were approximately one hour in duration. They were digitally recorded and transcribed verbatim by a professional transcriber. All identifying information was removed from the transcripts. There were technical problems with two of the interviews due to a low battery in the microphone; however parts of both interviews were suitable for analysis.

The research was approved by the Health Sciences Research Ethics Board at the University of Western Ontario and by the Athabasca University Research Ethics Board.

All participants gave informed consent. Each participant received a \$25.00 gift certificate for the University Bookstore as a token of appreciation for participating in the research.

#### Data analysis procedures

Data were analyzed using a constant comparative method (Charmaz, 2006; Kennedy & Lingard, 2006). Following completion of the first three interviews, open coding of each transcript was done to identify emerging themes. The interview questions were subsequently revised based on an iterative review to ensure that emerging themes were clarified and probed in greater detail. As themes emerged, they were defined by means of a process of ongoing review and refinement. Once the themes had been defined the transcripts were be coded using NVivo qualitative data analysis software (QRS International Pty Ltd., Version 8, 2008). Themes were then explored and key quotations were identified. The results were then interpreted within the context of the existing literature on VC and distance education and an explanation for the results was developed.

#### Strategies for validating findings

The findings were validated through triangulation. The identified themes were discussed with a faculty mentor to ensure that more than one researcher shared in the interpretation of the results. The results were validated through member-checking with a return of findings shared with a focus group.

## CHAPTER IV

### RESULTS

#### Review of statement of purpose

The purpose of this research was to explore the experiences of students who were studying medicine in a distributed medical education network that utilized VC as an instructional approach.

#### Presentation of results

Three themes were identified as a result of data analysis. These were:

1. The effect of VC on the classroom experience of the participants
2. The social implications for the participants
3. The impact on the participants of studying in a distributed network.

Each theme will be elaborated and discussed individually.

The effect of VC on the classroom experience of the students. Although it was a completely new way of learning for the participants they perceived themselves to have adapted well to the VC environment after an initial period of adjustment.

VC was definitely different at first. It was a very different system and we didn't quite know what to think of it. But I think really quickly, especially once we moved into this building, we just became so used to it. (Interview #7)

By the time they completed their first two years of medical school, some participants indicated they preferred the VC lectures and, as one participant commented, "Now I am so used to it that it's actually odd when we have a live lecturer." (Interview #8)

Prior to participating in VC teaching all lecturers received mandatory faculty development on using the VC system. The participants reported that they felt the faculty did well.

I would say they are surprisingly well prepared and there haven't really been any missteps. I think as they give more lectures they will be more effective with the visual aids. But I think everyone has been pretty effective. I've been impressed. (Interview # 3)

There were some instructors who did less well or felt the need to make sure the students knew it was the first time they had used the system. However, there were few negative comments about the technology or the ability of the faculty to use the technology.

The participants were asked about the classroom atmosphere. "It's a little more relaxed than it probably would be, definitely a relaxed atmosphere with talking. A lot of times it'll be related to what the lecturer is saying. Not always distracting, sometimes it's productive." (Interview #6) Students felt comfortable coming and going from the classroom during lectures or having a conversation with a classmate. "We eat more comfortably in class. We drink our water more comfortably. You're not worried about making too much noise. Things like that." (Interview #11) Attendance at class was excellent at the remote site. The participants commented that they believed it was better than at the central site.

According to the participants the presence of the camera had a huge impact on their participation during classes. Faculty often gauge student engagement by the questions they ask during or after class. To ask or answer questions students each have a microphone-buzzer at their seat so that the camera can focus in on the student speaking.

The student and those in close proximity to the student speaking are seen on the large screen at the front of the classroom, as one participant said “zoomed in, up close, and in high def” (Interview #3). This was a significant deterrent to student participation:

So when you buzz in what happens is you get put on a movie theatre sized screen. Me, I have intense stage fright so I shake when I buzz in. I don’t like the idea of me being on screen, huge like that, so I tend not to buzz in. I’ll ask somebody a question rather than go ask a question to the professor. (Interview #1)

The size of the screen was a common reason for students not to ask questions. The participants had much to say about this issue.

There seems to be a bit of an issue that some people in both campuses are afraid of buzzing simply because they don’t want to be on camera. I think this has changed a bit in our second year because if you’re embarrassed to be on camera I think some of the things you have to do in medicine are a whole lot more embarrassing than just being on camera in front of your colleagues. (Interview #3)

The participants justified the lack of question-asking in various ways. “Some people are just embarrassed about their lack of knowledge and so they won’t ask questions” (Interview #3). Additionally, “there are concepts or questions you want to ask but you don’t feel it’s something you want to trouble the class to have to listen to you” (Interview #2). Some felt that class size had more to do with the issue. “It definitely depends how many people are in attendance for comfort level. So I think even in undergrad, say in a classroom of more than 30 people, I might be more reluctant to ask a question” (Interview #4). Others indicated they had never been students who asked questions. “I don’t ask

many questions but I was never much of a 'question in class' type person anyway. I think it's just my personality...I was always really shy" (Interview #7).

The participants noted that as time passed and they became more comfortable with the technology and their classmates, there was less hesitation to ask questions. As well they commented, "It's always the same people, by the end of first year we already know everyone who was asking questions on the screen" (Interview #9).

Students compensated for not asking questions by using the student block representative who was responsible for collecting all the students' questions and e-mailing them to the lecturer. They also had access to the academic coordinator who was usually available to answer questions. Some of the participants also asked classmates when they did not understand something.

So being on the receiving end of VC, they can't hear us in London. I feel there's a lot more conversation going on, which is good in some ways. When you want clarification from your peers it's not really that big a deal to turn around and ask someone. (Interview #1)

The participants noted at least one disadvantage to this method.

There is a lot of asking each other...and it's helped me a lot. But sometimes I feel like students don't know and it's this medical school thing, like they can't be wrong or they can't say 'I don't know'. A lot of them will end up answering you but then you realize what they said was wrong. (Interview #11)

In spite of the obstacles they perceived to asking questions, the participants felt questions were important. During the focus group they commented,



I think some of the things you probably don't know you're missing. Some people don't ask because they don't want to be on the screen. Maybe that's the question that the answer would have helped you out. You're oblivious to the fact that there's extra information you're not getting. (Focus group)

Another aspect of question-asking that participants noted to be important was "The thinking process of asking a question, processing the information" (Focus group). They thought thinking through a question before asking was an important aspect of information synthesis. Questions were also valuable when there were inconsistencies in content or when students were having difficulty with challenging concepts. Participants reported using questions to reorient lecturers when they assumed students had been taught content that had not yet been covered or when the lecturers strayed from the objectives. Finally, the participants also thought questions "make the lecturer feel more appreciated and engaged" (Focus group).

Although they indicated that asking questions was important, most participants did not feel the lack of question-asking had negatively impacted their learning. In fact, there may have been a positive impact, as one participant commented, "I think it could have made us more independent learners for sure 'cause then you're just forced to go look things up on your own" (Focus group). Some worried that "what the docs here say might differ a bit from what the profs say in London and you might have contradicting information that you don't know which to go with" (Interview #2). Generally, the participants were comfortable with the alternate sources of information and felt that they did not have to work harder to compensate for not asking questions in class.

As well as asking about question-asking, participants were asked to comment on being asked to answer questions in class. They described two types questions asked in the classroom. The first type they referred to as 'softball' or 'gimme' questions. These were questions where the answer was obvious or was a simple 'yes' or 'no'. The participants did not appreciate having to wait for someone to buzz in to answer. During the focus group they commented "it can grind to a halt when [the professors asks] 'somebody in Windsor' and no one buzzes in right away. Everyone sits there and waits" (Focus group). The students felt that early in the first year there was a directive that faculty should pause and wait for a student to answer.

Sometimes to be interactive a lot of the lecturers just ask questions that are gimme questions, like yes or no. Everyone knows the answer. At first they would make all the students buzz in just to say it. And the questions were almost such gimmes that no student wanted to go through the hassle of buzzing in. Now they've improved that. They've allowed them [students] to shout out the answers and they [the lecturer] will repeat that. For any of the longer answers people buzz in. (Interview #3)

An issue that was spoken about by a number of participants was the number of questions directed to their remote class.

When we're constantly asked questions nobody wants to buzz in anymore. You've already spoken on camera and you don't want to speak again. Or everyone that's comfortable speaking on camera had already done so and it's all quiet people left. When you consider the London class is five times the size of the Windsor class really they should be answering five times the questions. But it kind of works out that it's half and half or even more directed to Windsor. (Interview #8)

The second type of questioning was Socratic. One instructor in particular was known for his use of this type of questioning and for selecting students to answer.

Last year we had one lecturer who loved to pick on students so no one was safe. If you were wearing a bright coloured shirt you were pretty much going to be a target.... And he'd really want you to get the answer so he would just keep asking. I know in these lectures people in Windsor either sat in the blind spots off camera or a few would skip class. (Interview #7)

Another participant commented,

Dr. X, he would just always choose people. It made the lectures go really, really quickly. Some people didn't like being picked on because they were afraid they didn't know the answer. But even if you didn't know the answer it wasn't a big problem. He was able to use technology really well and he made the class go quickly and smoothly. You felt like you were engaged. You paid attention because what if you got called on. But I know a lot of people in London stopped coming to class. (Focus group)

This issue generated considerable discussion about students choosing not to attend class or sitting in blind spots in the remote class in case they were called upon to answer a question. Nevertheless, the participants felt the lecturers were reassuring and used Socratic questions to draw out important points in the lecture and explain things. They indicated that question asking was important and kept them engaged whereas the opposite occurred if the lecturer made no attempts to invite participation. "There are some lecturers who do that...just get up there and they stand straight up front and they go through their PowerPoint® and read every slide. After the first five minutes you're zoned out and you don't care" (Focus group).

Overall, issues around asking and answering questions seemed to be a significant concern for most of the students interviewed. It was also a concern for faculty teachers. One participant noted: “they put a slide up saying ‘please ask questions in class’” (Interview #9). Several participants described feeling shy about being on camera or being anxious about being chosen to answer questions in class. In spite of these obstacles, they still felt questions were important. Some acknowledged that they had changed their classroom behaviour by not asking questions, while others had never been students who asked questions in class. However, the impact of not speaking in class was minimized by the availability of alternate ways to get information and by the participants’ initiatives in reading and exploring problems more independently.

Another interesting observation related to comments about the use of humour and the expression of emotion via VC. When faculty used humour during their lectures the effect was variable. One participant commented, “There’s definitely been some funny lectures and I’ve enjoyed them. I don’t think VC has hindered that at all” (Interview #10).

However others were less positive.

Some come across well, some not so well. There was a lecturer particularly, I don’t know how it was perceived in London but it was perceived really badly in Windsor. Because I think some of the humour wasn’t as humorous when seen on the VC. We really didn’t get it. People were complaining. There was too much trying to be humorous but there wasn’t enough teaching. (Interview #9)

Portrayals of other types of emotion, such as empathy, which are important in medical education, translate less well to the VC environment in the participants’ experience. For example patients are frequently invited to speak to the class about their illness

experiences. These presentations, known as the ‘case of the week’, can be quite emotional and are intended to demonstrate the psychosocial impact of disease on patients and their families. “I’ve been to the case of the week in London. And there’s a distance that you feel watching it [in Windsor]. I think the objectives are still met ...I still understand the patient’s point of view (Interview #4). The concept of distance was identified by another student as well who described VC in the following terms: “I tell my friends literally it’s like watching a movie” (Interview #1).

The students adapted the VC environment to their own use as well. They used the technology to generate practical jokes which helped develop camaraderie between the classes.

I liked those guys asking [Windsor student X] where he got his sweater! Yeah, and you can wish people happy birthday from the screen. Someone would buzz in a question and there would just be a sign there and a fake question. Or a fake question because someone next to you is sleeping....we just buzzes in and get out of the way and the camera would zoom in on that person. (Focus group)

Formal student presentations were universally panned by the participants. The sense the “student presentations are generally bad to begin with ....and I think VC makes it worse” (Interview #4) was common.

In summary, the students and faculty adapted well to VC-based teaching. However, there was a significant impact on student participation in class. Students were reluctant to ask or answer questions, sometimes to the point that they would miss class or sit in an off-camera location to avoid being noticed. Humour and empathy were difficult emotions to

integrate into the VC lecture environment. Students used to the technology to generate camaraderie between classes through practical jokes and public well-wishes to classmates.

Social impact on the participants. Most of the students had not lived in Windsor before and all were new to medical school. Only two students interviewed knew each other from their undergraduate programs. Some participants found the adjustment more difficult than others. “[It was hard to adjust to] being away from home, a class of 24 people and not knowing anyone. Not having many options and there’s less extracurricular things to get involved in” (Interview #11). However, the commonality of their experience facilitated class bonding. As one participant described, “I just feel really lucky to be with the people that we were put with and I think everyone is a pretty awesome person” (Interview #7). The students organized pot luck dinners, birthday parties, movie nights, and other activities that included everyone in the class. They felt the experience allowed them to develop useful skills. “You learn to work in a group with personalities that are different than yours which is a skill that you’re going to need working on teams throughout the rest of our lives” (Focus group). They saw themselves as “a very tight group” (Interview #1) and as trail-blazers for a new program.

As a new program there was a degree of uncertainty about how things would be integrated between the students at the main campus and the students studying at the remote campus. As this participant explained:

At the start of the program, especially being the first year, there was a little bit of uncertainty both on administration and the students’ part as to how this was going to run. Was this going to be two separate programs? Was this going to be all one class? You could tell no one knew how to define it. And I felt the pressure that as a student in

the first class I thought it would be best to start out as one class, one class with two locations rather than two separate programs. I really pushed some of my shy colleagues...to show up at social events or integration weekends. (Interview #3)

The participants clearly identified pressure from the program administration to integrate. “I think there’s definitely been a big push at all levels for integration. That was the big buzz word last year. This year...at the student level I think we’ve figured out the integration level that we want” (Interview # 10). Some participants felt that integration was more important than others. As one participant commented, “I feel that the people that made it a priority are, but there are lots of people that have no idea who anyone in London is” (Interview #6). As the program evolved the students in Windsor clearly identified themselves as part of the medical school class at the University of Western Ontario.

The participants felt it was important to know their classmates in London. Some felt it would help them in the future to know a wider circle of colleagues. Others enjoyed their friendship, “The majority of them are great people so why wouldn’t you want to know them?” (Interview #10). Some students got together with their London classmates for social events like Halloween or Christmas parties, while other students were involved only during more formalized activities such as integration weekends. These were weekends organized by the medical school in London with an academic component, such as a workshop on suturing, followed by social activities in the evenings. The majority of these activities were unidirectional with the Windsor students travelling to London, although there were some social activities, such as a spring formal, organized in Windsor. There was a feeling that the London students were reaching out to the Windsor group

although one student commented “some make an effort to come down to Windsor on weekends just to hang out. But I know for a fact that some people don’t care at all” (Interview #10).

The informal curriculum was another area explored in the interviews. Medical students at the University of Western Ontario have a club system for students with special academic or social interests. Some of these clubs involve opportunities for students to participate in international experiences, focus on social activism in the community, or become involved in projects outside the curriculum. These activities are not part of the formal curriculum but they are regarded by the administration as an important part of the experience of a medical student. The dean’s office provides some financial support to these clubs although they are entirely student directed. This was an area of challenge for the Windsor students as some of the clubs involve frequent meetings, fundraising activities, invited speakers, and community activities:

We didn’t have them last year but I think we realized how the system worked and we established clubs out here in Windsor. There’d be an [student] executive who is interested in X and they set up events so that our events parallel theirs or we VC’d into talks. We’ve started to set up our own clubs out here too. (Interview #1)

Students from Windsor found ways to participate and some were chosen to travel internationally as part of MedOutreach (<http://www.medoutreach.ca/>) and other international initiatives.

The participants were invited to comment on their social interactions with local university students in Windsor. There is a university in Windsor and the medical school



building is located on the University of Windsor campus. A few medical students participated in intramural sports with students attending the University of Windsor. The medical students had their own sports teams and played against the University of Windsor students. They described other efforts to integrate with students at the University of Windsor that were less successful.

We have had some joint events with the law students but they tend to be difficult to organize. It seems our schedules are at odds with each other...In terms of the other undergraduates I haven't had any contact with them and I don't really see any way we could break the ice in order to have contact with them...We have spoken to a few of the nursing students but nothing to the point that we would have a lot of interaction. (Interview #8)

There were participants who indicated that they had roommates who were University of Windsor students, so this may be an area of interaction that will grow as the program becomes more mature.

The students used social networking to maintain a connection between the two campuses. For instance they used e-mail extensively; they developed a class web-site, and put together a Facebook group. The Facebook group was set up before classes started in first year so students were able to meet their new classmates and even identify potential room-mates. "I feel like Facebook opened the door to getting to know them" (Interview #1) and "it helped me remember people's names in London because there are so many of them" (Interview #11).

Most of us have Facebook. I find it's really useful in terms of event planning, especially just around Windsor. It's easy to invite the whole class to events. I find

it's a good way, 'cause then everyone is included. It's a really easy way to include everybody. (Interview #7)

They also used Facebook to communicate between campuses:

There's a lot of interplay between London and Windsor classmates on Facebook.

So it's pretty big in both classes. When we do have joint events pictures are posted.

It's usually people from both campuses, so we all comment on the same pictures. So you know it's a good way of staying in touch. (Interview #8)

Students even made use of social networking for real-time communication. For example "Sometimes during a lecture a prof says something funny or something like that. Someone will write it on Facebook and there might be some comments" (Interview #10).

In summary the student group in Windsor became a close-knit group both in class and outside of the classroom through their shared experiences. They worked hard, with some success, to develop a social relationship with their classmates in London. There was a sense that most of this was unidirectional with less interest or need for the London group to maintain a strong relationship with the students assigned to Windsor. The students relied heavily on social networking, particularly Facebook, to facilitate their social interactions. The class had relatively little interaction with other student groups on the University of Windsor campus.

The impact on the participants of studying in a distributed network. As noted earlier, most of the students studying at the distributed site had been assigned to Windsor rather than choosing it.

I had never been to Windsor and I did not know anyone in Windsor. I had London as my first choice mostly because I didn't really know about the Windsor program and it was new. I was reluctant to be part of this brand new thing. (Interview #8)

The participants expressed initial anxiety about how this new program would work. However, comments such as, "I'm loving it. I'm really happy with the program. I'm a little nervous for clerkship. I love it. I'm really happy here." (Interview #7) were common. They enjoyed the small class size and the positive relationship with the faculty and administrative personnel. Although they did not choose the location, several participants commented that the small size suited their personalities. One enthusiastic participant stated:

I think given the choice now I would pick Windsor over London just because I got used to it and the smaller class size. It's a better fit with how I learn and how I interact with people...Windsor would be my top choice now. (Interview #2)

The most commonly expressed regret related to the social impact and a sense that it might be easier to develop closer friendships if the class was larger. The participants thought there might be a minimum class size below which it could be very challenging to create a positive class dynamic. While acknowledging that ranking or choosing a medical school program is an individual choice, all the students interviewed gave the program a very positive endorsement.

The participants felt that there was good integration of the content and that they were learning the same material as their counterparts in London. One or two expressed concern that the examinations were created by the London faculty and this might be a disadvantage for the Windsor students. However as one participant said:

Honestly, at the end of the day it's all about going home and studying. I feel we're pretty much getting the exact same thing that London is getting. We have all the same notes and everything. For the most part I don't think there's much difference.

(Interview #1)

The participants commented on the importance of the small group teaching, done in groups of 6-8 students, with a local physician facilitator. They indicated that they were comfortable asking questions in small groups.

There was a degree of rivalry or competition between the two campuses. It was not clear whether this was student driven or whether it originated with the faculty and administration. As one participant commented, "It's usually friendly competition. There was a little more competition at the beginning. Maybe down here we felt we had something to prove" (Interview #5). The participants felt that the local Windsor faculty and administration expected more of them and closely monitored their performance. Poor attendance was strongly discouraged. Marks or group averages were never released to either class and the participants' impression was that their examination performance was very similar. Where there did seem to be some friendly rivalry was during review sessions:

Some of the teachers get us to play *Jeopardy!* against each other in review sessions.

That's actually really good for us because we're all pretty competitive. During those

sessions we'll answer a lot more. We do pretty well considering there's only 24 of us. They're really effective review sessions and pretty fun for the two classes. (Interview #7)

As the year progressed the students and faculty gained confidence and their anxiety was reduced. "I think now there isn't a huge difference. They [administration] aren't as worried about it" (Interview #8).

The participants were asked whether they thought they had to do extra work to make up for not having direct access to the lecturers and not asking questions in class. They did have special review sessions at the end of each block. Some of these were set up by the block coordinators and some were organized by the students themselves. Some participants thought the sessions were compensating for something missing in the VC or filling gaps. Some thought the faculty wanted to ensure they did well.

I think to a degree there's also a bit of competition with some of the faculty. For block X and block Y we've had really good course coordinators. They've wanted us to know the material back to front. So they've dedicated a lot of time to give us meaningful review sessions. (Interview #10)

Most participants viewed the review sessions as a perquisite. They also thought the review sessions were intended to get the local physicians involved in teaching and medical education. Overall the sessions were much appreciated. "Those are usually fantastic. Our block representatives here in Windsor, they come in and the ratio is 1:24 so they are usually really good. I feel really good talking to the doctors and asking questions among a small group" (Interview #7).

In the focus group the participants commented that they collaborated and did a lot of group work. They felt that being in a distributed site strengthened their self-directed learning skills and made them more “independent from the faculty” (Focus group). Some felt they had to work slightly harder “maybe 15-30 minutes extra...but nothing significant” (Interview #2).

There were very few negative aspects identified to being in the distributed campus. Fewer research opportunities was one area that concerned some participants. As well some participants felt that their opportunities to work in certain highly specialized surgical areas such as cardiac or plastic surgery were more limited. One participant commented that it was more difficult to access some hard-copy library resources in Windsor. The only things mentioned that should be improved from the participants’ perspective were better VC facilities in the small group teaching rooms, a better student lounge, and more VC lectures from Windsor to London.

Administrative and academic support for the medical students in Windsor received unanimous accolades. “I think our Windsor staff is exceptional. They’re wonderful and they’ve made the first year seem...very smooth” (Interview #4). This comment and others such as “the fact that they are so supportive...that they are basically there for you” (Interview #5) were reflective of comments from all the participants. Because their group was small the participants felt that they received highly individualized support from the medical school staff. They were greeted personally in the morning and felt that the staff generally pampered and spoiled them.

The same positive feelings extended to the larger Windsor community. The students found the community to be extremely enthusiastic about the presence of the distributed campus in their city. Articles about the students were featured in the local press and special events would be featured in the newspaper. The students recognized that some of this was due to the politics of medical school expansion to the community but generally felt very welcome in the city.

They've been very welcoming and even in the hospitals everyone's been really nice...and very excited to see us. There's a bit of pressure. Everyone asks us if we're staying and we say we don't know. But the community has been very welcoming and kind. The patients are all very excited to see us. (Interview #10)

In summary, the participants were assigned to the distributed campus, a community with which most were not familiar. They felt a welcoming and friendly attitude from the community. They benefited from strong administrative and staff support. They had strong academic support from the local teachers and small group facilitators and felt what they were learning was not different from their classmates at the main university campus. There was some rivalry between the two sites. The participants felt initially this was driven by faculty anxiety about the academic performance of the remote students and their own feeling that they had to prove themselves. This concern gradually resolved and the students settled into a more collegial sense of rivalry with their peers at the main campus.

## Discussion

While confirming some of the results of previous studies (Abdous & Yoshimura, 2010; Augestad & Lindsetmo, 2009; Furnace, Hamilton, Helms, & Duguid, 1996; Gillies, 2008; Raffelini, 2008), this study of students' experiences while learning in a VC environment also reveals some interesting new findings. VC has facilitated the expansion of educational opportunities in locations distant from the main university campus. The students interviewed at the remote campus appreciated the opportunity to attend medical school that resulted from this expansion, acknowledging that they would probably not be able to attend medical school otherwise. Over the course of the first two years, the students and faculty adapted well to the VC environment and, in some cases, the participants expressed preference for VC. The relaxed atmosphere of the classroom facilitated student-student interactions and helped create a positive learning environment. However, the participants at the remote campus reported reluctance to ask questions in class, using alternate formal and informal ways to compensate for this. They also disliked being asked questions during class by the instructor, to the extent that some would sit out of the range of the camera or chose not to attend class at all when students might be selected to answer questions. A few participants also reported that some aspects of interaction, such as humour and empathy, could be challenging in the VC environment.

The twenty-four remote students became a tightly knit group who relied on each other for academic and social support. They felt that integration with the students at the main campus was strongly encouraged by the faculty and the medical school administration. Some students at the remote campus did develop strong relationships with classmates at the main campus but others saw this as a lower priority. They made extensive use of social networking, particularly e-mail and Facebook, to share information. This facilitated



social and academic interactions between the two groups of students. They skillfully adapted the classroom technology to play jokes on each other, send birthday wishes, or poke unsuspecting classmates in a good-humoured way. During the first two years, the students at the remote campus took responsibility for developing their own special interest groups or clubs, thus ensuring that they did not miss out on extracurricular activities that might be important for career development.

In terms of the impact of studying at a remote campus, the participants noted that initially they were anxious about being the first group of students to study by VC. Their perception was that the teaching faculty and the local administrators were also anxious about how they would perform academically compared to the students at the main campus. The student support services played an important role in supporting and reassuring the students. The students benefited from special review sessions, which they saw as a perquisite, to help them study. The early anxiety and a sense that they had to prove themselves eventually gave way to a friendly rivalry between the remote and main campus students. Generally, the remote students did not feel that extra study time was required or, if it was, the extra time was minimal. Some commented that VC had improved their learning habits by encouraging them to prepare for the lectures ahead of time or helping them to become more independent learners.

The participants felt welcomed in the remote community at many levels. They were effusive about the personal support they received from the student support team and local administration. They found their new faculty teachers enthusiastic and engaged in their education. The patients they met were happy to participate in the education of young doctors, and the community in general was excited to have them. Students from the class

were often interviewed and featured in the local news. Although none of the students who participated in the research had chosen to attend medical school at the remote campus, they were unanimous that it had been a positive experience.

The most pervasive finding in this research is the altered interaction between the learners and the instructors in the VC environment. This is manifest by the reluctance of the remote students to ask questions in class and by their discomfort when they are asked questions. This was identified by all the students who participated in the interviews and was also identified indirectly as a faculty issue, as the faculty felt it necessary to encourage students to ask questions in class. Question asking is a concern because interaction between the learner, the instructor, and the content is considered essential to the process of learning. The dynamic of these interactions is clearly altered in distance education, where there are varying degrees of separation of the learner and the instructor and different types of educational technology are in use.

Using Moore's (1997, 2007) theory of transactional distance, the interaction between the students and the instructors in the VC environment can be further explored. Moore developed the theory of transactional distance in 1972, while working on independent learning in distance education. His work was focused on the development of a theoretical basis for research in educational settings other than the traditional classroom. His theory was based on three key aspects of distance education: the program structure or curriculum, the dialogue or interaction between the instructor and the learner, and the degree of autonomy or independence of the learner. The term 'transactional distance', first used in 1980, describes the cognitive distance between the instructor and the learner rather than the physical distance. According to Moore's theory, the transactional distance is

influenced by the structure of the program, the quality and quantity of communication between the learner and the instructor, and the degree of independence or autonomy of the learner. Because the learner and instructor are physically separated there is a unique quality to their interactions that is independent of the actual physical distance between them. Highly structured and standardized programs leave little opportunity for the student and instructor to negotiate personalized goals and thus, are described as having a high degree of transactional distance. For example, a CD-based educational program would not involve any discussion between the instructor and learner and would therefore have high transactional distance. Conversely, a student designed self-study program with tutor support might have almost continuous dialogue, and therefore minimal transactional distance. Transactional distance can be thought of as the communication gulf that must be bridged between the instructor and the learner. With less opportunity for discussion, there is greater transactional distance. As the communication gulf widens between the instructor and the learner, the learner must become more self-sufficient and accept greater responsibility for his or her learning. Thus the higher the transactional distance, the greater the degree of autonomy required of the learner (Moore, 1997, 2007).

The optimal degree of transactional distance for successful learning has not been determined, although some authors suggest that learning effectiveness is greatest when the degree of transactional distance is lowest (Offer, Lev, Lev, Barth, & Shteinbok, 2004). Although technology can impact the transactional distance, there are other factors, such as the instructional approach and skill of the instructor and the degree of independence of the learner, which also determine transactional distance and hence influence the learning that occurs in distance education.

When Moore first put forward his theory of transactional distance in 1972, as noted in the historical overview in the introduction, modern telecommunication and VC were in their infancy. Moore (1997) considered the development of interactive communication media to be the most important advancement in distance education since his theory was developed. Specifically, he felt that these newer media introduced another dimension, student-student interaction, to the dialogue structure of distance education. Modern communications technologies, such synchronous VC used in this research, allow student-student interaction and participation in knowledge creation with or without the instructor.

Anderson (2003) proposed a theory with some similarities to Moore's theory of transactional distance. Anderson uses the term 'equivalency of interaction'. His theory is based on the three key forms of interaction in an educational setting; between the learner, teacher, and content. He states:

Deep and meaningful learning is supported as long as one of the three forms of interaction (student-teacher; student-student; student-content) is at a high level. The other two can be offered at minimal levels, or even eliminated, without degrading the educational experience. p.4.

A key aspect of Anderson's theory is that the *students* must be active in at least one area of interaction for successful learning to occur. The students in this study reported that the classroom was not quiet. In fact there was a significant amount of student-student interaction, often centred on clarification of lecture content. Anderson (2003) discussed the audio-conferencing environment in which there was a great deal of "side-talk". Side-talk referred to student-student discussion not shared with the instructor or students at other sites. In their study of audio-conferencing, Anderson and Garrison (1995)

determined that the side-talk between students was generally related to content and that this type of student-student interaction enhanced learning. Side-talk was also found to be important in the development of collaboration and helped to generate a sense of group cohesion.

Anderson and Garrison (1995) suggest that distance education students are able to adapt to the educational medium and learn to compensate for the strengths and weaknesses of the technology.

Using the lens of transactional distance to view the results of the present study one should first consider the structure of the program. Most educators would agree that the formal medical curriculum is highly structured with little opportunity for students to negotiate independent learning objectives. Further, as described by the students, there is minimal dialogue between the learners and instructors occurring in the VC classroom setting. According to transactional distance theory, this situation is one in which there is high transactional distance. This will require considerable independence on the part of the learner if the goals and objectives of the program are to be achieved.

The students in this study described clearly how they became less dependent on the faculty and relied more on peers and finding their own resources. They reported that lack of interaction with the VC instructor was not a major concern for them and they did not feel that there was a negative impact on their learning. They indicated that they found ways to get the information they required and had to learn what depth of learning was required on their own. In traditional classroom-based educational situations, interaction with the teacher is key component of the learning experience. However, in the complex

distance education environment, students can interact successfully with the content and each other in formal and informal ways, often with little involvement of the teacher (Anderson, 2003).

One aspect of interaction that was more complex was the difficulty the students reported experiencing was when emotions were evoked. This was particularly noted when humour was introduced or empathy was portrayed in the classroom. A high level of transactional distance might explain this finding. Offir et al. (2004) investigated verbal and non-verbal interactions in traditional and distance education. In the introduction to their study, they noted that non-verbal communication significantly impacts feelings and attitudes. They suggest that up to 70% of interpersonal communication is non-verbal and that, when there is confusion about an interaction, the non-verbal message over-rides the verbal interaction in the majority of cases. They also noted that teachers use non-verbal communication almost exclusively when communicating an emotional message. They further suggested that good non-verbal communication can reduce transactional distance. Their study involved detailed observations, using standardized instruments, of 30 VC lectures and 30 traditional lectures given by five university lecturers familiar with both teaching methods. They found that there were fewer student-initiated questions in the VC environment and that this persisted even when the instructors used nonverbal techniques to overcome the distance. They also found that teachers used fewer gestures and had difficulty making eye-contact with students in the VC environment. These are both techniques used to complement verbal interactions. It could be hypothesized that these issues are not so important when communication is straightforward and focussed on course content, but they may become significant when more sophisticated communication

is required. Gaps in non-verbal communication may become magnified when sensitive or highly emotional topics are addressed, such as occurs during the 'case of the week' presentations to the medical students, and there is high transactional distance. Similarly communicating humour often depends on gestures and nuance, which may be lost in the high transactional distance VC environment.

The other aspect of classroom communication is the situation where students were asked questions by the instructor. The participants in this study clearly indicated that they resented having to press a buzzer for a 'gimme question' where the answer was 'yes' or 'no' or was otherwise obvious. However, most dramatic was their response to being randomly selected to answer questions in class. The participants described situations with an instructor who used a Socratic teaching style and would select students to answer questions in class. It was reported that some students chose not attend class or sat on the periphery of the classroom, out of the camera range, to avoid being identified by the instructor. Of interest though, the participants indicated they enjoyed playing quiz games during class review sessions. It is possible that, in this review-session setting, not being able to answer questions might be less embarrassing, or that, as it was a group activity, one student would not be indentified to answer in front of his or her peers.

Question asking by teachers is a complex topic that can be looked at from a context, content, and response perspective. In a review on classroom questioning, Carlsen (1991) noted that questioning techniques such as allowing a pause for students to think have been found to result in more sophisticated student responses but risk boredom for those not expected to answer. In the VC environment where student disengagement may already be a risk, teaching techniques that are useful in the traditional classroom may not be as

successful. An instructor who pauses for students to think through more challenging questions may risk rapid loss of attention.

Fassinger (1996) surveyed professors and students at a private liberal arts college in the United States to determine their perceptions about classroom participation by students. Using multiple regression analysis the results showed that faculty perceived that students were more likely to participate if they were well prepared. Additionally, Fassinger noted interaction norms in the classroom including peer pressure not to speak or speak briefly, pressure to appear clever or confident, and pressure not to express controversial opinions, influenced student participation. In Fassinger's study, analysis of the student data showed that student confidence, as defined by fear of appearing unintelligent to the instructor or classmates, ability to organize thoughts and express them clearly, fear of offending others and feelings of intimidation or tenseness, was the strongest predictor of students' class participation. Many of these classroom pressures were described by the students in this research. These pressures are not likely related specifically to the use of VC, but VC may have contributed to student anxiety regarding answering questions in front of their peers.

Question asking using the Socratic method is used extensively in medical education, particularly for clinical or bedside teaching (Oh, 2005; Wear, Kokinova, Keck-McNulty, & Aultman, 2005; Zhou et al., 2011). The goal of Socratic questioning is to lead the learner to a new level of understanding by asking a series of questions each building on the former until the learner is unable to answer or a new concept has been revealed. Socratic questioning is thought to develop critical thinking skills as well as to help learners discover and understand concepts. Teachers may also use Socratic questions to



evaluate the learner's level of knowledge or understanding, thus exposing knowledge gaps.

Socratic teaching has a negative reputation in medical education because of the association of the method with a technique referred to as 'pimping' (Clapham, Wall, & Batchelor, 2007; Wear, Kokinova, Keck-McNulty, & Aultman, 2005; Zhou et al., 2011). Pimping is a malicious form of questioning, present when the questioner, usually a person in a more powerful position, knows the student would not likely have the knowledge or experience to answer the question. This results in embarrassment or humiliation for the student, who is unable to respond correctly. Because pimping is thought to be pervasive in medical education, there have been some studies of its use in clinical teaching. In a qualitative study of pimping Wear et al. (2005) found that students distinguished between good and bad pimping. They felt that if it was used in a non-threatening way, pimping encouraged them to study, think logically, and defend their decisions. It also promoted self-assessment and good communication skills. These findings were confirmed in a recent study by Zhou et al. (2011) of medical students learning radiology. In this study 73% of student participants thought that pimping was an effective teaching method. However, in both these studies, students acknowledged feeling embarrassed when they were not able to answer questions in front of their peers.

An additional factor related to questions in class was the impact on the students of seeing themselves on a large screen in front of their peers. Wegge (2006) investigated the impact of communication technologies including VC on their effectiveness and acceptance. He specifically looked at affective reactions to VC in two experiments designed to elicit emotional responses. He found that students in an examination

experiment who had higher test-anxiety experienced greater emotional responses and performed less well, particularly when their images was presented in a large format on the VC screen. The second experiment demonstrated similar findings when the subjects were presented with negative emotions and their pictures were visible on the screen. Wegge suggested that this was a disadvantage of VC, as in normal face-to-face conversation individuals are not normally able to see their own images on a large screen. Several of the medical students interviewed for the present study certainly commented that seeing themselves on the large screen was an impediment to asking or answering questions in class.

As noted in the introduction, from an instructional perspective, it is important to engage learners as active participants in the lecture format as this is believed to enhance learning and recall of content (Prince, 2004). However, in the VC environment it would appear that many of the techniques recommended to encourage student engagement, such as asking general questions and using short student-student discussion breaks, had the opposite effect in the VC environment described in the study. Clearly, instructor-student interaction, the cornerstone of active learning in the classroom, was significantly attenuated or even absent. Yet the students perceived themselves to be engaged in their learning and consistently indicated they were satisfied with their education.

One limitation of this research is the fact that there were no students who expressed any strong negative opinions about VC. This was in spite of attempts to invite participation from students who might have alternative opinions. One participant expressed concern about access to library resources. However, students at the remote site have full access to the online library resources of main campus library as well as full

access to the university library at the remote site. This was not identified as a concern for other participants. Another participant questioned access of the remote students to some medical subspecialties such as vascular or plastic surgery. While this is certainly a valid observation, medical students do have four months of elective in their final year. This is specifically intended for them to fill gaps they identify in their own education and to help them prepare for their future career choices. It is important that the medical school administration acknowledge this student concern and reassure the remote students that they will have opportunities to address these subspecialty gaps if they feel it is going to impact their career choices.

In summary, this grounded theory study of medical students' experiences in a VC environment has not identified any new theory, but it has exposed a theoretical explanation for some of the observed classroom phenomena based on existing distance education theory. The experiences and perceptions of the students who participated in this study of VC reflect an educational environment with high transactional distance. Consistent with Moore's (1997, 2007) theory of transactional distance the students indicated that they developed greater autonomy to compensate for the high transactional distance. High transactional distance may also explain their perception that empathy and humour come across less well in the VC environment. The described reduction in the student-instructor communication also created more student-student interaction consistent with Anderson's (2003) theory of equivalency of interaction.

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### Conclusions

1. The educational experience for the medical students studying medicine remotely was very positive. The students experienced strong peer, administrative, and community support. Although they did not chose to study remotely all the participants felt the experience had been positive and would not hesitate to recommend the program to new applicants to medical school.
2. The classroom dynamics were significantly altered in the remote classroom. Students participating by VC were reluctant to ask or answer questions even when encouraged to do so by the instructors. This can be explained by the increased transactional distance between the students at the remote site and the instructors at the central site.
3. Increased transactional distance resulted in greater student autonomy and considerable student-student interaction. These two factors were important in compensating for the decrease in interaction with the instructors at the central site.
4. Increased transactional distance also resulted in challenges in the portrayal of emotions, particularly humour and empathy, to the remote students.

#### Questions raised by this study

These observations raise some interesting questions for the faculty teachers and the medical school administration. Given the alteration in classroom dynamics, how should the faculty teachers respond to this situation? Greater student autonomy and independence

are very positive outcomes, particularly as one of the competencies expected of a graduating medical student is skill in self-directed and life-long learning. Graduates are also expected to become skilled in collaborative learning, another area where the remote students felt they developed strength. But, is a reduction in interaction between students and teachers a positive change? Is it important for medical students to ask questions in class? What types of questions are usually asked in class and are they critical to student learning?

Another area that merits further study is the faculty experience of teaching by VC. Faculty expressed concern that the remote students were not asking questions and were interacting less with the instructors. How does this affect their interaction with the class and the quality of their teaching? Do they need to be concerned about classroom interaction? Are there some faculty instructors who are better than others at engaging the remote students? What classroom teaching methods facilitate student engagement during VC lectures?

The challenges in conveying emotions in the VC environment are also of importance. There are many occasions where portrayal of emotions, such as sadness, fear, anxiety, stress, or humour, are important in the understanding of disease and the impact on the individual or family. Can the transactional distance be overcome in the VC environment or should attempts to adapt expression of these emotions and use of non-verbal communication be abandoned and presented in an alternate format?

Another area for potential future exploration is the nature of the student-student interaction in the classroom. The results of this study indicate that this was a positive

change. Further exploration of the dynamics of this interaction would be of interest. It might also be important to explore mechanisms to enhance this type of interaction as it could potentially benefit both remote students and the students in the traditional classroom.

### Recommendations

1. Whether specific recommendations should be made to address the high transactional distance is unclear. At present there is an effective equilibrium between the components of the system; transactional distance is high but greater interaction between students and student autonomy have compensated for this. The remote students are content and happy with their educational program.
2. Universities considering expansion of their MD-Program to a distributed program should be aware of the importance of the interaction between students and should be prepared to foster learner autonomy.
3. Faculty development should include discussion of transactional distance so that faculty instructors are aware of the altered classroom dynamics and are prepared to adjust their expectations of the remote students.

### Suggestions for future research

Future research could be focused on the following three areas.

1. Using Anderson's theory of equivalency, an exploration of the dynamics of the remote classroom should be further studied. This should focus on the nature of the conversations taking place during VC lectures and how these conversations relate to educational outcomes.

2. Further study should investigate the nature of classroom questions both by students and by the instructors. The literature on this topic is not very informative. Asking and being asked questions is believed to be important but there is little information regarding the content or value of classroom questions.
  
3. It would be of interest to learn more about the perceptions of faculty who teach in the VC environment to remote classrooms. Faculty teachers may require additional support and more in-depth faculty development than is currently provided to assist them in interacting optimally with remote students.

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## **APPENDIX A**

Letter of information



## Letter of Information

### **Undergraduate medical students' experience in a distributed medical education network**

A researcher, Dr. C. Kenyon, from the Schulich School of Medicine and Dentistry at the University of Western Ontario is conducting a research project looking at the experiences of medical students studying medicine in a distributed education network. There is no information in the medical literature reflecting what it is like to study medicine at a distance. The researcher is interested in your experiences as a medical student in Windsor.

The research will be conducted using individual interviews with approximately 10 students. Each interview will be audio-taped and transcribed verbatim. The transcribed interview will be anonymous with all identification removed. There are no right or wrong answers as your opinions, positive and negative, are of interest in this research. The interviews will be approximately 1 hour. Interviews will be scheduled during non-class or clinical time and will take place in Windsor at the medical school building.

Participation in this study is entirely voluntary. You may refuse to answer any questions, or withdraw at any time with no effect on your future academic success. The researcher, Dr. C. Kenyon, will conduct the interviews. Dr. C. Kenyon has not been and will not be involved in evaluating or assessing your performance at any time during your program. Should you agree to be interviewed and later wish to withdraw you may do so in which case your interview tape and transcript will be destroyed.

The taped interviews and consent forms will be taken from the Windsor campus to London by the researcher. The data will be kept in a locked cabinet in the researcher's private locked office until the data analysis is complete. Once data analysis is completed the tapes will be destroyed.

There are no anticipated risks to this research. Your experiences may assist in future planning for distributed medical education networks, particularly in the areas of student support and improvements in teaching methods.

As a token of appreciation if you agree to be interviewed you will receive a gift certificate for \$25.00 at the university bookstore.

If you have any questions about this study please call Dr. C. Kenyon at 519-646-6100, ext 64361 or e-mail at [ckenyon@uwo.ca](mailto:ckenyon@uwo.ca). You may also contact Professor Thomas Jones (thesis supervisor) at the Centre for Distance Education, Athabasca University at 1-866-514-6233 or email at [tomj@athabascau.ca](mailto:tomj@athabascau.ca).

If you have any questions about your rights as a research participant or the conduct of the study you may contact The Office of Research Ethics at (519) 661-3036 or by email at [ethics@uwo.ca](mailto:ethics@uwo.ca).

If you are willing to be interviewed please respond by e-mail to [mfarquha@uwindsor.ca](mailto:mfarquha@uwindsor.ca) or [ckenyon@uwo.ca](mailto:ckenyon@uwo.ca).

Please retain a copy of this letter for your personal records



Consent form

**Medical students' experience in a distributed medical education network**

I have read the letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

Name (please print) \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Consent obtained by (print name) \_\_\_\_\_

Signature of person obtaining consent \_\_\_\_\_

## APPENDIX B

### Interview guide

- How are you enjoying medical school?
- Did you select or were you assigned to Windsor/London? How do you feel about your choice/assignment? Why did you select Windsor/London? Are you satisfied with your decision? What do you feel are the advantages/disadvantages of the site where you are studying?
- Can you describe your experience in the classroom?
- What previous experience do you have with DE or learning in a technology assisted environment?
- Can you describe your experiences with VC? How does this impact on your learning from the lectures?
- Are you able to ask all the questions you want during lectures? Do you feel comfortable asking questions during a VC? What do you do if you need clarification or extra help after the lecture? How do you access the lecturers if you need to?
- How have the lecturers tried to adapt to the VC environment? Has this been successful in your opinion?
- Could you describe the atmosphere in the classroom? Are the students attentive to the lectures? What is attendance like for the lectures?
- Do you feel you have adequate or appropriate support at your site.....such as student counseling, educational support, technical support, administrative support etc.
- How would you describe your interactions with peers at the other site?

- How well do you feel you know your peers at your own site? How would you describe your interactions with your local peer group?
- How well do you feel you know your classmates at the other site? How would you describe your interactions with your classmates at the other site? Do you meet with them face-to-face?
- What other mechanisms do the students use to communicate between sites? E.g. do they blog/use MSN/Facebook/list serves etc
- Do you collaborate with classmates to study or review content?
- What things do you think enhance/detract from your learning experience?
- Medical school classes often develop a personality. How would you describe the personality of your class?
- How well do you feel the clinical and small group teaching components are integrated into your program? Do you feel that your clinical or small group teachers understand the 'big picture' including what you learn in lectures? If not how do you and your classmates handle this problem?
- Are there any social functions where students from both sites get together?
- Usually there are a lot of clubs and special interest groups that are associated with medical school. Can you describe the other activities that you and/or your classmates are involved in?
- Professionalism is a big topic in medical education right now. How do you feel you and your classmates are evolving professionally? How do you see yourself developing as a professional?
- What advice would you give someone starting a similar program?

- What factors have made the system work?
- What factors made this a positive or negative experience for you?
- Have you changed your personal style when you are on camera?
- How much interaction is there with students at the University of Windsor?
- How have the faculty adapted to the system? Have you observed any characteristics/body language/use of humour or tone that work or do not work
- How have students responded to faculty humour?



## APPENDIX C

### Research ethics approval

#### MEMORANDUM

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**DATE:** November 13, 2009

**TO:** Cynthia F. Kenyon

**COPY:** Dr. Thomas Jones (Supervisor)

Janice Green, Secretary, Research Ethics Board

**FROM:** Dr. Simon Nuttgens, Chair, Research Ethics Board

**SUBJECT:** Ethics Proposal #09-47C *“Undergraduate medical students’  
experience in a distributed medical education network”*

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On behalf of the Athabasca University Research Ethics Board, I provided an expedited review of the above-noted minimal risk research proposal and supporting documentation. I am pleased to advise that this project has been granted **FULL APPROVAL** on ethical grounds.

Please make minor revisions to your application as outlined below, **highlight the background in yellow to show where changes were made**, and then **resubmit the revised application, for file purposes only**.

**Application Form –**

1. Question B1-1 – Acronyms (VC, MD, DE, f2f) should be explained in this introductory area.
2. Question B2-4 – “Collected” should be checked, and “There is no personally identifiable data” should be unchecked, as you indicate later in B2-5 that you will be collecting and storing the names of participants.

3. Clarification requested: Question B2-10 – Was the funder (Neonatal Associates Research and Development Fund) consulted on the data destruction schedule? In Question A6-3, is there no required final reporting to the funder?

The approval for the study “as presented” is valid for a period of one year. If required, an extension must be sought in writing prior to the expiry of the existing approval. **A Final Report is to be submitted when the research project is completed.** The reporting form can be found online at <http://www.athabascau.ca/research/ethics/>

As you progress with implementation of the proposal, if you need to make any changes or modifications please forward this information to the Research Ethics Board Chair via Janice Green, the REB Secretary.

If you have any questions, please do not hesitate to contact [janiceg@athabascau.ca](mailto:janiceg@athabascau.ca)



## Office of Research Ethics

The University of Western Ontario  
Room 4180 Support Services Building, London, ON, Canada N6A 5C1  
Telephone: (519) 661-3036 Fax: (519) 850-2466 Email: ethics@uwo.ca  
Website: www.uwo.ca/research/ethics

### Use of Human Subjects - Ethics Approval Notice

**Principal Investigator:** Dr. C.K. Kenyon

**Review Number:** 16200E

**Review Level:** Expedited

**Review Date:** June 02, 2009

**Protocol Title:** Undergraduate medical students' experience in a distributed medical education network

**Department and Institution:** Paediatrics, St. Joseph's Health Care London

**Sponsor:**

**Ethics Approval Date:** June 11, 2009

**Expiry Date:** May 31, 2010

**Documents Reviewed and Approved:** UWO Protocol, Letter of Information and Consent

**Documents Received for Information:**

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced study on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the HSREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the HSREB:

- a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) all adverse and unexpected experiences or events that are both serious and unexpected;
- c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.



Chair of HSREB: Dr. Joseph Gilbert

Ethics Officer to Contact for Further Information			
<input type="checkbox"/> Janice Sutherland (jsutherl@uwo.ca)	<input type="checkbox"/> Elizabeth Wambolt (ewambolt@uwo.ca)	<input type="checkbox"/> Grace Kelly (grace.kelly@uwo.ca)	<input checked="" type="checkbox"/> Denise Grafton (dgrafton@uwo.ca)

*This is an official document. Please retain the original in your files.*

cc: ORE File