

## Knowledge Building – Using online environments for case-based learning in the health sciences at the University of Toronto

### Opportunity

Working with colleagues, both within and external to the University of Toronto, Dr. Leila Lax, an Assistant Professor in Biomedical Communications at the University of Toronto Mississauga and the Institute of Medical Science at the University of Toronto, has applied the theory of Knowledge Building to enhance student learning and engagement in courses in the health sciences.

Knowledge Building theory, defined by Drs. Marlene Scardamalia and Carl Bereiter of the Institute for Knowledge and Innovation and Technology, at the Ontario Institute for Studies in Education/University of Toronto, involves the creation of an environment that supports cognitive collaboration and the intentional improvement of knowledge, ideas, and practice. Dr. Lax has created a number of award-winning courses for individual and collaborative online learning in undergraduate and graduate health sciences education and continuing medical education.

### Innovation

For each course, opportunities for online Knowledge Building are designed around providing authentic experiences through the use of clinical case studies. The objective is to retain the complexity of clinical situations to support authentic student decision-making. Patient videos are created and pedagogically integrated in the online programs through a unique set of Knowledge Building scaffolds or learning process tools designed by Dr. Lax and colleagues. The actors and film-makers from the Faculty of Medicine Standardized Patient Program, who are involved in the production of the patient videos, are experienced at portraying both patients and health care professionals and in teaching communication skills.

Medical Legal Visualization Course: The University of Toronto offers the only two-year Master of Science in Biomedical Communications (BMC) program in Canada. BMC is an interdisciplinary program in the design and evaluation of visual media in medicine and science. Online Knowledge Building was integrated into the second-year Medical Legal Visualization course, using the Knowledge Forum® platform, to extend the opportunities for case-based discussion, collaborative critique, and formative evaluation of student images beyond the classroom. Knowledge Forum is an electronic group workspace designed to support the process of knowledge building. Students upload consecutive iterations of their medical legal visualizations on Knowledge Forum so that classmates,

instructors, and external experts can comment and contribute to improvement. With only 16 students in the class, mentorship becomes a collective process; students learn through providing and receiving assessments and building-on each other's ideas.

End-of-Life Care Distance Education Program: The End-of-Life Care Distance Education Program was designed as an online collaborative Knowledge Building environment to help family physicians in the Toronto, York, and Simcoe regions improve their knowledge and understanding of palliative care and support better care for their dying patients and their families. The End-of-Life Care Distance Education Program is a 22-week, accredited continuing medical education course made up of five multimedia online case studies for asynchronous Knowledge Building and two face-to-face or videoconference sessions for synchronous discussion. Each module is conducted online for one month so that physicians can work together, anywhere and at any time. The course is case-based and employs a problem-based approach; video case studies feature actors who depict patients with symptoms and issues common in the last days of life. The physicians watch the videos online, research the symptoms and treatments, and then discuss management and care options online, facilitated by a palliative care expert from a local hospital.

Mr. SINGH'S PAIN, part 1 - Case pg. 1

Build-on Annotate Close

Mr. SINGH'S PAIN, part 1 - Case pg. 1 [edit](#)

by Jenn T.  
Last modified: 2009, Sep 24 (21:41:11)  
by Leila2 L.

Module 2

- Schedule
- Pre-Test
- Introduction
- Case
- Ideas-at-the-Centre
- Discourse
- Epilogue
- Objectives

*Mr. Singh's Pain Part 1*

**Case**

 Dr. Graham is a family doctor working in Bramford with a special interest in palliative care. She is asked by Dr. Henry, a local urologist, to see his patient, Mr. Singh. She receives this consult note, [eReferral Letter](#), and makes an appointment to see the patient the next day.

When she arrives, the loud barking of a dog begins as she approaches the steps of the modest home in the old part of Aurora. The barking gets louder after she rings the doorbell. Moments later, an elderly, tired looking man opens the door. The dog charges out, but is quickly satisfied that the doctor isn't a threat. "Down, Max, bad dog. Sorry doctor, I don't have the energy to control him anymore. Please come inside so I can close the door."

 "Thank you. I'm Dr. Graham. Are you Mr. Singh?"  
"I am. It's good of you to come. I'm sorry I took so long to come to the door. My wife and daughter went out for the afternoon to do some shopping, and it takes me a while to get moving these days."

He leads you into the den where you take a seat. The house is comfortably furnished, and family pictures are everywhere.

[Back](#) **1** 2 3 4 [Next >](#)

Web-Based Communication and Cultural Competence Program: Internationally trained graduates of medical programs often lack an understanding of the cultural context and patient-centred care as practiced in Canada. This online program has been developed, with support from the Government of Ontario, to incorporate the Medical Council of Canada's objectives concerning communication and culture, as well as legal, ethical, and organizational aspects important to practicing medicine in a Canadian context. The educational design stresses Knowledge Building, but unlike the previous two web-based examples, the students are not mentored nor do they work collectively online; thus, support for accuracy, deep understanding, and reflection had to be built into the resources. Five design strategies were developed for use in this program:

- **Video Vignettes**: Five problem-based modules and a communication skills module were developed with authentic cases that simulate doctor/patient interaction in video vignettes with text support. The students are offered choices of directions that the cases might take.
- **Reflective Exercises**: After the students make their choices for treatment or response to each stage of a case, videos show the strengths, weaknesses, and consequences of different decisions. None of the case studies has one clear answer; they illustrate ethical issues and clinical dilemmas doctors face in daily practice. The reflective exercises include commentaries to encourage consideration of the choices made and the processes students used to make those choices.
- **Commentaries**: In addition to the Reflective Exercises, commentaries provide information on case interpretation, learning application, and supportive mentoring and guidance.
- **Concurrent Feedback**: Knowledge checks, tests with online formative feedback, were embedded throughout the modules. Correct answers are supplied after a second try, along with in-depth explanations and links to resources and guidelines for practice.
- **Contextualized Resources**: Links to resources are offered throughout the modules, in the case studies, the reflective exercises, and the knowledge checks – wherever students need to connect to content.

## Outcomes and Benefits

Medical Legal Visualization Course: The students have incorporated online Knowledge Building as an essential part of their learning. Knowledge Forum is used for formal feedback and communications, but the students have expanded online group interaction and building of ideas to other technologies that they use more readily, such as Twitter, wikis and Google docs. Structuring group feedback is no longer the sole responsibility of the professor but an intrinsic component of the learning. In a formal evaluation study, all of the students assessed the educational value of the process of online Knowledge Building as excellent or good. The students identified numerous advantages to using Knowledge Forum for collaborative learning:

- More egalitarian student participation;
- Creation of a record of the process for development of medical visualizations;
- More varied specialist/instructor participation, including outside experts; and
- More in-depth and analytical student-to-student critiques and comments.

End-of-Life Care Distance Education Program: The physicians cover not only the learning objectives in their online discussion, but also address additional issues and concerns, beyond the formal curriculum, such as religious and cultural issues around death and dying. Collaborative online Knowledge Building enables participant identification of real-world issues and collective problem-solving of current practice problems.

Web-based Communication and Cultural Competence Program: Although the students were initially uncomfortable with having no 'right' answers to the medical and ethical problems presented in the case studies, many of them consequently worked through all the options for each case so as to gain a deeper understanding of medical practice in Canada. The capacity of web-based resources to support learning about nuances of culture and communication was demonstrated through the student success and response to the program.

## Challenges and Enhancements

For busy students and professionals, the biggest challenge of working collaboratively online often relates to time. For example, in the Medical Legal Visualization Course, some of the students indicated that the time to read, write, and respond in text was the greatest impediment to participation in Knowledge Forum critiques, although this did not seem to affect their participation. The physicians in the End-of-Life Care Distance Education Program commented on the quality of the course, but also noted the difficulty they had in finding the two to three hours a week to participate fully.

The development of each of the Knowledge Building courses, outlined above, requires a considerable investment in resources – personnel, infrastructure, and funding, with expertise needed in pedagogy, content areas, evaluation, and technology.

## Potential

Medical Legal Visualization Course: This initial application within the Biomedical Communications Program provided the experience and the model for future adaptations of Knowledge Forum within the health sciences.

End-of-Life Care Distance Education Program: The End-of-Life Care Distance Education Program could be re-conceived to respond to interprofessional continuing education so that various health professionals who deal with palliative care can share perspectives and approaches to assessment and patient management. Interprofessional collaboration is a growing trend in health professional education and a reality of clinical practice; online learning can facilitate wider sharing among professional groups and help overcome geographical challenges.

Web-based Communication and Cultural Competence Program: This award-winning program is available for use by international medical graduates throughout Canada on the Medical Council of Canada web site at <http://www.mcc-img.ca>.

Dr. Leila Lax has published extensively on Knowledge Building pedagogy and is happy to share her publications, expertise, and models with others who are interested in building these experiences into their own courses.

## For Further Information

Leila Lax  
Assistant Professor  
Biomedical Communications  
Department of Biology  
University of Toronto Mississauga and  
Institute of Medicine, University of Toronto  
[l.lax@utoronto.ca](mailto:l.lax@utoronto.ca)

Masters of Science in Biomedical Communications Program, Medical Legal Visualization Course: <http://www.bmc.med.utoronto.ca/bmc/index.php>

Lax, L., Taylor, I., Wilson-Pauwels, L., and Scardamalia, M. (2004). Dynamic Curriculum Design in Biomedical Communications: Integrating a Knowledge Building Approach and a Knowledge Forum® Learning Environment in a Medical Legal Visualization Course. *Journal of Biocommunications*. 30:1.

End-of-Life Care Distance Education Program: <http://icarus.med.utoronto.ca/eolcare>

Lax, L., Singh, A., Scardamalia, M., & Librach, L. (2006). Self-Assessment for Knowledge Building in Health Care. *QWERTY: Journal of Technology and Culture*. Vol.1 (2) 19-37. <http://www.ckbg.org/qwerty/index.php/qwerty/article/view/11/11>

Web-Based Communication and Cultural Competence Program: <http://www.mcc-img.ca>

Lax, Leila R., M. Lynn Russell, Laura J. Nelles, and Cathy M. Smith, Scaffolding knowledge building in a web-based communication and cultural competence program for international medical graduates. *Academic Medicine*, Vol. 84, No. 10, October 2009 supplement. [http://journals.lww.com/academicmedicine/Fulltext/2009/10001/Scaffolding\\_Knowledge\\_Building\\_in\\_a\\_Web\\_Based.3.aspx](http://journals.lww.com/academicmedicine/Fulltext/2009/10001/Scaffolding_Knowledge_Building_in_a_Web_Based.3.aspx)

Nelles, Laura Jane, Cathy M. Smith, Leila R. Lax, and Lynn Russell. (2011). Translating face-to-face experiential learning to video for a web-based communication program. *The Canadian Journal for the Scholarship of Teaching and Learning*, Vol. 2, No. 1. <http://dx.doi.org/10.5206/cjsotl-rcacea.2011.1.8>

## Program Committees and Research Partners

### End-of-Life Care Distance Education Program

#### **Dr. Anita Singh**

Course Content Co-ordinator  
Palliative Care Consultant  
Temmy Latner Centre for Palliative Care  
Mount Sinai Hospital &  
Faculty of Medicine  
University of Toronto  
Toronto

#### **Dr. Lawrence Librach**

Director

#### Dr. Leila Lax

Course E-Learning Co-ordinator  
Assistant Professor  
Biomedical Communications  
Department of Biology  
University of Toronto Mississauga and  
Institute of Medicine, University of

#### **Dr. Anoo Tamber**

Palliative Care Consultant

# Contact North | Contact Nord

Ontario's Distance Education & Training Network

Joint Centre for Bioethics  
University of Toronto

**Dr. Hyon Kim**  
Palliative Care Consultant  
Sunnybrook Health Sciences Centre

Sunnybrook Health Sciences Centre

**Dr. Paolo Mazzotta**  
Palliative Care Consultant  
Sunnybrook Health Sciences Centre

## Web-Based Communication and Cultural Competence Program

Dr. Lynn Russell  
Former Director Wighman-Berris Academy  
Medical Education Consultant  
Faculty of Medicine, University of Toronto  
University of Toronto Mississauga and  
Institute of Medicine, University of Toronto

Dr. Cathy Smith  
Standardized Patient Program  
Faculty of Medicine, University of Toronto  
Toronto

Dr. Leila Lax  
Assistant Professor  
Biomedical Communications  
Department of Biology

Laura Jane Nelles  
Standardized Patient Program  
Faculty of Medicine, University of