Technology-enhanced Interactive Surgical Education: The Foundation for Establishing Strategic Residency Training Program Alliances

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Specific Aim:
Implement and evaluate a technology-enhanced instructional tool that will directly translate into the ability to *create virtual interactive teaching modules* pertinent to surgical care and surgical techniques.

Program Significance:
The gold standard for teaching surgeons has been the integration of clinical service and education on specialty defined clerkships. This type of learning (relatively unchanged since its introduction in the early 20th century) is highly experiential and is dependent on close instructor/ trainee relationships, and is characterized by a progression of responsibility earned by the trainee as competencies are developed. Certain limitations in the current system of graduate surgical education have been highlighted by recent nationwide changes in the working environment and in the content of specialty surgical disciplines:

1. The depth and breadth of surgical experience is highly variable among individual trainees owing to simple logistics – the trainee cannot be in attendance for all index surgical cases unfolding in different operating rooms. This problem is compounded by differences of technique and approach to complex surgical diseases among instructing surgeons both locally and regionally across the U.S. or worldwide.
2. The base of clinical and basic science knowledge and technology in surgical specialties continues to expand at an exponential rate, placing ever greater demands on rapid, efficient learning by the trainee. Much of this information is made available largely in discrete venues or clinical scenarios. Exposure to the most up-to-date innovations, therefore, is uneven and potentially delayed among trainees.

These deficiencies in the surgical training model were noted after a careful reevaluation within our surgery department and have necessitated the development of novel, information-rich, student-centered modes of surgical education. We have determined that a technology-enhanced approach can effectively and efficiently address this issue.

Plan Overview:

- Acquire† and install Macromedia **Breeze** software package (Presentations, Live, and Training). [refer to http://www.macromedia.com/software/breeze/]
- Develop a multimedia-based surgical core curriculum comprised of a series of virtual interactive surgical training modules.
- Testing of this teaching approach. A stepwise manner of introducing/ integrating the technology-enhanced teaching modules will be adopted. Initially, smaller groups of trainees would participate in content-specific learning modules (e.g. general surgery) during weekly Grand Rounds (a formalized didactic session).
- Department-wide vertical integration – the teaching modules would be useful for many surgical subspecialties such as thoracic surgery, cardiovascular, transplantation, surgical oncology, and trauma surgery.
- Conduct live, **cross-institutional** teaching sessions lead by renowned experts within a particular surgical discipline. Surgical faculty from multiple institutions such as, the University of Pittsburgh – Dr. James Luketich, Brigham and Women's Hospital – Dr. David Sugarbaker, and Toronto General Hospital – Dr. Griffith Pearson have committed to participate in our pilot endeavor.
- Foster the development of strategic academic alliances among surgical faculty from different institutions both nationally and worldwide.

Novel Aspects:

- All trainees at the core teaching hospitals (Fairview-University Medical Center, Veterans Affairs Medical Center, and Regions Hospital) and at satellite teaching hospitals

throughout the twin cities could simultaneously attend the designated didactic sessions (i.e., surgical training modules) and participate in real-time.

- No specialized skills are required by the trainee other than the ability to use a web browser. Each participant would access the training module using a unique user identification and password. Interaction is conducted through a web chat room contained within the training module environment.
- The interactive training modules could be recorded, edited by the instructor, catalogued, and stored on a central server as an online reference library for future access by trainees at any time, from anywhere.
- Microsoft PowerPoint is the interface for instructors to create teaching modules; this allows for digital video and robust graphics to be easily integrated into lessons. Since this software is already widely used in academia, there is minimal additional training required by instructors.
- Quizzes or full length tests can be created with the 'Test Wizard' in Macromedia Breeze and participant scores can be tracked.

Specific Roles:

- I will serve as the project coordinator and as the liaison between the participating surgical departments. I am the current Chair of the Surgical Education Council and have extensive experience with developing and refining the surgical core curriculum.
- The other 10 physician members of the Education Council will serve as the initial core of instructors to lead the effort to develop the content and delivery of the training modules.
- A hired information technical specialist will manage the Macromedia Breeze platform and central server where the teaching modules will eventually be stored.

Learning Outcomes:

- Increased and more consistent participation from all faculty instructors and trainees.
- Rapid delivery of recent advances in surgical knowledge and techniques, as well as the current opinions/ viewpoints of leading experts (especially of those outside of our institution) from any surgical specialty.
- Improved trainee learning efficiency and effectiveness.
- Unlimited trainee access to core surgical knowledge areas.

Evaluation:

- Conduct trial runs of the virtual training modules as they are developed and assess for the ease of use and effectiveness of multimedia content.
- Form an evaluation team comprised of both instructors and trainees to administer surveys (which can be delivered online within the virtual teaching environment) to participants pre- and post-session. Feedback will be used to tailor the style and content of teaching modules.

Courses Affected

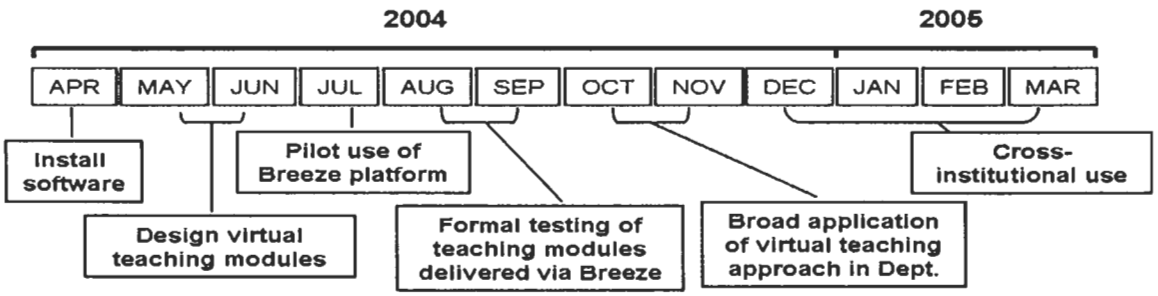
The impact of this curriculum initiative will affect all surgical residents (about 40 to 45 per year) within our program. Also, medical students (about 200 per year) enrolled in the required surgery externship (Surg 7500) will be directly affected. There will be a variable number of medical students affected in the 12 elective surgery externship courses (Surg 7502-04, Surg 7509-13, Surg 7522-23, Surg 7525-26).

Budget:

	Tel Grant	Dept. of Surgery
Macromedia Breeze (Education Edition) -Breeze presentation platform -Breeze training module -SCORM learning management system adapter module		**$9750.00†**
Breeze Live add-on module		**$9750.00†**
Technical support (~250hrs @ $40/ hr) -audio/ video production assistance -upload teaching modules to Breeze platform -information management -organization of online library -central server maintenance	**~$10,000.00**	
TOTAL	**$10,000.00**	**$19,500.00**

† We are in the process of applying for an equipment grant awarded by the Minnesota Medical Foundation with a submission deadline of March 1, 2004. I have an established track record of obtaining funding from this organization. A contingency plan for funding from the Department of Surgery is in place in the event that our proposal is not fundable by the Foundation.

Timeline:



Departmental Support:

Our mission statement states that "The academic charge of the Department of Surgery at the University of Minnesota is to provide a superb environment to facilitate the training of individuals at all levels – medical student, resident, and fellow – in the discipline of clinical surgery and surgical sciences." Initiation and development of a technology-enhanced teaching approach designed to increase efficient and effective learning is directly in accord with this overall focus.

Mentorship Phase (Sustainability):

By implementing technology-enhanced teaching on a departmental-wide scope, we will serve as a role model for innovation in surgical education both locally and nationally. In the long term, we intend to use this medium to foster new strategic alliances among surgical faculty at outside institutions and to strengthen preexisting cross-institution relationships. The online library of core teaching modules could be made available to other trainees outside of our program. This educational approach will be presented and discussed at national conferences (e.g. American College of Surgeons or Society of University Surgeons).