



helping instructors teach with technology

digital media
center*2008 TECHNOLOGY-ENHANCED LEARNING (TEL) GRANT PROGRAM***APPLICATION FORM**

If you have questions about the program or require assistance in completing this form, please contact the Digital Media Center's TEL Grant Program manager, **Kurtis Scaletta**, kurtis@umn.edu, (612) 624-1323.

Project Title:	Validation Study of a Web-based Assessment and Simulation of Surgical Treatment of Common Orthopaedic Surgery Procedures
Abstract (50 words):	In 2007, the investigators created a WebVista pre-assessment of carpal tunnel surgery skills for orthopedic surgery residents. This study will determine the validity of that tool as a cognitive assessment and its correlation to their motor skills test and to the results of a 'perception of preparedness' survey.

Note: You will also need to enter the Project Title and Abstract into the TEL Grant tracking tool.

I. PRINCIPAL INVESTIGATOR/PRIMARY CONTACT

Please designate a single investigator to whom we can address official correspondence, and enter this investigator's name in the space provided.

Name:	Ann E. VanHeest, MD		
Department:	Orthopaedic Surgery		
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II. ADDITIONAL INVESTIGATORS

Name:	Janet Shanedling, Ph.D.
Department:	AHC Office of Education School of Nursing

Name:	Matthew D. Putnam, MD
Department:	Orthopaedic Surgery

III. PROJECT DESCRIPTION (250 WORDS OR FEWER)

In this section, please describe your proposed TEL grant project in 250 words or fewer. In addition to describing the technology-enhanced learning activity or process you will develop, provide details on the courses that will be affected by the project, your expected learning outcomes, and the roles each member of your design and development team will play.

At present, during the fourth year of the five-year program, surgical residents demonstrate in a cadaver laboratory their knowledge and skill of specific orthopedic procedures. During the past year, we created an online pre-assessment for one of those procedures: carpal tunnel surgery. The purpose of this project is to determine the validity of that tool to predict and accurately measure residents' knowledge and capability to perform carpal tunnel surgery. We hypothesize that the score on this cognitive assessment will have a positive correlation to the scores residents receive on their motor skills test and to the results of a 'perception of preparedness' survey. In addition, we wish to gain insight into the point in the five-year program at which such pre-assessment is most valuable in the learning cycle. Once the instrument has been validated, we intend to use it as a template for other orthopedic surgical specialties, the series of which can be syndicated to other orthopedic surgery programs external to the U of M. Finally, we plan to measure and compare student outcomes with and without use of this instrument as part of our scholarly research. To date, WebVista has rarely been used for learning or assessment for surgical residents, who are located at various hospital sites throughout the Twin cities. We anticipate using this project as an exemplar for extending the use of this course management system tool for all surgery specialties, and for Graduate Medical Education competency assessment, both within and external to the University of Minnesota.

1. LEARNING ACTIVITY OR PROCESS

Describe what specific activity or learning process you will design.

In 2007, the principal investigators on this proposal designed and developed a WebVista assessment for 4th year residents in orthopedic surgery. The assessment was intended to closely simulate the application of knowledge and skills essential to completing carpal tunnel surgery: 1) anatomy, 2) physical exam, 3) diagnostic testing, 4) critical decision-making based upon evidence-based literature, 5) surgical steps, 6) completion of an operation report, and 7) identification of and response to common surgical complications. The assessment uses a range of enterprise tools of the U of M Learning Platform including Web Vista, Wimba, and Flash (with SCORM to integrate with WebVista). The assessment is now completed, and has undergone usability testing.

But does it work? The purpose of this proposal is to seek support to complete a validation study of the instrument, a study which would be documented by scholarly research. In that study, we will:

- ♦ Validate the content and items included in the test as appropriate indicators of the cognitive skills we are testing
- ♦ Validate that scoring on the assessment is accurate and reliable
- ♦ Demonstrate external validity by showing predictive consistency of the assessment results with another test (the cadaver lab)
- ♦ Evaluate residents' perceptions of preparedness (a qualitative measure) by assessing their sense of preparedness for the cadaver lab both before and after the WebVista assessment, and then correlating the survey results with their performance on the cadaver lab
- ♦ Test residents at each level of the assessment program to determine its most valuable use as a learning tool in the educational cycle.

In essence, we plan to demonstrate that the Web-based carpal tunnel surgery assessment can serve as a knowledge base assessment that predicts and correlates with orthopedic residents' actual surgical skills as graded in a motor skills lab. The outcomes of this research will be used to refine and finalize the WebVista assessment tool, and will be documented in scholarly publication.

2. COURSES AFFECTED

Describe the course(s) or curricula that will be affected by TEL grant funds.

The U of M Department of Orthopedic Surgery Residency Program, within the Medical School, will use the planned WebVista tool for assessment of orthopedic surgical skills. This tool will simulate the surgical steps necessary to complete orthopedic surgical procedures (beginning with carpal tunnel surgery). It will include a safety assessment that will enhance medical learning prior to performing the surgical procedure on cadavers and then patients. If the Web-based assessment proves successful, the same course design will be applied for assessment of surgical skills in other departments of the Medical School, for example, urology, general surgery, cardiac surgery.

3. LEARNING OUTCOMES

Define the expected student learning outcomes from the project.

As a result of using the validated WebVista assessment tool, **orthopedic surgery residents** will demonstrate knowledge of:

- ♦ Anatomy
- ♦ Diagnostic testing

and skills of:

- ♦ Surgical preparation
- ♦ Surgical steps
- ♦ Clinical decision-making and evidence-based practice
- ♦ Surgical problem-solving

RESEARCH OUTCOMES

- ♦ **Validation of WebVista Assessment Instrument:** The first phase of this research will be to document content validity, predictive validity, and reliability of the instrument. Content validity will be determined by comparison of content tested by the instrument to those commonly tested in other comparable orthopedic surgery residency programs and by a factor analysis conducted through consultation with educational

statistics experts. Hand surgeons will complete and later discuss the assessment to confirm inter-rater accuracy of scoring. Criterion-related and predictive validity will be derived from correlation of scores with cadaveric lab motor skills outcomes.

- ♦ **WebVista Assessment correlation to Motor Skills Cadaveric Testing:** The hypothesis of this study is that Web-based assessment will be highly predictive of actual surgical skills. All residents in the orthopedic program, each at varying levels of proficiency, will be pre-tested using the WebVista assessment instrument. (Note that one section of the WebVista assessment requires scoring by rubric of a Wimba voice-recorded operations report.) Each of the 30 residents in the program will then be tested with a motor skills lab with grading of their surgical skills by two board-certified orthopedic hand surgeons using both qualitative and quantitative measures. The results of the Web-based assessment will then be correlated with the results of the motor skills testing.
- ♦ **Year of Residency:** We will administer the WebVista assessment and motor skills cadaveric testing to groups of residents in each of the five years of training. This will allow us to establish benchmarks for expected performance depending on experience level, and will help indicate the optimum level at which the pre-assessment can be applied as a valuable learning tool. We will obtain feedback via anonymous survey from each group pertaining to the 'perception of preparedness' and perceived learning value of the assessments.

4. TEAM ROLES

Describe the roles and responsibilities of investigators, teaching and/or research assistants, University support staff members, and outside developers.

Team Roles (Summarized in the Project Timetable below)

IV. PERSONAL STATEMENT (150 WORDS OR FEWER)

Provide one or two paragraphs (150 words or fewer) outlining your experience and interest in teaching with technology and describing how this program fits with your professional development goals in this area.

Dr. Ann VanHeest, Program Director for Orthopedic Surgery Residency Program, has focused on the Accreditation Council for Graduate Medical Education (ACGME) initiative for assessing the six general competencies in resident medical education. The surgical residency program now uses the e-portfolio for assessment of ACGME competencies, with a current strategic focus on assessing surgical skill (Patient Care competency). This grant would fund the validation of a template for a series of Web-based orthopedic surgery assessments, which could be extended to residency programs in other surgical specialties. By teaming with Janet Shanedling and the AHC Office of Education course development group, we intend to explore the capacity to develop authentic simulation assessment tools that can serve as pre-learning for residents' surgical skills laboratory tests. We plan to conduct and report on this development within the context of scholarly research, to contribute to the development of scholarly research in teaching and learning.

V. TIMETABLE & BUDGET (NO MORE THAN 1 PAGE)

Provide a timetable and budget description no more than one page in length. The initial proposal should be written for a "tier 1," one-year project with funding of up to \$10,000. All proposals accepted for "tier 1" funding will be considered for "tier 2" funding following a workshop for grant recipients. See the Eligibility and Funding section of the TEL grant Call for Proposals for more information.

1. PROJECT TIMETABLE

List the tasks necessary to complete your project. Include a timeline detailing development milestones and the estimated time required to complete each task.

Activities/Tasks	Roles and Responsibilities	Completion Date
1. Validate content and scoring of the WebVista instrument (for carpal tunnel surgery)	♦ Drs. VanHeest, Putnam ♦ Michael Rodriguez, Off. of Research Consultation (Ed. Psych within CEHD) ♦ Janet Shanedling	End of March 2008
2. Finalize WebVista Instrument and learner survey	♦ Janet Shanedling ♦ Paul Ceelen (programmer)	April 2008
3. 36 residents (all levels) complete the WebVista assessment	♦ Drs. VanHeest, Putnam	End of April 2008
4. 36 residents (all levels) complete motor skills (cadaveric lab) testing	♦ Drs. VanHeest, Putnam	May 2008
5. Collect and analyze scores of WebVista assessment, 'perception of preparedness survey,' and motor skills assessment.	♦ Shanedling and VanHeest ♦ Drs. Putnam and VanHeest ♦ Julie Agel ♦ Office of Research Consultation	August 2008
6. Report on findings for (including year-of-residency results) for WebVista assessment tool	♦ Shanedling and VanHeest ♦ Dr. Putnam, Julie Agel	September 2008
7. Finalize carpal tunnel assessment module. Create 'generic' template from the module for use in other orthopedic surgery procedures and in other surgical specialties in the U of M Medical School on the use of the WebCT/Vista assessment template.	♦ Shanedling and VanHeest ♦ Paul Ceelen	October 2008
8. Create a 'User's Guide and Scoring Manual' to accompany the assessment template tool.	♦ Shanedling and VanHeest	December 2008

2. PROJECT BUDGET

Funding of up to \$10,000 is offered to support TEL projects. **Matching funds are required.** In a table, list the hardware, software, training, and/or development support necessary to develop your planned TEL activities. Use columns to differentiate expenditures to be funded by the TEL grant and those covered by collegiate/departmental matching funds.

Name	Role	% Effort	TEL Grant	Dept. Match
Ann VanHeest, MD	Principal Investigator	4%	562 (1%)	\$1,687 (3%)
Janet Shanedling, PhD	Co-Investigator	4%	\$1,377 (1%)	\$4,131 (3%)
Matt Putnam, MD	Investigator/Faculty	2%	\$694 (1%)	\$694 (1%)
Paul Ceelen	Web Developer	5%	\$2001	
Julie Agel	Statistician	3%	\$859 (1.5%)	\$859 (1.5%)
Office of Research Consultation	Consulting on statistical analyses and interpretation	10 hours @ \$100/hour	\$1,000	
Development hardware and software will be provided by the AHC Office of Education.				
TOTAL			\$6,493	\$7,371

VI. ALIGNMENT WITH LEARNING OUTCOMES

Describe the relationship of this project to the University's undergraduate learning outcomes (http://academic.umn.edu/provost/teaching/cesl_outcomes.html).

The Medical School is strategically committed to developing surgical simulation modeling to improve medical education and patient safety. A primary strategic initiative of the department of Orthopedic Surgery is to improve assessment of ACGME competencies, as evidenced by our use of the e-portfolio for residents. Inherent in the assessment of the WebVista module has been the focus on assessment as a vehicle of learning and a focus on critical thinking/problem solving, evidence-based practice, and documented mastery of a body of knowledge and skills appropriate to orthopedic surgery residents. The strategic plan of the Academic Health Center and the priorities of the AHC Office of Education focus on the development of competency/outcomes-based education and associated metrics and assessment. Both the Medical School and the Academic Health Center are prominently committed to documenting the value of and furthering research into teaching and learning as important forms of scholarly research. This project supports the strategic priorities of the Department of Orthopedic Surgery, the Medical School, and the AHC Office of Education.

VII. CONFLICT OF INTEREST

I/we certify that I/we do do not

have a conflict of interest as defined under the Board of Regents' Individual Business or Financial Conflict of Interest policy (http://www.umn.edu/regents/policies/administrative/Individual_COI.htm). If you selected "do," please describe the nature of the conflict of interest below.

VIII. OUTCOMES FROM PREVIOUS TEL GRANTS

Applicants who have previously received TEL grants should describe, in 1-3 paragraphs, the outcomes of each TEL grant received. Be sure to include the title of the grant and the year it was received.

Janet Shanedling was a recipient (with Melissa Avery) of a TEL Grant in 2005. The purpose of that grant was to develop a series of learning activity templates that could be used across the School of Nursing curriculum in the development of WebCT/Vista courses. The project was concluded within that year, and, in addition, we developed a generic version of the templates that can be used within any curriculum at the University of Minnesota. The CD-ROM, called *Web Skeletons: Digital Tools for WebCT/Vista Course Planning and Development* includes not only the learning activity templates, but also a short module on the basics of course development. This software should be available on the University's central server or through the SVPP's office.

SUBMITTING YOUR PROPOSAL

- Once completed, submit your TEL grant **Application Form** to <http://telgrants.dmc.umn.edu>. Instructions on using the tool are available at <http://dmc.umn.edu/grants>.
- Also complete and return the **Signatures Page** signed by your department head(s) and dean(s) following the instructions on that document. (<http://dmc.umn.edu/grants/>)