

2005 TEL Small Grant Proposal

Cover Sheet

Project Title: Improving teaching and learning of parenteral product preparation skills through the development and implementation of online instructor training and student evaluation systems.

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Project Description

The Pharmaceutical Care Learning Center at the University of Minnesota College of Pharmacy is a 5-semester course sequence (Phar 6171-6175) that develops students' patient care and pharmacy product preparation skills. As part of the sequence, students have to demonstrate repeated proficiency in preparing sterile parenteral products (bags, syringes, etc) in sterile hoods. In actual practice, such products are injected directly into patients. Consequently, proper skill development and effective assessment is literally a "life-or-death" matter. The Learning Center has developed a scoring rubric for the evaluation of the various components of sterile technique.

Use of this scoring rubric by instructors has two significant challenges. The first is consistency in teaching, which is inherently necessary for optimal learning. Each semester the 3 Learning Center faculty (authors) oversee ~8-14 instructors (graduate students, pharmacy residents, and select Doctor of Pharmacy upperclassmen) who are responsible for teaching parenteral technique student learning activities. Although all of these instructors come to the Learning Center with some background in parenteral product preparation, their prior experiences may be years removed and are often inconsistent, making thorough training necessary to promote consistent student learning. Frequent instructor turnover due to intra-College competition for research assistant and instructor positions makes comprehensive instructor training an every-semester occurrence. Second, the scoring rubric is available both as a paper document and as an online entry form (input to a server-side database). Currently, instructors evaluate the students' performance on paper and then transfer their ratings and comments to the online rubric. This inefficient process both delays feedback to students and forces time and resource-driven decision to only electronically archive only about 40% of the students' technique assessments. This in turn significantly hampers the longitudinal assessment of student and class learning and teaching performance.

This proposal targets our two significant challenges. First, we will develop and implement an online parenteral technique instructor training module. The specific activities of this project are summarized in Table 1, along with the timeline for completion and an estimate of hours. The online training module will utilize both WebCT and Cold Fusion user interfaces to walk the instructor through a series of tutorials including applicable guidelines and legally-binding references, appropriate parenteral technique, the scoring rubric, and demonstrations of good and poor technique (streaming-video enhanced). It will also engage the instructor in practice evaluation sessions and a "final exam", using streaming video to simulate live student technique. It will provide experience and feedback on accurate application of the technique scoring rubric. Second, we will integrate online assessment of technique via TabletPC technology into the Learning Center's learning activities for both instructors and student peer-assessment. The average parenteral activity has 2 instructors and 4 pairs of students. This would require 6 TabletPCs: 1 each for the instructors and 1 for each pair of students completing peer assessments. (Students currently use the paper version of the rubric during activities as well. Although all students have handheld computers, screen size makes handhelds completely impractical for online entry of the rubrics.) Submission of the rubric would occur via the Learning Center's already existing wireless access, allowing students to view instructor's and peer's ratings and comments within minutes of completing the activity rather than days later. Online entry of ratings will allow us to start electronically archiving peer ratings (previously not feasible due to inefficiencies as described above). This archive will then be used to identify areas of poor student and class performance so that educational strategies may be adjusted and instructional performance will be improved.

The project has the following programmatic expected outcomes:

1. Improved instructor preparedness through a streaming video-enhanced training module
2. Increased instructor retention of material through review of online materials
3. Improved instructor consistency between activities and semesters
4. Maximized teaching time and minimized teaching time lost to administrative duties
5. Captured "teachable moments" by eliminating the lag time between activity and feedback
6. Increased the number of technique assessments archived into the online database
7. Qualified and quantified common technique errors based on this larger archived set

The project's programmatic outcomes focus on improved teaching and would result in the following learning outcomes:

1. Improved student learning and application of parenteral technique
2. Reduced/eliminated the number of students receiving unsatisfactory ratings on technique

3. Decreased the number of activities required for a student to master parenteral technique skills
4. Modified learning strategies, including potential TEL strategies, to target the common errors

The three authoring faculty will be responsible for the development, implementation, and assessment of the instructor training module and the integration and assessment of the TabletPC technology into the educational structure of the 5-semester series. Three external reviewers (current practitioners) will be utilized to maintain broad applicability of the revised content to multiple practice settings. Two Doctor of Pharmacy students will be hired to assist with the tasks outlined in Table 1, including literature review, document, presentation, and video development, and data analysis. A College staff member will schedule meetings and focus groups and provide other administrative support.

Timetable and Estimated Hours (Assumptions: grant is awarded in the beginning of April 2005; *All times are cumulative time of all faculty (3), 1 support staff, and 2 research assistants (Doctor of Pharmacy students))

| Date, Phase, and Est Hrs* | Activities (Est hrs/activity) |
|---|---|
| Apr 2005 – Information Gathering – 40 hrs | <ul style="list-style-type: none"> • Complete literature review for current/revised parenteral preparation guidelines (10) • Visit parenteral product preparation practice sites (i.e., home health, hospital, clinic) for ideas/feedback on application of guidelines (2-3 sites) (20) • Hold pre-development focus groups to explore students’ and instructors’ perspectives on training and assessment process, including identifying areas of inconsistency or inadequate preparation (10) |
| May 2005 – Information Synthesis and Initial Drafting – 100 hrs | <ul style="list-style-type: none"> • Develop draft outline for online teaching assistant training module (12) • Condense focus group information into themes (6) • Finalize outline for instructor training module, incorporating themes from focus groups and practice sites (6) • Develop list of documents, presentations, and sample scenario videos to create for online module (12) • Draft plan for module assessment (6) • Draft documents and presentations for online module (60) |
| June 2005 – Draft Review and Initial Development – 145 hrs | <ul style="list-style-type: none"> • Send documents and presentation slides to external reviewers for feedback (2) • Develop logistical and educational plan for incorporation of TabletPC technology into student assessment of parenteral preparation technique (9) • Develop/revise educational activities for implementation of TabletPC assessment technology (24) • Review and finalize documents and presentation slides (20) • Develop materials for assessment of module (35) • Develop online module infrastructure (Cold Fusion pages, server-side database(s), and WebCT site) to facilitate delivery and assessment of the online module, including adjustments for TabletPC use (if any) (55) |
| July 2005 – Continued Development – 130 hrs | <ul style="list-style-type: none"> • Record presentations for online streaming media access (20) • Develop videos (demonstrating optimal parenteral technique and simulated students’ good and poor performance) (60) • Review, revise and finalize plan and materials for assessment of module (likely dynamic as development of module progresses) (30) • Finalize online instructor training module, incorporating presentations, documents, and videos (20) |
| Early Aug 2005 – Testing – 25 hrs | <ul style="list-style-type: none"> • Trial run of online instructor training module with 1) external reviewer(s) and 2) sample instructor (3rd year professional student who will be one of about 12 parenteral TAs in the Fall 2005) (15) • Adjustments made to online software and databases systems as necessary (10) |
| Mid-Late Aug 2005 – Implementation – 120 hrs | <ul style="list-style-type: none"> • Instructors complete the online training module and live follow-up for refining skill development (20) • TabletPC-facilitated online parenteral technique evaluation implemented in 6171, 6173, and 6175 (40) • Student training on use of TabletPC for pilot online peer assessment of parenteral technique (20) • Review of TabletPC-facilitated online parenteral technique evaluation and adjustments to database and software systems as needed (40) |
| Dec 2005 – Performance Review – 40hrs | <ul style="list-style-type: none"> • Hold post-implementation focus groups to explore students’ and instructors’ perspectives on training and assessment process, including identifying areas of inconsistency or inadequate preparation (10) • Online training module adjusted based on feedback and performance (30) |
| Jan 2006 – Application to | <ul style="list-style-type: none"> • Data synthesis and analysis (40) • Spring 2006 implementation of parenteral instructor training in Phar 6172 and 6174 (24) |

| Date, Phase, and Est Hrs* | Activities (Est hrs/activity) |
|--|--|
| broader curriculum and Dissemination – 200 hrs | <ul style="list-style-type: none"> • Application of TabletPC online evaluation systems to non-parenteral areas (clinical and compounding) (20) • Exploration of online instructor training module development for other College of Pharmacy courses – presentation to College's Education Policy and Assessment Committees (12) • Exploration of expanded use of project College of Pharmacy Learning Center on Duluth campus (12) • Abstract of project prepared and submitted to the American Association of Colleges of Pharmacy for possible poster/podium presentation at the July 2006 Annual Meeting in San Diego, CA (12) • Manuscript preparation (80) |
| Total Hrs | 600 hours development + 200 hours data analysis, broader application and dissemination = 800 |

Budget (Hourly rates of faculty and staff include 32.8% fringe)

| Item | College Expense | Grant Expense |
|---|------------------------------|----------------|
| Personnel | | |
| Faculty time – development, implementation, and assessment (beyond usual parenteral teaching roles) (305 hrs) | In kind | -- |
| Faculty time – Data analysis, broader application, and dissemination (140 hrs) | In kind | |
| Staff support (\$23/hr x 20 hrs) | In kind | -- |
| Summer research assistant support (3 rd year Doctor of Pharmacy students) (\$15/hr x 280 hrs) | \$1,000 | \$3,200 |
| Server-side database, WebCT site, and Cold Fusion site development (\$40/hr x 55 hrs) | \$2,400 | -- |
| External Reviewers (\$100 honorarium/gift x 3 reviewers) | \$150 | \$150 |
| Equipment | | |
| TabletPCs (\$2100 x 6) | \$6,300 | \$6,300 |
| Digital video cameras, video processing hardware and software, RealMedia server, Cold Fusion server, other web development software | Already available at College | -- |
| Focus Groups | | |
| Space, advertising, food (\$100/group x 4 groups) | \$400 | -- |
| Dissemination | | |
| Poster printings (Coffman), photocopying, other materials | -- | \$300 |
| Totals | \$10,250 | \$9,950 |

Evidence of Departmental Support and Connection with Strategic Initiatives and Transferability

The University of Minnesota College of Pharmacy is in the process of finalizing a 5-year strategic plan. A significant component of this plan is the pursuit of a progressive, application-based curriculum through technology-enhanced education. This TEL grant proposal is in concert with the College's teaching mission and vision to enhance the development of practitioners through innovative use of technology that ensures efficient and effective education. Furthermore, the College of Pharmacy has recently expanded to Duluth (the first graduating class will be in 2007), and the successes and limitations of this project will be shared with that campus, along with guidance and support for implementing a similar project. This proposal, with its potential for expanded use of both online instructor training modules and online real-time evaluation strategies, will further enhance the College's teaching mission and service to Minnesota. Lastly, the authors of this proposal and the College as a whole value the scholarship of teaching and dissemination of unique methods of student instruction. This project will continue the College's strong tradition for educational scholarship.

Appendix

Summary of Previous TEL Grant Award (Drs. Sorensen and Brown)

Technology Enhanced Learning Small Grants Program 2001-2002 Award Recipient

Project Title: Fostering Peer Review, Self Assessment and Improved Patient Care Through Streaming Media Performance Review With Developing Professionals

Awardees: Kristin Janke, Todd Sorensen, Patricia Lind, and Michael Brown, Univ of MN College of Pharmacy

Sample patient care streaming video vignettes were developed for playback via the web. These vignettes, used both in lectures and in prelab activities, purposely exposed students to both optimal and poor skill performance. In addition, streaming video technology was used to record and archive student performance of patient care scenarios, allowing self, peer and instructor assessment of the performance. A standard evaluation tool was used and a central database was developed to record class abilities in key skill areas. The five sequential courses of the patient care skills learning center are involved to enhance student and class tracking and build learning materials of increasing complexity.

Ease of use of the technology was reported as 'very good' or 'acceptable' by 92% of the students in the first semester of implementation. This increased to 98% by the end of the second semester of implementation, which coincided with an increase in the use of high-speed connections for viewing the streaming videos. The 'optimal' and 'poor' vignettes were reported educationally beneficial by 85% and 80% of students, respectively. Self and peer assessment of students' recordings were reported as educationally beneficial by 76% and 79% of students, respectively. There was a noticed disconnect between instructor evaluation and self/peer evaluations, with students rating their performances as 'acceptable' or better twice to five times more often than instructors. Learning activities have been adjusted to increase student understanding of common errors leading to disconnect between self/peer and instructor evaluations.

Use of the streaming video technology and database has grown to other areas of the Learning Center curriculum (ex: non-sterile compounding, clinical documentation activities, clinical skills [BP monitoring]). With the College of Pharmacy's Duluth expansion, all components of the streaming video and evaluation database were incorporated into their Learning Center as well. This speaks well of the sustainability of the technology and processes developed in the initial project. The faculty of the Learning Center are building a scholarship of learning and education focusing on the use of technology in student learning and instructional performance.

The scholarship that our previous TEL grant supported was published as an abstract and poster:

Lind PR, Brown MC, Janke KK, Sorensen TD. Fostering Development and Assessment of Patient Care Skills Using Streaming Media Technology. American Association of Colleges of Pharmacy Annual Meeting Poster Session. Minneapolis, MN. July 2003. Abstract published in the American Journal of Pharmaceutical Education 104(JUL): p NIL_0090. 2003.

The scholarship that the TEL grant supported was presented at the following seminars and meetings:

Use of Digital Video Streaming Technology for Education and Assessment in the College of Pharmacy Partners in Learning: A Campus-Wide Symposium on Best Practices to Enhance Student Learning. Minneapolis, Minnesota. April 2004.

Use of Digital Video Technology for Education and Assessment. Interprofessional Education and Resource Center Seminar. Minneapolis, Minnesota. January 2004.