

Please use the template below to summarize your grant. Your summary should be about 3-4 pages in length and should be submitted to me in its final form no later than June 15, 2009. Rena has prepared some examples of aims, objectives and progress statements, and outcome and progress statements for your reference as you prepare your report. These examples are generic; it is likely that those included in the actual proposals/reports will be more specific. These examples are shown in blue.

Grant Recipient Name (*Linda S.Gorman*)
Report date (*10/10/09*)

Grant period (*08-09*)

Using Turning Point Clicker system in CLS Clinical Chemistry Classes

Specific Aims of the Project

- Improve student comprehension of Clinical Chemistry material
- Engage students in interactive learning as a way to improve their certification exam scores in Clinical Chemistry

Progress on Project Objectives

1. Take present Powerpoint lectures in CLS 832 and integrate the Turning point clicker system before the July 2008 class.

This was accomplished and the Turning Point lectures were given to the CLS 832 Intro to Clinical Chemistry class that started July 2008. This course was delivered in August 2009 and the collected data was used in a presentation given in February 2009 to a group at the Clinical Laboratory Educator's Conference in Denver, CO.

2. Powerpoint presentations used in the CLS 844 Adv. Clinical Chemistry course will integrate the interactive clicker system into the Fall 2008 schedule of lectures.

The lectures in CLS 844 Adv. Clinical Chemistry were also adapted to the Turning Point technology and given to the CLS class 2008-09. The initial glitches in the system seem to get better in this class. Students were more familiar with the system. They also liked the integration of questions and seemed to be more engaged in the learning activities.

3. Student assessment of the interactive system will be anonymous and occur at the end of each class schedule before the final exam is given.

Student evaluation of CLS 832 was not delivered thru Survey Monkey but thru the class evaluation used by DL and University of Kentucky classes. Results were not available until the end of the semester. While positive and indicating that the clicker system was advantageous, these results came in after the classes were finished.

Progress on Outcomes

1. Students will achieve an 85% score or better on the Final exam in CLS 832 as compared to the 2007-08 CLS class.

a. This Final exam is comprehensive for the material in CLS 832. Students have 4 written quizzes prior to this final exam to assess their comprehension. In 2007-08 there were 4 students with over 85% on their final in CLS 832 and 6 with less than 85% score. In 2008-09 with the clicker system there were 4 students over 85% on their final and 7 under 85% score. Grades for 2007-08 were similar enough to the 2008-09 class that there is no significant statistical difference.

2. Students will achieve an 85% score or better on the Final exam in CLS 844 as compared to the 2007-2008 class.

a. In 2007-08, there were 10 students with a final exam score over 85% and only 1 with a score less than 85% (n=11). In 2008-09 there were 7 students with a score over 85% and 3 with a score under 85% on the final exam. The grades for 2007-08 were not statistically different than the grades from 2008-09 (with clickers). The final grades in 2007-08 were 3 A's, 7 B's, 1 C. The grades from 2008-09 (with clickers) were 2 A's, 7 B's, 1 C.

3. Students using the interactive learning process will score better on the certification exam of their choice compared to the 2007-08, 2006-07 and 2005-06 classes in Clinical Chemistry section of the exam.

- a. Comparison of the 2007-08 group who took the ASCP certification exam to those who have taken the exam from the 2008-09 class reveal an increase in average points in Clinical Chemistry scores but the numbers are not strong. In the 2007-08 class 6 out of 11 students in the class took the ASCP certification exam. The UK program score in Clinical Chemistry was 409 point Average compared to 482 for University program average nationwide. The UK CLS class in 2008-09 had 4 out of 10 eligible students take the ASCP certification exam so far. The UK average in Clinical Chemistry for this group was 442 points with a National University program average of 494 for this exam. This is a 33 point increase in the UK average score for Clinical chemistry.

Project Summary

(Portions of the Summary may be excerpted from your original. This section should be modified to provide an accurate description of your actual project as it was conducted.)

Interactive learning in the Clinical Chemistry courses was introduced to the CLS class 2008-09 and is being continued with the present class. Using the Turning Point Clicker system in these courses was studied to see if it would improve the student understanding and comprehension of diverse and complicated concepts found in this material. CLS students have a difficult time comprehending the information from lectures and assignments in the CLS 832 and CLS 844 Clinical Chemistry courses offered here at University of Kentucky. Part of the problem is the speed with which the CLS 832 class has to be delivered in our modular curriculum. This leads to students falling behind in their textbook readings and having a limited number of homework assignments. Demonstrations of the interactive clicker system had occurred at our College retreat in February 2008 and at earlier venues here on campus that I had attended. I also saw a demonstration of a similar clicker system at a CLS professional meeting in 2006 where the subject matter was hematology.

Using the Turning Point clicker and my Powerpoint lectures, I integrated questions into each lecture. The plan was to lecture thru several concepts and then ask questions over that material as the lecture progressed. Students had some issues with the clickers at first, but once we entered into the CLS 844 Advanced Clinical Chemistry material the initial issues had been resolved. Students use clickers to respond to the question and the results can be posted for immediate feedback. The instructor can then address student misconceptions if they chose the wrong answer right away and without delay. This immediate feedback enables the student to "learn" the correct concept and factual information before the wrong idea can become embedded in their brain cortex. The added advantage is that students are engaged in their learning process. The interactive lecture is a better learning tool and the textbook an added resource rather than an item that sits on a shelf.

While my data is not very impressive at this point, I do feel that the students are more engaged in the class and participate thru the clicker option. With only the data from 2007-08 as the non-clicker group, it is hard to see the advantage of using the clicker system in clinical chemistry classes. So far the grades for CLS 832 and for CLS 844 appear to fall in about the same distribution. (see below) There may be some class differences that

contributed to these similar findings. The class from 2007-08 had about 5 more mature students in the class who would have exhibited better study habits than most college age students. The class from 2008-09 also started with about 12 students but lost 4 of them between the summer sessions and the early fall semester. Dwindling to a group of 8 instead of 12 may have altered their study habits toward the CLS classes they were taking. These are intangibles and not easily measured.

On the positive side, while the outcomes for #1 and #2 were a match between 2007-08 and 2008-09 classes, the ASCP certification scores for 2008-09 shows a 100% pass rate for the students who have taken the certification exam the first time. The class from 2007-09 where 6 out of 11 students took the certification exam shows 2 Failed scores and 4 Passed scores for first time examinees. The improvement in students certification scores is also a valid index of how well the Turning point clicker system can contribute to long-term memory for our CLS students.

DATA collected for the Clicker study as of October 2009

- CLS 832 Intro course
- Fall 2006
 - 9 A's, 3 B's, 1 C n=13
- Fall 2007
 - 4 A's, 5 B's, 1 C's n=10
- Fall 2008
 - 4 A's, 5 B's, 2 C's n= 11
- Overall grades for Basic Introduction Clinical Chemistry class were not different from previous years.
- Students using clickers seemed more engaged in learning and were more attentive
- Several students earned better grades in this course than in the Advanced course that followed. This may have been due to the amount of material or to a focused time without so many interruptions. The course was completed in 3 weeks, approximately.

- CLS 844 Adv. Clinical Chem
- Fall 2006
 - 4 A's, 5 B's, 3 C's n=12

- Fall 2007
 - 3 A's, 7 B's, 1 C's n= 11
- Fall 2008
 - 1 A's, 6 B's, 1 C's n=8 (clickers used)
- Overall the grade distribution continues to show more B-grades than A-grades, even with the Turning Point system.
- There were some extenuating factors that may have skewed the class results for 2008.
- The long-term goal of more success on national certification exams has yet to be determined. This class slated for those exams in summer and fall 2009.

Certification Exam Results (incomplete data so far)

Class 2007-08 (prior to clicker introduction) had Certification scores in Clinical Chemistry as follows:

Individual scores: 539, 353, 584, 386, 419, 395 (Only 6 out of 11 students in the class has taken certification exam)

UK Clinical Chemistry Average score according to ASCP was 409

University Based CLS programs Average Clinical Chem score was 482

Class 2008-09 (with clickers)

Individual score: 391, 357, 502, 519 (Only 4 out of 8 students has taken the certification exam so far)

UK Clinical Chemistry Average Score according to ASCP was 442

University Based CLS programs Average Clinical Chemistry Score was 494

- The Turning Point clicker system was applied to a Basic and Adv. Clinical Chemistry course in Fall 2008. While the statistics do not indicate much of a difference at this point, the class environment was more engaging using this system and the students more participatory.
- Continued refinement will be made as this system of active learning is applied to future classes.