End-of-Year Report for Instructional Grants 2007-2008
Center for Teaching Effectiveness
General Education Initiative
IT-User Services

The conditions of receiving a CTE / GEI / IT Instructional Grant require an end-of-year report. Please answer the following questions in one-two paragraphs each, complete the budget page regarding funds expended, and return the completed template as a Word attachment no later than Thursday, July 31, 2008. Please return the document to Martha Carothers [martha@udel.edu] and Sheila Warren [warren@udel.edu]. Final reports are posted on the Gen Ed and CTE grant websites. Thank you.

Faculty Name(s) and Department(s)
James A. Wingrave, Department of Chemistry and Biochemistry
Bridget A. Brennan, School of Education

Grant Project Title
General Chemistry Workshops

1. Did you complete your project as planned? What changes and modification to the original project did you have to make, if any?

   The original project primarily sought to enhance the student's quantitative reasoning through the development of new problems for CHEM-103/CHEM-104. Although a substantial amount of such problems have been written and implemented in workshops, the process of revising problems is not complete. Complete revision of workshop manuals was not expected, however, in the original proposal. While this aspect of the project remained a priority, modifications to the structure of workshop were found to be crucial to fostering collaborative group work and enhancing quantitative reasoning. The traditional problem solving session was partitioned into three segments: review, problem solving, and group quiz.

   Improving workshop leader training was also determined to be an important focus for bettering workshops. The weekly leader meetings also adopted a more structured schedule that included a problem solving session specifically aimed at improving the leaders ability to assess student misconceptions in problem solving in situations mimicking those encountered within workshop. Such training provides leaders with the means to better facilitate student problem solving in workshop. Between thirty and forty of these student misconception problems were written, which equates to roughly three questions for each leader meeting.

2. What concrete results have you, your students, and your department seen from your project? Please give specific examples of what has worked well and what needs further refinement.

The new structure of workshop in conjunction with better training methods for leaders has provided the infrastructure for which collaborative, student-oriented group learning specifically geared towards quantitative learning can occur. Attendance in workshop has increased significantly over previous semesters, and students stay for the entire scheduled period. Also, we found that workshop sections in which an IF-AT group quiz was administered had higher attendance throughout the semester than sections in which a traditional group quiz was given. Structuring workshop into different components also provided more control in terms of group formation. Large, unproductive groups and students working independently were no longer issues prohibited collaborative group work.

Coordinating the material of the workshops with lecture is the item that needs the most refinement. Multiple sections of lecture and the tendency for these lectures to run behind schedule caused workshop topics to be ahead of those covered in lecture. Better synchronization of these two aspects of the course would greatly improve the quality of workshop.

3. How have you assessed student-learning resulting from this project? Give specific examples and attach supporting documentation (e.g. products of student work, writing samples, tests).

Assessing the quantitative reasoning gained in workshop proved to be harder than expected. Due to the numerous educational aspects of the course (lecture, homework, laboratory, workshop, etc.) it was difficult to segregate learning benefits that were reaped entirely as a result of workshop. Several assessment techniques were attempted each semester including problems designed to gauge the growth of the students problem solving ability and assessments designed to evaluate the impact of the IF-AT quiz within the workshop atmosphere. Neither of these assessment techniques provided statistically important results. Examples of each are attached.

4. Would you consider your project a success? Please elaborate.

We consider our project successful. Aside from the increased attendance and organization of workshop, students and leaders responded positively to the new workshop. Students have remarked that they found their experiences in workshop so rewarding that they continued to meet with their groups outside allotted workshop periods to study for exams. Several of the problems written over the past semester engaged students to the point where they wanted to stay after workshop such that the leader could work through the solution with them. After one semester of this new

workshop it was apparent (based on the attitudes of the students, attendance data, and comments from leaders) that this new workshop was a significant improvement over the previous. We have presented our results at two education conferences (Lilly East and MADCP), and we are currently writing a manuscript, which we plan to submit to the Journal of Chemical Education.

5. What would you do differently if you could do the project again?

   As mentioned in (2), there was some discord between timelines for lecture and workshop. As a result, many of the results we hoped to see were not likely because students would spend a large portion of workshop trying to learn lecture topics rather than trying to solve the problems. Better communication between the instructor and/or peer mentor with the workshop leaders with sufficient time between leader meetings and workshop would help coordinate workshop material with lecture. The additional questions written over the past year will allow for a larger bank of challenging material that can be used when lecture is falling behind schedule.

6. How will the project continue beyond the grant phase?

   With the new infrastructure for workshop, more quantitative methods of training workshop leaders, and a slew of new questions to be implemented in workshops, workshops now have a strong foundation from which small adjustments/refinements can be made. In the upcoming year, the duties of the graduate student mentor will be divided between two undergraduate mentors. These undergraduate mentors will lead weekly TA meetings, observe workshops on a weekly basis, and continue to write questions for the workshop manuals and quizzes. Most of the improvements foreseen in the future of this project will be centered on developing new problems and further structuring the workshop manuals. Further refinements to selection and observation of leaders may also be made to ensure leaders are consistently fulfilling their duties and fostering an environment for collaborative student learning.

7. Complete the budget page for your project expenses.

Budget *List the budget items that you have expended so far in the spaces provided. PLEASE NOTE grant funds must be expended by June 30, 2008. In other words, all encumbered costs must clear the grant budget account by June 30, 2008.*

ITEM	AMOUNT REQUESTED	DEPT/COLLEGE actual and in-kind funds	EXPLANATION/JUSTIFICATION
TOTAL of Budget Items	20,000.	18.431.80	
Faculty summer S-contract	1,700	1,725.38	*Faculty summer total amount by rank including appropriate fringe benefits (8% no summer retirement) or (37% summer retirement) may not exceed $4,750 Asst; $5,410 Assoc; $6,300 Full Professor.*
Graduate stipend	11,750	10,979.20	Chemistry Graduate Teaching Assistant to do the majority of the problem development and evaluation
Graduate stipend fringe 4%		438.93	
Graduate student non-contract (no fringe), or undergraduate student misc wage (no fringe)	1,700 750	2,085.00	Summer pay for CoPI Pay for 5 member undergraduate advisory committee ($150/student)
Consultant non-UD S-contract			
Consultant non-UD S-contract fringe 8%			
Equipment (itemize/detail)	2,000	1,374.00 39.95 82.40 49.95	Laptop Computer Extra Memory Digital Recorder Flash Drive
Software (itemize/detail)	500	321.00 148.10	Software Software
Supplies & Books (itemize/detail)	700	48.00 117.00 86.49 77.40	Poster for Lily East Conference IF-AT Scratch-off quizzes PLTL Manuals Goggles for Demonstration
Conferences & Travel (itemize/detail)			
Other (itemize/detail)	900	47.50 680.00	Lily East Conference Registration Statistical Data Analysis Program

		131.50	Luncheon for demonstration
Sustainability costs			Costs to be covered to sustain course and maintain equipment and software once grant funds are expended.
Pending support from other source(s)			
Prior grant(s) (2000-2006)			