The Workshop Project Newsletter

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Progressions: Peer-Led Team Learning

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website:
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PLTL Connections Aid Retention at Miami Dade Community College

While doing some research for a marketing piece I was putting together, I came across the following data on the college for which I work:

> According to the National Center for Education, Miami Dade Community College is now the largest college in the country. Last year (2002) we exceeded The University of Texas at Austin by more than 1,100 students. We had been the largest community college in the U.S.; now we are the largest college. Last year 150,000 individual students took credit and noncredit classes at the College. Since the beginning in 1960, the College has enrolled over a million students. Miami Dade College awards more Associate degrees than any other college or university in the country, including the most degrees to minorities; the most degrees to Nursing and Liberal Arts and Science students; and we graduate the 3rd largest number of students with health-related degrees. We host the largest number of international students of any college or university in the country. It should be noted that we are not just in the business of cranking out degrees and diplomas because the research tells us that our students do as well as, or better, than the native students of the universities or colleges to which they transfer.

That all sounds very nice, impressive, ad it is. However, there is another bit of data that is not too often shared. and that is only 20% of the students who originally enroll with the intention of earning an

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Finding Support for Peer Leaders

When asked about barriers either to implementation or to the institutionalization of PLTL, faculty mention a number of areas: the time and effort required to get started; recruiting, training, and supervising leaders; finding or preparing suitable materials; space and time arrangements; and funding. Funding refers primarily to the expense of paying workshop leaders. This article will briefly review ways in which to support workshop leaders for their roles in PLTL, including funding and non-funding rewards.

In a recent Progressions article* Jack Kampmeier made a very convincing case that a cost of $100 per student per semester which includes both leader stipend and staff support has resulted in very large learning gains for students, and in personal and professional benefits for workshop leaders at the University of Rochester. Others have pointed to significant reductions in DF grades or Withdrawal numbers for PLTL courses. Jack points out that $100 seems reasonable in the context of courses for which tuition ranges from $500 to $3000 per course. But you may have noticed TV pictures of California students protesting the increase of tuition to $26 a credit, that is $78 for a three-credit course; Miami Dade Community College charges $52 a credit, $156 for a three-credit course. In these cases an additional $100 per student is substantial, and even institutions with high tuitions are

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PROJECT NOTES: INSTITUTIONALIZING PLTL

One of the themes of the conference at The City College of New York, in October 2003 was institutionalization. We've had many years of experience building Peer-Led Team Learning (PLTL) - developing the model, disseminating it, and interacting with people who are using it. But at some point we really have to deal with how to get it to become a part of the way that we're teaching at our institutions. During this conference, a panel examined this issue. Allan Berkey's talk is the lead article. Other panel members included Nancy Kegelman, Interim Dean—Academic Affairs at Brookdale Community College (NJ), David Malik, Chancellor's Professor of Chemistry at Indianapolis University/Purdue University at Indianapolis, and Maria Tamargo, Dean of Science at CCNY.

Pratibha Varma-Nelson helped frame their talk by addressing the idea of networks, both at the local and national levels. She observed that PLTL is promoting change through communication at all levels. Even the PLTL model's six critical components are all about communication: "Communication with the administrators so you can get support; communication with your students so you know who they are so you can write materials that are appropriate for your student population; certainly communication with the leaders: if you don't do that it all falls apart; communication with the learning assistance center. When you start pedagogy like PLTL, you need to form a local network. And then you go beyond the local network.

"There's now a national network. It started small, with five or six people who implemented PLTL in our institutions. This network was rich and productive because we weren't all from the same institution; there was diversity of disciplines and thinking. That's what made this successful. People tend to listen to their peers and that's what PLTL is all about. But there's the other part, which is that if you go beyond your peers maybe you learn more. Had Jack [Kampmeier] said we would only talk to people from Research One universities this would probably not have happened; but Jack, I think, never gave it a second thought - when he met David he said, 'this is a great idea no matter what.' I hope we continue to cross boundaries.

"In creating a national network, the Workshop Project Associate grants are helping with this task. The network is just people from different institutions coming together to disseminate and promote good practice. By 2002 there was not only chemistry, but also biology, math, and physics. How do you get people first interested in it? How do you get them to understand this at a deeper level, realizing that this is not a one-shot deal?"

Jack Kampmeier also helped frame the discussion by noting that, "What we want to focus on are issues of long-term sustainability and institutionalization. The objective is that we want to make sure that our efforts are irreversible, enduring; that there's a continuing enduring reform as a result of what we're doing.

"Here are some working hypotheses about the process of institutionalization. The evolution of this is a process. It starts with learning about the model. And that involves a commitment by the individual faculty members to actually do this; a commitment to the critical components. A very important part of that is adapting the model to the local circumstances. There's a whole set of activities to integrate implementation with the institution. Some of this is finding people on campus who share the agenda of the implementer. There's a wonderful example where the institution had a commitment to learning communities. So a faculty member was able to make the argument that a workshop is a learning community. That's what this is about—finding other people in the institution who have the same agenda; they could be faculty; they could be support services; they could be top administrative officials.

"Then there are issues around building an institutional structure. These are things like getting the workshop on the registrar's schedule or getting integrated with room schedules, for example. The important thing is to collect some local data about the impact of PLTL; there's a lot of national data, but everybody wants to know, 'Does that work on my campus?' Building the institutional structure can have lots of other dimensions. We have a network

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Peer-Led Guided Inquiry: Combining Systemic Change Models

How did I come to develop, implement, and conduct research on a hybrid form of Peer-Led Team Learning (PLTL) and Process Oriented Guided Inquiry Learning (POGIL)? The story starts in 1998, when, after receiving my doctorate in chemistry, I obtained a postdoctoral position with the NSF-funded Systemic Change Initiative known as ChemConnections. Faculty from more than 25 different colleges and universities comprised ChemConnections, and they had developed modules (http://www.wwnorton.com/college/titles/chemistry/chemx/) to provide inquiry-based contextual frameworks for helping students understand core chemistry content. The post-doctoral position included teaching at Beloit College (Wisconsin) for two years, where I enjoyed relatively small class sizes (5–35 students), and an open, supportive environment. I was encouraged not only to use the ChemConnections modules and their embedded active learning strategies in my teaching, but also to incorporate aspects of other curricular reform efforts that I thought would similarly enhance student learning. This post-doctoral experience was pivotal in opening my eyes to the wealth of available reform-oriented approaches, including PLTL and one of the underpinnings of POGIL (http://www.pogil.org), Guided Inquiry. I later joined the Multi-Initiative Dissemination (MID) Project (http://www.cchem.berkeley.edu/~midp) as part of the evaluation team, which further increased my familiarity with the fundamental conceptions of learning and teaching in various curricular reform projects.

My current position is Assistant Professor of Chemistry at the University of South Florida (USF) in Tampa. When I was hired, the chair of the department made it clear that I was expected to carry out some form of curricular reform in general chemistry. The University has a population of approximately 45,000 students, and the general chemistry course has a normal class size of approximately 200 students per lecture section, meeting three times per week in the 200-seat lecture hall. This course size and structure presented a problem: I knew that Guided Inquiry could be implemented in small classes, but I had a large class. I knew that PLTL could be implemented in recitation sections with large classes, but I had no recitation sections. Further, most of my students were commuters, making informal arrangements outside the official university schedule unworkable. After considering these difficulties, I decided that a hybrid of PLTL and Guided Inquiry in which I replaced one lecture each week with a Peer-Led Guided Inquiry activity had the potential to deliver the desired curriculum reform.

I met with the chair and spoke of my experiences with PLTL and Guided Inquiry. I also presented evidence from published research concerning classroom lectures, quoting from Birk and Foster in *J. Chem. Educ.* [1993, Vol. 70**,** pp. 180-182] : "In any event, this study provides little evidence to suggest substantial learning occurs as a result of attendance at lectures." I believe the researchers were being very careful, respecting the limitations of their study, but suggesting that we need to rethink our assumption that lectures are effective. Chemical education researchers and curriculum reformers share a commitment to gathering data with which to evaluate assumptions, and the chair was willing to provide financial support for the pilot implementation of a new approach, departing from the all-lecture model, so that data could be collected on its comparative effectiveness. The chair provided stipends for undergraduate leaders (the PLTL model) to learn how to utilize Guided Inquiry (the POGIL model) in classes of 10-14 students each. With the chair's support, the coordinator of our general chemistry program offered to allow the replacement of one of his thrice-weekly lectures with these Peer-Led Guided Inquiry (PLGI) sessions.

Why the hybrid? The difference between PLTL and Guided Inquiry is more than simply a difference in class sizes. Examining commercially available curricular materials for each approach in light of a three-phase learning cycle exposes a philosophical difference. In

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a learning cycle, students are not formally introduced to a concept until they have explored data or models (the exploration phase) in ways that help them recognize the need for a larger idea (the concept invention phase), which is then introduced and given its conventional name. Finally, students are asked to solidify their understanding of the concept by applying it (the application phase), often via homework. In general, the materials for Guided Inquiry can be used to replace lecture entirely and are designed to support the exploration and concept invention phases of the cycle, though they also include a few exercises and problems that can be used for the application phase. PLTL materials, on the other hand, are most often designed to work within a lecture course. In a lecture course, the first two phases happen during lecture, usually in reverse order: the presentation of a concept is followed by an exploration of the concept, perhaps by means of sample problems worked by the lecturer to demonstrate the value of the concept. Since lecture is intended to handle all but the application phase, PLTL curricular materials, known for their challenging problems, can focus on the application phase, providing support that helps students extend concepts already explored in lecture. Knowing that I was going to replace one lecture with the Peer-Led reform influenced my decision to choose the Guided Inquiry materials, since they are designed for the introduction of new material.

In a classic paper Abraham and Renner [J. Res. Sci. Teach., 1986, Vol. 23 pp. 121-143] specifically explored the question of the appropriate sequence for the phases of the learning cycle, comparing the efficacy of each possible permutation. In situations where the students in the study were learning new material, the authors concluded that the concept invention phase should not be the initial phase. Having a PLGI session, which begins with exploration and then concept invention of a key concept, prior to lectures involving the key concept, enables the lecturer to maintain the necessary content coverage by spending less time on concepts introduced in PLGI sessions.

Implementing this hybrid method meant that peer leaders or facilitators were needed. The general chemistry coordinator helped me recruit a group of undergraduate students who had previously received an “A” or “B” in the course. I arranged weekly training sessions throughout the semester that lasted two hours. In the first hour, I acted as the peer leader while the actual peer leaders played the role of the students, working through a Guided Inquiry activity in cooperative learning groups. The second hour was spent discussing how the activities were structured, the main concepts developed by the activities, what the peer leaders had experienced during the first hour, and how to apply all of this to their peer leading. This weekly activity proved quite productive and I was confident that the peer leaders understood both the chemistry and the pedagogy because they demonstrated both to me during the training sessions.

As the PLGI pilot semester began, increasing demand for general chemistry resulted in the opening of another lecture section. The general chemistry coordinator volunteered to teach this new section. This circumstance, though unplanned, provided an ideal control group for the experiment comparing PLGI with lecture. The control group had the regular three lectures per week. The experimental group had two lectures and one PLGI session. This section was capped at 100 students during the pilot semester due to space concerns. (The section incorporating PLGI has since been opened to the full capacity of 200 students.) The instructor for both sections had more than 25 years of teaching experience. To ensure that the students in both sections were equivalent, their SAT scores were compared. In addition, both sections took the same exams at the same time, and all exams were created with equal input from all instructors, including the general chemistry coordinator but not myself (I was not an instructor, though I coordinated the PLGI sessions). Students from the PLGI section performed better on the first exam and did progressively better than the control group in subsequent exams including the final, an American Chemical Society Examinations Institute exam (ACS SP97A) containing both conceptual and algorithmic problems. The drop rate for both sections remained similar.

These comparative exam results from this first semester of using PLGI could be interpreted as a complete success. However, it is important to consider alternative possibilities. Even though both groups were equivalent with respect to SAT scores, they might have been different in other ways. To account for this uncertainty, a regression analysis was performed examining the effect of student SAT scores, lecture section (PLGI or control), and attendance at PLGI sessions on exam scores. The analysis indicated a positive relation between the students’ SAT scores and their performance on all exams. After the first exam, attendance at PLGI sessions also had a significant and positive relationship with exam scores. Before the first exam, students had had only three PLGI sessions and were still getting used to working in this fashion. By the second exam, students who attended the PLGI sessions regularly tended to benefit more than students with the same SAT score who did not attend. This benefit was still observed for the final exam. Lecture section did not affect student exam scores for any exam. These findings demonstrate that PLGI, a hybrid of PLTL and POGIL, is beneficial to students and feasible in large classes.

A more detailed description of the analysis and findings of this research will appear in the Chemical Education Research Feature of the Journal of Chemical

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RESEARCH IDEAS FROM PORTLAND STATE UNIVERSITY

The first part of this presentation illustrates assessment data we've been collecting at Portland State University (PSU), and the second part shows how we are using Peer-Led Team Learning (PLTL) to probe students' visualization skills.

Assessment of Student Success in Organic Chemistry - The Effect of PLTL Workshops

In terms of assessment, we look at three common characteristics: (1) success, (2) persistence, and (3) performance. For us, success is defined as a grade of "C-" or better, and the percentage success is measured as a fraction of the total class that starts. Persistence means completing all three terms successfully, where success is defined as before. This is a full-year course in Organic Chemistry, yet very few students take all three courses in the same year (fall-winter-spring). Performance refers to student grades for all those who complete the course and get a grade (including withdrawals and other administrative grades). We also have student scores on a standardized exam from the American Chemical Society (ACS), with student scores reported as percentile rankings relative to the nationwide group who took the same exam.

We have been doing PLTL at PSU for four years now. We accommodate approximately 30% to 40% of the students in workshops for both General and Organic Chemistry. Workshops are optional. We feel it is important to take students who really want to do it. This affects our decision to make workshops optional, but the decision is partly influenced by resources as well. Over 1600 students have been served in workshops over the four years, including both General and Organic Chemistry. A summary of the data is presented in Table I.

Normalizing this group of students tends to be a problem. What defines the students who choose to do workshops -- are they the better students? Are they more motivated? We have examined their overall GPA to get an indication of the type of student they are, not just in chemistry. Students' overall GPA is typically higher that the GPA they obtain in Organic Chemistry. For example, the average student who did not select workshops had an overall GPA of 3.15, but a 2.50 in Organic Chemistry, a difference of 0.65. Students who selected workshops are indeed "better" students, but don't suffer as drastic a drop as do the overall group (overall GPA 3.29, course GPA 2.90, difference 0.39).

We have also been interested in the attitudes of the students towards workshops. We used a standard workshop survey (see the PLTL website for the survey form) to assess how they feel about the workshop. A majority (n=232) of the students pointed out these positive aspects of the workshops:

- interaction with the workshop leader;
- interaction with other students in the group;
- they like it enough to recommend it to other students;
- they are improving their grades as a result of workshop.

Overall, we see that the success rate, persistence and performance are all improved as a result of the PLTL workshops.

Table I. Success, Persistence, and Performance with PLTL Workshops at Portland State University (Four years)

	Success	***Persistence***	***Performance***
	C- or higher		course %
	(D or lower)	all 3 terms	ACS %-ile
Workshop	**83 %**		**71 %**
	(17 %)	**53 %**	**85 %-ile**
Non-workshop	**68 %**		**64 %**
	(32 %)	**28 %**	**80 %-ile**

Assessment of Student Visualization Skills - PLTL Workshops as a Testbed for New Approaches

The second part of this presentation is about how PLTL has been used to assess students' skills in visual thinking. As a result of visiting a Gordon Research Conference about two and a half years ago, I collaborated with Neil Stillings, a well known and respected cognitive psychologist, from Hampshire College. The Gordon Conference offered $5,000 minigrants to collaborators who previously did not know each other and were from different disciplines. The conference topic was 'Visualization in Science and Education.' Dr. Stillings had an interest in understanding how students approach three-dimensional information. Three-dimensional information is crucial for organic chemistry and is often the limiting factor for students' understanding.

Dr. Stillings and I turned our attention to stereochemistry because it involves the ability to manipulate three-dimensional objects mentally. There are known gender differences in terms of the ability to mentally manipulate images. Dr. Stillings was well aware of this and I reported to

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him that this was a source of difficulty for all kinds of students.

PLTL workshops provided us with the opportunity to try something different -- something outside of lecture mode. Workshop students were a "ready-made" group to experiment with. The basic stereochemistry issues in these courses include determining whether molecules have planes of symmetry and visualizing a three-dimensional model on paper. These kinds of visualization issues are well known to cognitive psychologists. In fact, the Shepherd-Metzler test is used in the SATs where students are given three-dimensional blocks with different orientations to identify those which are similar.

We compared students in organic chemistry (since they already have a background in stereochemistry) to see how the students visualized three-dimensional images. In the first year, we used the Shepherd-Metzler test for the organic chemistry students and administered it three times in the year -- at the beginning of the year, in the middle (after learning stereochemistry), and at the end. The test is susceptible to practice and students generally do better each time with the biggest increase noticed between the first and second times. Students on average did perform better, and we are still sorting out whether the magnitude of the improvement is consistent with a practice effect with the exam or because of their experiences with stereochemistry.

The differences with respect to gender were also examined. It is known that males generally are better with three-dimensional visualization than females. This was confirmed in the results. The difference in scores between workshop and non-workshop students were quite similar with the non-workshop females improving a bit more.

We repeated the experiment the following year using a more sophisticated test. The MMRT (Molecular Mental Rotation Test) was used to assess the students' ability to visualize three-dimensional organic molecules rather than blocks. This test provided similar results -- again we saw that students do better after learning stereochemistry and that males performed better than females. Understanding the reasons for these differences and how to address them is a very important question. It has always been a source of concern in cognitive psychology circles. We would also like to pursue this question and then decide what means of intervention exist. The PLTL workshop is perfect for this.

Dr. Stillings observed workshop groups working on three-dimensional models and noted the following:

- students normally start out deeply confused;
- physical models are important -- some students prefer visual means of learning while others favor kinesthetic (hands-on) methods;
- the MMRT is very difficult, but there are different strategies for doing this test. There are at least three different approaches:
  - o by visualizing one molecule turning until it matches another;
  - o a piecewise rotation -- by breaking up a complex molecule into simpler pieces and mentally moving them around to see if the two molecules are the same;
  - o to apply an algorithm (rather than visualization) to determine whether a molecule is an "R" or "S" configuration.

The results from the MMRT have led to several follow-up questions, particularly with regards to learning styles and how the students approach three-dimensional visualization problems. Obviously there is the need for further research and we intend to implement new instructional interventions based on students' characteristics. This year we will look at demographic information such as age, race, gender, and ethnicity to see if there are any correlations among these variables in order for us to better address the problem of three-dimensional mental modeling.

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PROJECT NOTES

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going at Rochester now. We meet every Tuesday morning to decide what to do next. Putting in place a leader training course as a credit course is part of building the structure; the more structure you build the more permanent the initiative is. Collecting local data is a mechanism for putting you in contact with the larger group, the research activities headed by Leo Gafney and Vic Strozak. National connections can be disciplinary connections, or connections with this project. All of those start to build a web of interactions that lead to stability. The national connections are exceedingly important; nobody wants to work alone.

"The most fundamental thing about the PLTL project is that it mobilizes a powerful force to the institution, namely, the ability of the students, the generosity of the students, the willingness of the students to interact in productive ways to support one another. That's an incredible force!"

And worth our efforts to sustain it.

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An Experiment in Improving Scores on ACS Course-Specific Examinations at Southern Utah University

The Division of Chemistry at Southern Utah University (SUU) has had two concerns relative to its general chemistry courses. First, performance by students in the general chemistry series (and in fact other lower division classes at SUU) appears to demonstrate relatively large ranges of enrollee preparation and/or ability. As a result, these courses sometimes appear to exhibit bi-modal grade distribution curves on examinations. Second, faculty are finding variations on how (what might be labeled) "critical thinking students" and "algorithmic problem-solving students" are performing on the more "concept-oriented" American Chemical Society final exams that are required for each class at SUU, versus their performance on the more "problem-solving orientation" of faculty-written midterms.

In an attempt to address these concerns, a Divisional faculty member applied for and received a sub-grant from a National Science Foundation (NSF) grant in Peer-Led Team Learning (PLTL) (Woodward, Weiner, Gosser, 1993; Gosser, et al., 2001, p. iii). It was hoped that a more interactive, collaborative PLTL (Cracolice & Trautman, 2001) setting with an appropriate mix of students could enhance the learning of all groups of students if integrated with the lecture and laboratory portions of the class. During the academic year of 2002-2003, the faculty member altered the operation in one section of general chemistry from four to three weekly lectures, and substituted a weekly, two-hour PLTL workshop for all students. The faculty member and a learning specialist also met weekly (one-hour course) with the student peer leaders to discuss chemistry content and learning concepts. The other two sections of general chemistry were to be operated in a similar fashion to past experience, to provide a control group for the course-specific ACS exams. (Later in this paper, it will be observed that the concept of control groups operating similarly to past experience was not followed. The 'control groups' also experimented with recitation sessions and computer-aided instruction.) While PLTL learning theory states it much more eloquently (Cracolice & Trautman, 2001), the major concept in this approach is to create student study groups in which each student would be required to participate verbally and on-the-board in problem-solving activities.

Experimental Procedure

During the 2002-2003 academic year, a single section of general chemistry of fewer than 50 students was used as an experimental PLTL group that used recitation workshops of about 6 to 8 students. In an attempt to maintain the same set of students for Fall and Spring semesters, a strong request was made by the concerned faculty member that the students enrolled Fall semester also register in his trial section in Spring semester. Over 80% of the students were able to comply with this request. The materials developed for the national PLTL Workshop Project were used during the 2002-2003 experiment (Gosser, et al., 2001; Roth, Goldstein, Marcus, 2001; Gosser, Strozak, Cracolice, 2001).

This project focused principally on addressing the two previously mentioned concerns. First, are the observed grade distributions actually bi-modal, or do apparent distributions result from a wide range of student scores from a fairly small student population? In addition, will the PLTL workshops have the same effect at SUU, as they have nationally, of increasing the mean scores and general grade distributions for the faculty-generated examinations in general and organic chemistry for the section as a whole (Gafney, 2001; Gosser & Roth, 1998; Cracolice & Deming, 2001; Tien, Roth, Kampmeier, 2002; Lyle & Robinson, 2003)? Second, is there any evidence that the mean scores have been increased on the more "concept-oriented" ACS final exams by the more conceptual approach of the PLTL workshop? While abundant national data exist to demonstrate improvement of student scores and grades on faculty-generated tests by the PLTL workshop approach (Gafney, 2001; Gosser & Roth, 1998; Cracolice & Deming, 2001; Tien, Roth, Kampmeier, 2002), there appears to be an absence of data related to performance on the ACS "term-end" course-specific examinations that are available. To test the first concern, the modality and the mean scores on the mid-term examinations during 2002-2003 obtained by workshop participants were compared with similar data obtained by non-workshop (control) participants during 2001-2002 using only the same faculty member's sections. The faculty member tried to minimize test variations by constructing mid-term examinations from text bank examination questions. To test the second concern, the modality and mean score results of the ACS final examinations were compared between the 2001-2002 and 2002-2003 academic years for all general chemistry course sections, regardless of which faculty member taught. This comparison is possible since the ACS final examinations are standardized and nationally normalized. Moreover, the Division of Chemistry employed the same ACS final examinations for Fall semesters 2001 and 2002 (ACS First Term General Chemistry Exam Form 2000), and for Spring semesters 2002 and 2003

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(total year ACS General Chemistry Exam Form 2001).

Three other pieces of typical PLTL data were also examined to determine student attitudes. The PLTL Workshop materials contain three survey instruments to examine attitudes of the students and the student leaders. Two of the surveys, Self-Rating Checklist and Leader Survey (Gafney, 2001), were designed to assess student leader attitudes and experience in performing their roles as student leaders in the PLTL Workshops. The third survey, Student Survey (Gafney, 2001), was designed to assess attitudes of the students who are completing the experimental general chemistry class with the required PLTL Workshop. These data are of course more qualitative and anecdotal in character.

TABLE 1
MEAN PERCENTAGE SCORES ON CHEM 1210 & 1230
MID-TERM TESTS IN THE YEARS 2001-2002 AND 2002-2003

Class (Test)	2001-2002	2002-2003	Mean Change
1210 (#1)	81.7%	83.3%	+1.6%
1210 (#2)	75.1%	83.0%	+7.9%
1210 (#3)	71.7%	79.2%	+7.5%
1210 (#4)	80.8%	77.0%	-3.8%
1230 (#1)	78.8%	86.8%	+8.0%
1230 (#2)	79.1%	85.3%	+6.2%
1230 (#3)	79.6%	82.5%	+2.9%
1230 (#4)	82.8%	89.8%	+7.0%

Results

Table 1 presents the results of comparing the mean percentage scores on CHEM 1210 & 1230 mid-term tests in the years 2001-2002 and 2002-2003. In all cases, the comparisons in Table 1 were only between the class sections in general chemistry taught by the same faculty member during 2002-2003 with the workshops participants, and during 2001-2002 with non-workshop (control) students. While there was an increase in the mean percentage scores between the corresponding tests in seven of the eight midterm exams between the academic years of 2001-2002 and 2002-2003, statistical analyses indicate that only five of the increases in the mean percentage scores for the mid-term examinations were statistically relevant. The "t-tests" were conducted at the 95th percent confidence level, assuming that the means were not different between the corresponding mid-term examinations, respectively, from the 2001-2002 to 2002-2003 academic years. Thus, any "p" value that is less than 0.05 rejects this hypothesis, indicating that the means on corresponding tests are statistically different. These "t-tests" analyses concluded that only the mean percentage scores for Tests 2 and 3 for Fall 2001 were statistically different from the corresponding mean percentage scores for Tests 2 and 3, respectively, for Fall 2002, and only the mean percentage scores for Tests 1, 2 and 4, respectively, for Spring 2002 were statistically different from the corresponding mean percentage scores for Tests 1, 2 and 4, respectively, for Spring 2003. The mean percentage scores for Tests 1 and 4, respectively, from Fall 2001 to Fall 2002, and for Test 3 from Spring 2002 to Spring 2003, however, had "p" values greater than 0.05, indicating that the means on these tests were not statistically different between the academic years of 2001-2002 and 2002-2003.

Table 2 presents the results of comparing the mean raw scores on ACS Finals in the years 2001-2002 and 2002-2003 among all sections of CHEM 1210 in the two Fall semesters, and all sections of CHEM 1230 in the two Spring semesters. The data were separated into three categories of: (1) the workshop PLTL sections taught by the concerned faculty member, (2) the non-PLTL control sections taught by other faculty members, and (3) the averages for all groups (three general chemistry sections). Comparisons between the mean raw scores on the ACS First Term General Chemistry Exam Form 2000 between the Fall semesters of 2001 and 2002 indicate small decreases of –0.4 to -.7 in the corresponding mean raw scores for all sections analyzed. In contrast, comparisons between the mean raw scores on the total year ACS General Chemistry Exam Form 2001 between the Spring Semesters of 2002 and 2003 indicate increases of +2.8 to +6.1 in the corresponding mean raw scores for all sections analyzed.

Statistical analyses were also conducted to determine if the differences in the reported corresponding mean raw scores for the ACS finals were statistically relevant. Again, "t-tests" were performed at the 95th percent confidence level with the assumption that there were no differences in the means of the corresponding tests from the 2001-2002 to 2002-2003 academic years. The analyses concluded that since none of the "p" values for the Fall ACS exams comparisons were less than 0.05, none of the corresponding mean raw scores were statistically different for any of the groups examined between Fall 2001 and Fall 2002 for the ACS First Term General Chemistry Exam Form 2000. In contrast, between the years of Spring 2002 and Spring 2003, the "t-tests" analyses concluded that the corresponding mean raw scores of, respectively, the control non-PLTL sections and all groups were statistically different, and the corresponding mean raw scores of the workshop PLTL sections, were on the borderline of being statistically different for the Spring total year ACS General Chemistry Exam Form 2001.

In an attempt to determine if student-score distributions for the mid-term and ACS course-specific exams were bi-modal, numerical histograms of the student percentage grades versus student frequency of occurrence were completed. Normal bell curves were also statistically fit to the histograms. While select histograms appeared to have some bi-modal character, the majority was visually well represented by normal bell curves.

Statistical analyses were also conducted to determine how well the normal bell curves fit the actual histograms. Such analyses are necessary to ensure that the values of the means and medians generated in these studies are appropriate representations for the histograms and the assumed bell curves. Deviations in the statistical curves generated demonstrate that the actual histograms do not vary greatly from the normal bell curves assumed for each individual mid-term exam and each ACS course-specific exam. The data reflect that histograms for all exams are generally fit by the normal bell curves, and the mean and median of each exam are therefore reasonably representative. To further test the possibility of the curves not being normal bell curve distributions, a "Kolmogorov-Smirnov test" was performed. Since none of the curves have a "K-S" value sufficiently large (greater than 0.21), they apparently are all normal bell curves.

TABLE 2: MEAN RAW SCORES ON ACS FINALS IN THE YEARS 2001-2002 AND 2002-2003 BY SECTION AND CLASS

CLASS (SECTION)	2001-2002	2002-2003	MEAN CHANGE
CHEM 1210 (Workshop PLTL)	39.9	39.5	-0.4
CHEM 1210 (Non-Workshop Control)	41.3	40.6	-0.7
CHEM 1210 (All groups)	40.6	40.1	-0.5
CHEM 1230 (Workshop PLTL)	33.1	35.9	+2.8
CHEM 1230 (Non-Workshop Control)	31.5	37.6	+6.1
CHEM 1230 (All groups)	32.1	37.0	+4.9

The results of the national surveys of student peer leaders (Self-Rating Checklist and Leader Survey) at SUU were very similar to survey data conducted on PLTL studies at other institutions, in that the student leaders expressed strong support for the workshop recitation process in assisting students in their learning process (Gafney, p. 79). The concept of having the students themselves work in the group process of learning did appear to occur. Peer leaders believe that the PLTL Workshop did create a more interactive, collaborative PLTL setting with an appropriate mix of students that enhanced the learning of all groups of students who participated verbally and on-the-board in problem-solving activities.

Similarly, the results of the national surveys of the students who were taking the courses for credit (Student Survey) at SUU were very similar to survey data conducted on PLTL studies at other institutions, and closely mirrored the opinions expressed by the PLTL student peer leaders (Gafney, p. 80). Students taking the courses for credit believe that the workshop recitation process was very beneficial in assisting them in the learning process.

Discussion and Conclusions: Obviously, the authors would like to have been able to control all variables in this study except for the insertion of the PLTL Workshop in the second year. This would allow us to assume that the results, which were observed in the preceding section, were all attributable to the effect of adding the recitation workshop. Nevertheless, despite numerous efforts to control variables in this project, it is recognized that there remained a number of factors that could have impacts affecting these results. A few examples follow.

While it is impossible to assure that the composition of the learning groups in any given section taught by any given faculty member were similar enough from year to year that we can dismiss variations in preparation or capability of the students, the data presented here does correspond to other national experiences, which demonstrate individual test score and grade increases resulting from recitation workshops.

Although the Division of Chemistry elected to change texts between 2001-2002 and 2002-2003 from "Chemistry" (McMurry and Fay, 1998) to "Chemistry, The Central Science" (Brown, LeMay, and Bursten, 2003), this effect was minimized as much as possible by preparing mid-term exams from text bank questions that tend to be more standardized on a national basis.

Finally, the two control sections of CHEM 1210/1230 in 2002-2003 turned out to be not controlled after all. Without the knowledge of the concerned faculty member, both of the instructors in the control sections also instituted recitation workshops to assist students in their learning process. One faculty member also had students purchase Chemistry Skill Builder 2000 (Spain & Peters, 2001), and employed these in addition to regular homework assignments. Such healthy competition among faculty members appears to have possibly had a very positive effect on the ACS final examinations, and may have resulted in increases in the mean raw scores on the total year ACS General Chemistry Exam Form 2001.

In spite of these variable factors, and perhaps even because of the latter item of broad acceptance of recitation sections by all faculty, the Division of Chemistry at Southern Utah University is encouraged with the results of the experiment of using PLTL Workshops in combination with its regularly scheduled lecture and laboratory program for CHEM 1210/1230. The means and medians of scores on mid-term examinations have been increased, and the learning of all students in the section would appear to have improved based on test data from mid-term examinations. In addition, the means and medians of scores on the ACS final

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exams were maintained during Fall semester, and were improved during Spring semester. Since all instructors were using modifications of recitation sections, there is cause to assume that some of the effect may have been from students taking a more active role in their own learning by participating verbally and on-the-board in problem-solving activities. Data thus far appear to indicate that recitation sections of any nature are helpful, whether or not they follow strict PLTL protocol. The improvement on the Spring semester year-long ACS test is especially encouraging since allegedly one of the benefits of interactive, collaborative workshop/recitation settings is to improve the long-term retention of student learning.

One conclusion resulting from this study is in direct contrast, however, to initial assumptions. While initial observations of the histograms for several exams appeared to reflect bi-modal learning curves, statistical analyses of the data indicate that all histograms examined appear to approach normal bell curve distributions. The visual illusion of the histograms being bi-modal in character most likely results from the relatively broad range of scores for smaller sample sizes in these general chemistry sections.

In the 2003-2004 academic year, CHEM 1210/1230 is utilizing PLTL-like workshops/recitations in an attempt to continue the enhancement of learning in general chemistry. One instructor is also continuing to use Chemistry Skill Builder 2000 (Spain and Peters), in addition to instituting a recitation section every other week. Data will continue to be collected and assessed in this and future years to determine the viability of such trial efforts to improve learning in the general chemistry series. The initiation of recitation sections is not restricted, however, to only general chemistry. The faculty member in organic chemistry is also employing recitation workshops as well with the assistance of undergraduate students who have recently completed these course series.

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Peer-Led Guided Inquiry

(Continued from page 4)

Education. PLGI at USF will continue for at least another year as a result of funding from NSF (DUE-0310954).

Another "cool research idea" for the future is to look at how peer leaders learn to become good guides rather than lecturers as a result of their PLGI experience. My research group is currently exploring this process.

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COMMUNICATING WITH ELECTRONIC JOURNALS

Several years ago we began our PLTL project at Brookdale Community College (NJ). We started with a pilot project in two sections of our General Chemistry I. In listening to all the people I have heard speak about their PLTL experiences at various conferences it appears that our experiences have been pretty typical. When we started we dealt with many of the same problems people described at the conferences. There were periods of great joy and great frustration.

In the first year our leaders wrote detailed journals. Many other PLTL groups also found that having their leaders write journals to be helpful. We developed a general format for the journals. Part of the reports/journals was questions leaders and their students had. Journals also included comments or problems that the leaders encountered in their sessions as well as a list of covered workshop problems. Each week our student leaders would post their journals online.

One of the pressing questions during our first year was whether or not the students should be given answers. Both the leaders and the students became quite frustrated because answers were not being provided. Leaders wanted to give answers and students wanted to have them.

When this question first arose I started an online chat using e-mail. Leaders and faculty member gave input. The discussion was heated, heartfelt and long. Ultimately we decided to trust the PLTL method, i.e., we took a leap of faith. We decided not to provide answers. It wasn't until students began seeing their grades dramatically improve that they were willing to trust that PLTL was transforming them.

Many other questions and problem that arose were dealt with in a similar fashion via the internet and in our weekly meetings with leaders. There were only a few occasions where we assembled the entire PLTL staff – teachers and leaders – in a formal gathering to problem solve and deal with questions. Most of the time the online discussions allowed us to identify and address problems very early and very effectively. Having a group to help think through problems was invaluable and more often than we expected solutions came from our leaders.

Some of the speakers at the 2003 Leadership Conference described developmental stages in their PLTL projects in which they touched on a bit of their history, growing pains experienced or even mentioned doubts that arose about whether or not PLTL would actually work. In addition to classroom discussions I communicated directly with my students through e-mail and so whenever they had concerns or worries we would discuss frequently via e-mail and sometimes in person. This allowed me to involve leaders in problem-solving since they worked with students weekly and could help by giving me useful feedback.

As all of us who have used PLTL in our classes know, the leaders are the heart and soul of this program. For me the feedback that leaders provide inspires me, keeps me current with how students are finding the course while it also gives me answers to questions that I have not been able to answer about individual students. Our regular online discussions proved invaluable in this process. The immediacy of using the computer allows me to get and give feedback right away. Working through the questions from student leaders about what to do was handled very quickly so problems never festered.

The immediacy of using the computer allows me to get and give feedback right away. Working through the questions from student leaders about what to do was handled very quickly so problems never festered.

PLTL has inspired me so much that I have written articles, given presentations and even a number of workshops in an attempt to communicate with others the excitement I feel for the approach.

So far, I have written two lead articles in national journals:

- "Good Students Become Great Leaders," Strategies for Success, Benjamin Cummings, Spring 2003, issue # 39. [It is the lead article at http://www.aw-bc.com/events/strategies/newsletters/index.html, select issue # 39.]
- "Teamwork Works," NEA Higher Education Advocate, October 2003. [It is the lead article (http://www.nea.org/he/advo-new/front.html, choose the October 2003 issue.]

I was very impressed with what other colleges and universities have accomplished using PLTL. I came away from the 2003 Leadership Conference realizing that I still have a lot to learn. I published, spoke and gave workshops mainly because of the enthusiasm that I have for PLTL and how successful it is. I just wanted to get the word out.

What always surprises me is that PLTL is such a simple technique yet it is so powerful. It provides the same statistics as the more complex approaches such as Guided Inquiry (POGIL) and Problem-Based Learning (PBL). All increase retention, improve grade distributions, student understanding, critical thinking, confidence and ability to work in teams. They all lead to increased numbers of students enjoying and taking more chemistry courses.

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often unable or unwilling to provide funding for PLTL leaders. So we need to consider a variety of possibilities. Jack mentions a number of funding alternatives for student leader stipends. This article picks up where he left off, exploring in greater detail options for providing student leader stipends or recruiting and supporting leaders without stipends.

1. Workshop Project Associate grants. These $5000 mini-grants ($10,000 with matching funds from the institution) have made it possible for an individual instructor or small group of instructors to initiate PLTL. The grants are not renewable and so provide only a start. But for many, the WPA support has been the foundation for PLTL. The period of temporary funding has been a time to gain experience and collect data about the program, and then to seek continuing support from other sources.

2. Leaders are not paid. A number of institutions are recruiting leaders and not paying them. At these sites students receive course credit. Mike Shaw at Southern Illinois at Edwardsville (SIUE) and Chris Bauer at the University of New Hampshire use somewhat similar approaches. New leaders are not paid but may take an accompanying course for credit. After acting as a leader once, a student is paid if selected for a second leadership experience. At SIUE, these experienced leaders may participate in a no-credit program that provides a transcript commendation noting leadership experience in chemistry. At UNH, some students opt for payment for workshops, but receive another credit for weekly consultation about their work. Similarly, at Portland State and the University of Miami leaders are not paid, but may receive credit. At Boston University students receive two credits of undergraduate research credit per semester. Mort Hoffman reports that BU is instituting a two-credit course titled, "Chemistry Education Practicum." Students there are very satisfied and like the idea of a rather easy A that will help them maintain a high GPA.

3. Grants. Funding from grants, particularly for curriculum innovation, has been helpful to PLTL leader funding in several ways. Miami-Dade Community College has a Title V grant as a minority-serving institution, "Creating a Culture of Academic Success in Math, Science and Engineering." This pays peer leaders for several courses that have been identified as critical regarding the objective. The University of Houston-Downtown, Prince George's Community College and others have attached PLTL to NSF and other grants. This funding may work in various ways. First, the grant may explicitly include PLTL as a teaching/learning initiative and make funds available. Second, some grants do not allow for student stipends, but paying for faculty time may free up money from instructional budget lines that can be transferred to student leaders.

4. Internal Soft Money. A number of sites report that they receive funding "from the Dean." Another form of internal funding exists at Western Oregon where budget cuts have reduced available resources. Several of the biology professors chip in to a fund that pays leaders on an hourly basis. This is not an approach that they hope to institutionalize.

5. Internal Fees. Alan Berkey, Dean at Miami Dade Community College, reports that even non-lab courses have a lab fee of $10 to $15 and this can be used to pay some of the peer leaders.

6. Work-study. Several sites including the University of Portland (OR) have reported using the work-study program to fund at least some leaders. The program is in place at virtually all colleges and may well be worth investigating, although there are economic qualifications and restrictions on the use of funds.

7. Academic Assistance Centers. These centers offering academic support are active at many institutions, and are growing. At a number of PLTL sites personnel from these centers assist in the training of leaders and even provide funding for leader stipends.

8. System-wide Initiatives. A few years ago the Indiana system put through a tuition increase. The money raised is used to encourage learning initiatives. David Malik from Indiana University/Purdue University Indianapolis (IUPUI) received funding for a grant titled "Student-to-Student Scholars, S^3: Academic and Educational Success via Student Engagement with other Students." PLTL is a key component but the project also includes assistance centers and service learning.

9. Institutional Budget Line. Coastal Carolina, Ohio University, Athens, the University of Rochester, and some others seem to have permanent institutional funding. This is probably the ultimate goal.

Providing course credit rather than a stipend for leaders has been adopted by a number of public and private four-year institutions, but it does not appear to be the practice at community colleges at all. There are several reasons for this. First, community college students are concerned about credits that they can transfer to a four-year institution. Second, community colleges may have difficulty waiving tuition. Third, community college students generally need the stipend and would work outside of school without it.

Although funding is frequently mentioned as a problem and possible reason for discontinuing workshops, there are many sources of funding PLTL programs and providing for peer leader stipends. We hope that these suggestions may stimulate thinking and lead to ideas for funding, or other form of support and recognition for leaders.

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* *Compared to What? The Cost-benefit Analysis of PLTL, 4:3, p. 1*

Introducing the PLTL Model to South African Educators at Prince George's Community College

A beautiful representation of the Rainbow Nation! I was so honored to host a group of 55 Black, Colored, Indian, and White South African Educators (SAE); they were teachers, administrators and Department of Education officials working in harmony to improve public education in South Africa. They even brought the sunshine with them that lovely Monday afternoon.

The SAE are participants in the U.S. Leadership Training Activity for South African Further Education and Training (FET), a "three-year project aimed at addressing problems of capacity and quality in the FET sector in South Africa." This PLTL workshop was a part of the second wave of the USAID/SA funded FET initiative conducted by Prince George's Community College, Largo, Maryland, to provide ten weeks of training sessions which focused on:

- teaching skills and strategies,
- advanced curriculum development methods, and
- educational management expertise and materials development knowledge (as applied in U.S. high schools, community colleges and state education departments).

The SAE are currently engaging in job-shadowing, on-the-job training, student-teaching, institutes and workshops.

Following a weekend bus tour of Washington DC, worship at the Greenbelt Community Church, a cultural exchange hosted by the Lambda Gamma Gamma (ΛΓΓ) Chapter of Omega Psi Phi Fraternity, and having received a joint donation of scientific graphing calculators from the fraternity and the Andrews Air Force Base Parrish Council, the SAE were ready to work.

The workshop opened with a PowerPoint outline of the driving force behind and history of the PLTL initiative, followed by a presentation of vision, mission, goals and objectives for the PLTL project in my classroom. The first exposure, a video clip of a college algebra PLTL group led by PGCC student Phillip Sylling, provoked much inquiry from the SAE as Phillip employed real, active and discovery methods to build dog pens (of constant perimeter but varying dimensions and area), from a model fence made of cash-register tape. Phillip's PLTL team performed an activity/experiment, collected data from it, and used that data to calculate results. Their analysis of the data and results led the team to discover a polynomial expression for determining the area of a rectangle as a function of its width. The team evaluated their formula by testing it against their experimental results. Finally, they determined the domains of their variables.

The SAE took special note of Phillip's wait time for responses, and the fact that he never gave an answer. I took the opportunity to demonstrate the use of technology in the classroom by using a Texas Instruments TI ViewScreen 80,81,81,83 projection system and Excel to show how the team could have also graphed their data and/or performed regression analysis to arrive at the same answers.

Then it was time for the SAE to actively participate. Their activity was "Sandwich-making as a model for learning stoichiometry." The concept of cooking by recipe was transferred to carrying out a chemical reaction by balanced equation. The concepts of stoichiometrically matched amounts of reactants, limiting reactants, reactants present in excess, theoretical yield, and percentage yield were discovered in this guided activity.

The workshop was concluded with a PLTL favorable statistical comparison of homework, quiz, laboratory performance task, exam, and attrition data for one general chemistry and twenty Anatomy and Physiology PLTL classes versus non-PLTL classes.

What an overwhelming response! Quickly, the SAE compiled a contact list, which nearly every member signed, requesting supplemental materials (to their PowerPoint handouts and workshop activity packets). Tisilio (cultural name pronounced "Tuh-dee-so") Marshall (Christian name) Madimane, head of the Natural Science department and a Physical Science instructor at the Teto High School in the Free State Province reflected: "In South Africa, all information comes from the teacher.

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"In South Africa, all information comes from the teacher. This type of teaching (PLTL) allows the student to be more responsible…"

Their activity was "Sandwich-making as a model for learning stoichiometry." The concept of cooking by recipe was transferred to carrying out a chemical reaction by balanced equation.

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This type of teaching (PLTL) allows the student to be more responsible…" His sentiments were echoed throughout the group. Teachers, principals and administrators all wanted to know more about PLTL. Tsilio later shared with me notes from his journal concerning a meeting of the chemistry teachers; their consensus was as follows:

> "For the people who were chemistry people, we followed what was happening and were quite impressed. The other thing was, it was a simple method for introducing how to balance equations...The content was not strange—the sandwich model was practical—which means you move from what is known to learners to the unknown and from the simple to the complex…The communication was in both ways…The element of creativity was there—We used something not intended for the laboratory to explain the concept."

At the conclusion of this ten-week educational odyssey, we at PGCC hope the impression of the PLTL model will have been significant enough to warrant the SAE's concluding report to their government include a recommendation for the integration of PLTL into South African teaching methodology.

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PLTL Connections Aid Retention

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AA or an AS degree graduate within five years. The national average is about 20-22% so statistically speaking, we are not atypical. Also, if you look at the national data, most of the freshmen students who do not return for their sophomore year are academically qualified to do so. What's keeping them from coming back? One major factor is a lack of connections. I am talking about connections to their fellow students, to their professors, to a career goal to name but a few possibilities. You see, most of these students we lose at the very beginning of their college careers do not complete programs because of feelings of isolation. Many colleges and universities make a considerable effort toward recruiting new students but let me tell you something: If we can take that 20% retention and make it 25%, we'd have more students than we've ever wanted. Our classrooms would be overflowing. In order to raise the success and retention rates without inflating grades we must effectively address that connectedness issue.

…most of these students we lose at the very beginning of their college careers do not complete programs because of feelings of isolation.

Several years ago when two of our chemistry teachers came back from a PLTL conference and asked for money [to get involved in PLTL], I allocated $3,000 from my division budget to get them started. Almost all of this money was used to hire and train peer leaders. The next year, they asked me for twice the amount and I was willing to do it because they showed me data that the PLTL students in Organic Chemistry and General Chemistry were getting higher grades and the retention rate was significantly higher. These differences in success and retention caused me to take a closer look at the rates across the disciplines.

For social sciences the combined success rate was 89% with a 7% withdrawal rate. The success rate for biology was 62%; chemistry 63%; math 69%. But the withdrawal rate for biology is 16%; chemistry 14%; math 17%, compared to 7% in the social sciences. Are our social science teachers better? Are they getting the better prepared and brighter students? I don't think so.

About four years ago I got assigned the task of putting together a grant proposal that was going to the Department of Education. The target audience in this proposal were students in various mathematics, chemistry, biology and engineering courses that traditionally had lower success and higher withdrawal rates. The primary interventions were smaller classes using a learning community pedagogy, a major technology component including real-time on-line activities and peer tutors. We were awarded the funds ($1.7 million) to begin the project in the Fall 2001 term.

For the last three years we have moved the PLTL model from chemistry to biology, to math: General Biology 1 and General Biology 2, Calculus I, Calculus 2. And this year we moved it to Engineering. The results have been phenomenal. The success rates for chemistry went from 63% to 80%; for biology 62% to 87%; for math 69% to 81%. This project has been so successful that the highest

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levels of management have started to pay close attention to the results we have been getting. In fact, plans are now being discussed that will institutionalize the program at some level so that funding may continue once the grant has expired. Often times programs such as the one I described are not considered for institutionalization because of the expense. Smaller classes are more expensive. Peer leaders can be costly. Training faculty will cost money. However, when one compares the initial costs with the gains of raising retention and increasing the number of graduates, it is indeed a small price to pay.

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Q & A and Comments

Question regarding retention and recruitment:

Answer: "If it is our intent to go out and recruit students, it is immoral and unethical to get them there and not provide them with the resources they need to succeed. And that is a whole different argument than the dollars and cents; not that the dollars and cents are not important." *Alan Berkey*

Comment: "The pitch that I gave to my administrator is the development of leadership skills and critical thinking skills of the leaders. So I have very easily gained support from my administrator." *Susan Barrows, Penn State, Schuylkill*

Question: "My department chair was thinking about making all chemistry majors serve as leaders. Has anybody ever had an experience with that?" *Lucille Garmon, State University of West Georgia*

Answer: "You probably are not going to be successful with that. Have a couple of different ways that students can contribute - choose some for peer leaders. That way you don't leave others out." *Pratibha Varma-Nelson, Northeastern Illinois University*

Answer: "The leaders have to be self-sold on it." *David Malik, Indiana University/Purdue University at Indianapolis*

Question: "Are students resistant to the idea of helping their peers? Because in my institution there's a competitive attitude." *Tracy Morkin, Emory University*

Answer: "The students in my class had that competitive attitude, but it disappears as they move along in the class…It's important for them to see their progress with regard to PLTL. If they don't see that they are progressing as a result of the PLTL model, your program is dead." *Jack Kampmeier, University of Rochester*

Answer: "I would say that what pre-med students are competitive about [is] becoming a peer leader. Because it helps them in applying to medical school in terms of experience and recommendations from the teachers who get to know them and can write better recommendations for them than any teacher that they have taken classes with through Organic Chemistry." *David Malik*

Comment: "Another thing is that my students need to know that it helps everybody, the strong and weak students; the strong students learn probably even more." *Maria Tamargo, Dean of Science, The City College of New York*

Comment: "I've heard from the interviewer in the Medical School that they wanted to know, 'What is this thing that we're doing that was causing so much enthusiasm among our students?' So it helps in the interview process." *Pratibha Varma-Nelson*

Comment: "From the perspective of the community college, [the students] first want to know what this will do for them. But it's key to have good training for the team leaders. The students don't know the answer to the problem and so they make the students work through a problem and develop that critical-thinking skill." *Nancy Kegelman, Interim Dean-Academic Affairs, Brookdale Community College*

Comment: "To change the culture on your campus, turn the students loose. The students' ability to convince other people about this model exceeds ours by orders of magnitude. They have the credibility that we don't have, even with our colleagues." *Jack Kampmeier*

Comment: "Also, the way you can convince people is that PLTL students are candidates for undergraduate research. Faculty like that." *David Malik*

This issue of *Progressions* contains articles based on presentations from the 2003 PLTL National Leadership Conference, held at The City College of New York, October 9-12. These include:

- PLTL Connections Aid Retention at Miami Dade Community College, by Alan Berkey (page 1) - presentation as part of the panel of administrators, on Friday, October 10;
- Peer-Led Guided Inquiry: Combining Systemic Change Models, by Jennifer Lewis (page 3) - presentation on Saturday, October 11;
- Research Ideas from Portland State University, by Carl Wamser (page 5) - presentation on Saturday, October 11;
- Communicating with Electronic Journals, by Tom Berke (page 11) - presentation on Friday, October 10.

The transcription of conference tapes was completed by Chinedu Chukuigwe and Okason Morrison, PLTL Project Assistants, CCNY. Thank you for your efforts! *AE Dreyfuss*

Progressions: Peer-Led Team Learning is a quarterly publication of the PLTL Workshop National Dissemination Project. *Progressions* is intended to build the Workshop community through discussion of the implementation of the PLTL Workshop Model at institutions of learning.

The editors welcome contributions. Please submit announcements of upcoming events, articles, or pertinent concerns you would like addressed.

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The Six Critical Components of the Peer-Led Team Learning Workshop Model

- The Workshop is integral to the course.
- Course professors are involved in the selection of materials, training and supervision of peer leaders, and they review the progress of Workshops.
- Peer leaders are selected, trained and supervised to be skilled in group work as facilitators.
- Workshop materials are appropriately challenging, directly related to tests, designed for small group work.
- The Workshops are held once a week for two hours, contain six to eight students per group, in space suitable for small-group activities.
- PLTL is supported by the department and the institution with funds, course status and other support so that the method has the opportunity to be adopted across courses and disciplines.