THE PEER-LED TEAM LEARNING INTERNATIONAL SOCIETY
PROCEEDINGS OF THE INAUGURAL CONFERENCE
MAY 17-19, 2012
NEW YORK CITY COLLEGE OF TECHNOLOGY OF
THE CITY UNIVERSITY OF NEW YORK
BROOKLYN, NY 11201-2983

Why Attendance is Mandatory in Workshops: Comparison of Course Grades of Workshop Attendees vs. Non-attendees with Similar GPA and SAT Scores

Lucille Garmon

Abstract

Records of test scores and course grades going back over ten years are available for approximately 5400 students in first-semester general chemistry and 3300 students in second-semester general chemistry at the University of West Georgia. In this project those attending workshops regularly throughout a semester were matched in GPA (prior to taking general chemistry) and SAT scores with those not attending regularly. Most students were enrolled in sections in which workshop attendance was an integral part of the course. Those not attending fell into three categories: those in sections that included workshop but who chose not to attend and thus not to meet that requirement; those who were enrolled in an honors section, which did not include workshops; and those taking the course online, as the sections offered online have up to now not included workshops. In all cases, those with similar GPA/SAT scores who attended workshop outperformed those who did not.

PLTL at UWG

The PLTL model was first used at the University of West Georgia in Fall of 1998, for one section of one course, and currently involves all sections, except honors and online, of both first and second semesters of general chemistry and both first and second semesters of allied-health chemistry. The thermodynamics semester of physical chemistry also includes a workshop on the PLTL model. In Spring, 2012, there were a total of 632 students in 41 groups and the program employed 37 leaders.

Scope of Study

Although many studies have compared student success with and without workshops in chemistry, to the author's knowledge none so far have attempted to match students of similar abilities and to compare the success in general chemistry of students regularly attending workshop with those who do not attend workshop, either through their own choice or because workshops are not offered for their section of general chemistry. Although workshops are an integral part of the four courses listed above, and routinely appear on students' schedules, there are actually three groups of non-attendees. One group consists of students in the separately-scheduled honors section, a small class for which workshops are not part of the syllabus. A second group is made up of those taking first or second-semester general chemistry online. Up to now, there have not been workshop sessions for online students. The final group consists of students enrolled in sections that include workshops but who, for various of reasons, do not attend regularly, thereby losing the portion of their grade derived from workshop attendance and participation.

Data Available

Workshop Records

Throughout the history of PLTL at UWG, each leader has, after each workshop meeting, completed and turned in a report listing which students were present and what they scored out of a maximum of 10 points based on attendance, preparation, participation and attitude, and effort on a summary quiz at the end of the workshop. A portion of one semester's composite record for one course is shown in Table 1. Other information included in the records kept, but not shown here, were student ID number, course number and section, instructor, workshop leader, workshop meeting days, times, and location, midterm and final averages, and number of workshops attended for each of the four tests given during the semester.

Table 1.

Portion of Typical Spreadsheet Showing Records of Students in a Chemistry Course over One Semester

Student Name	WS 1	WS 2	WS 3	WS 4	WS 5	WS 6	WS 7	WS 8	WS 9	WS 10	WS 11	WS 12	WS 13	WS 14	Jeopardy	Total attend
Axxxxx	9	8	7	9	8	9	9	9	8	9	8	8	a	9	10	14
Bxxxxx	a	8	7	10	9	10	10	10	10	8	10	a	9	9	10	13
Cxxxxx	a	a	5	9	8	9	8	0	W	—	—	—	—	—	——	5
Dxxxxx	9	9	7	9	8	9	8	9	8	9	8	9	8	9	10	15
Exxxxx	9	8	8	9	9	9	9	9	9	9	9	8	a	9	11	15
Fxxxxx	9	10	8	9	10	9	9	9	10	8	9	9	a	9	11	14
Gxxxxx	9	8	a	9	8	9	8	9	9	9	8	8	a	9	11	13

Note: The last workshop of each semester is a "Jeopardy"-type game in which everyone who attends and participates receives at least a 10 and those on the winning team earn a score of 11.

Records from Registrar's Office

During early registration prior to the start of classes each semester, enrollment information is available from the Registrar's office. This information includes a listing, by course and section, of all students registered for general chemistry. In addition to students' names and ID numbers, it includes high school grade-point average, or HS_GPA, college grade-point average, or GPA, (except for entering freshmen), SAT scores, and ACT scores, if available. A portion of typical data is shown in Table 2.

[Note: the last column, FI or CI, is a calculated value based on grade-point average and SAT or ACT score. This will be discussed further below.]

Table 2.

Information Available about Enrolled Students Prior to Their Taking General Chemistry

Student name	GPA	HS_GPA	SATm	SATv	ACTc	ACTe	ACTm	ACTr	ACTs	FI or CI
Axxxxx	2.66	3.6	580	570						2480
Bxxxxx		2.74	390	420	24	30	20	24	21	2466
Cxxxxx		3.93	500	430	18	19	18	15	18	2895

Dxxxxx	1.87	3.35	550	500	22	23	24	22	20	1983
Exxxxx		3.66								unknown
Fxxxxx		3.81	610	680	27	32	24	27	25	3195
Gxxxxx	2.26	3.53	550	560						2239

Academic Records

After completion of a course in general chemistry the grade earned is obtained from instructor records.

Methodology of Study

The "Freshman Index" and "College Index"

In order to focus on the effect of workshops on student success, students were matched for native ability and background preparation as well as for motivation and study skills. A combination of SAT (or ACT) scores and GPA's was used to evaluate these factors. This is shown in the last column of Table 2, where "FI" stands for "Freshman Index" and "CI" stands for "College Index."

The Freshman Index is a formula used by the Admissions Office at UWG.

$$FI = (500 \times HS\_GPA) + SATm + SATv.$$

or

$$FI = (500 \times HS\_GPA) + (42 \times \text{composite ACT}) + 88.$$

The Freshman Index was used in this study as a measure of ability/preparation/study skills for students who are in their first semester as college freshmen. After the first college semester, this study replaced HS_GPA with college GPA, thus giving the College Index, or CI. Only students with complete information for calculating FI or CI (hereinafter referred to as the "index") were included in this study. Students with a higher value of the index were assumed to be the more able students.

The course grades of students who had regularly attended workshop were com-pared with grades of students with similar index who had not attended workshop regu-larly. In all cases the overriding criterion for comparison of attending vs. non-attending groups was matching the "ability" of the students, based on average index value.

Division of Data into Four Quadrants

A numerical value was assigned to each letter grade of students completing a given course during a given semester: 4 for A, 3 for B, 2 for C, 1 for D, and 0 for F. W's were eliminated from further consideration, as were those for whom the FI/CI index was unknown.

The remaining entries were divided into four categories, each one quadrant in a matrix of ability and attendance.

Higher ability/high attendance: In this group were the students in the upper half of index scores who had attended workshop regularly.

Higher ability/low attendance: This group had an average index score very close to the average in the first group but did not attend workshop regularly. Included in this group were the students in honors sections as well as the more able among online students and others who attended less regularly.

Lower ability/high attendance: Students in the lower half of index scores who had regularly attended workshop throughout the semester made up this group.

Lower ability/low attendance: This group comprised the lower index scores of online students as well as the less able students who attended some, but not all workshops.

In this methodology, sorting was done first by attendance, highest to lowest, with the top half labeled "high" in attendance and the others "low." Usually the top half had missed no more than one workshop meeting during the semester. The "high" and "low" attendance groups were separately sorted by index score, again highest to lowest. The high-attendance group was then divided in half by index. The upper half became the "high/high" (ability/attendance) and the lower half became the "low/high" (ability/ attendance).

For both the upper and lower ability groups of the high-attendance students, numerical averages were found for index, workshops attended, and grade in course. Similar averages were found for upper and lower ability groups among the low-attendance students. However, instead of dividing the low attendees in half by ability, the number of students considered in the "high/low" (ability/attendance) group went down the index list far enough so that the average index matched the average index of the high-high-group.

Finally, the "low/low" group averages were found by continuing down the index score, until the average index matched that of the low/high (ability/attendance) group.

To aid in illustrating this process, a portion of the spreadsheet for first-semester general chemistry in the Fall of 2010 is shown in Table 3.

Table 3. Organization of Data into "Quadrants"

Subj	No.	Grade	FI or CI	Attend	Grade	Index/Attend	Averages for Quadrant	
CHEM	1211K	A	3390	15	4	high/high		
|	|	|	|	|	|	|		
CHEM	1211K	B	2699	14	3	high/high	**high/high**	**Avg attend**
CHEM	1211K	C	2696	15	2	high/high	**N = 83**	**14.8**
CHEM	1211K	B	2692	15	3	high/high	**Avg Grade**	**FI/CI Avg**
CHEM	1211K	A	2690	15	4	high/high	**3.07**	**2947.0**
CHEM	1211K	B	2676	15	3	low/high		
|	|	|	|	|	|	|		
CHEM	1211K	B	1915	15	2	low/high	**low/high**	**Avg attend**
CHEM	1211K	D	1859	14	3	low/high	**N = 83**	**14.6**
CHEM	1211K	F	1843	14	1	low/high	**Avg Grade**	**FI/CI Avg**
CHEM	1211K	D	1440	14	0	low/high	**2.16**	**2389.5**
CHEM	1211K	A	3450	0	4	high/low		
|	|	|	|	|	|	|		
CHEM	1211K	D	2636	12	1	high/low	**high/low**	**Avg attend**
CHEM	1211K	B	2630	13	3	high/low	**N = 55**	**8.3**
CHEM	1211K	B	2625	13	3	high/low	**Avg Grade**	**FI/CI Avg**
CHEM	1211K	F	2620	10	0	high/low	**2.4**	**2948.0**
CHEM	1211K	D	2615	12	1	low/low		
|	|	|	|	|	|	|		
CHEM	1211K	D	2005	13	1	low/low	**low/low**	**Avg attend**
CHEM	1211K	B	1975	0	3	low/low	**N = 43**	**10.8**
CHEM	1211K	D	1963	12	1	low/low	**Avg Grade**	**FI/CI Avg**
CHEM	1211K	D	1954	12	1	low/low	**1.60**	**2392.60**
CHEM	1211K	F	1953	13	0	low/low		
|	|	|	|	|	|	|		

Vertical lines indicate rows missing in order to show all four quadrants in the table. Note that in order to have average indexes for high/low and low/low as close as possible to the average indexes for high/high and low/high, respectively, not all of the low/low data could be included in the comparison.

Results

Analyses have been completed for the past five years for the first course in general chemistry, both the for fall and spring semesters. This course is also offered in summer at UWG but due to the small numbers enrolled this is not included. The second course is offered spring and summer but not in fall except for those taking the course online. Only the last five spring semesters of the second course are included here.

Results are presented below in graphical form in Figures 1, 2, and 3.

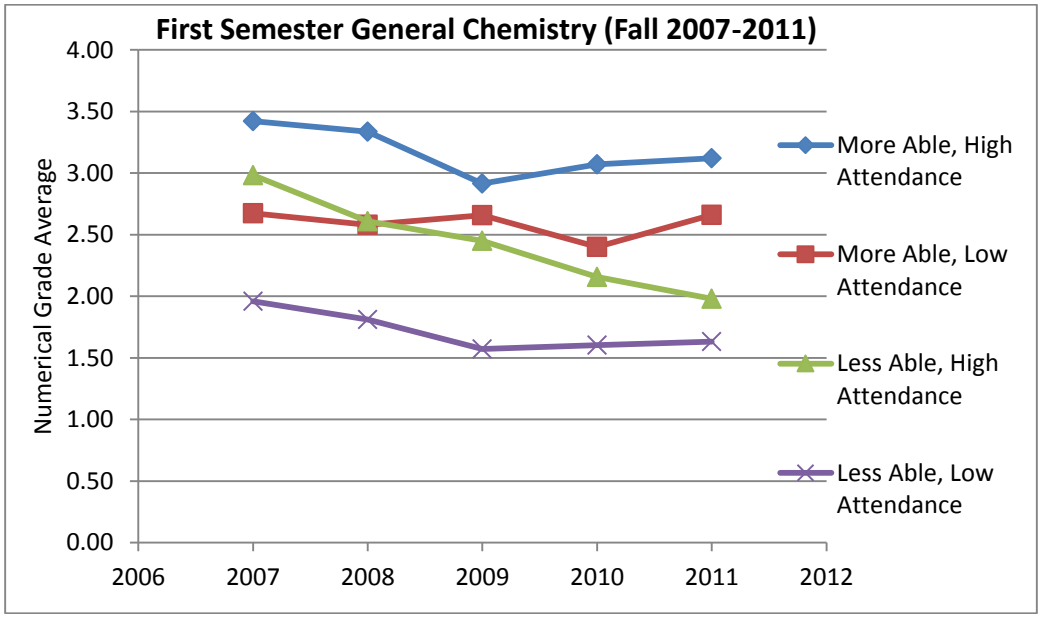

Figure 1. First-semester general chemistry for fall semesters, 2006-2011

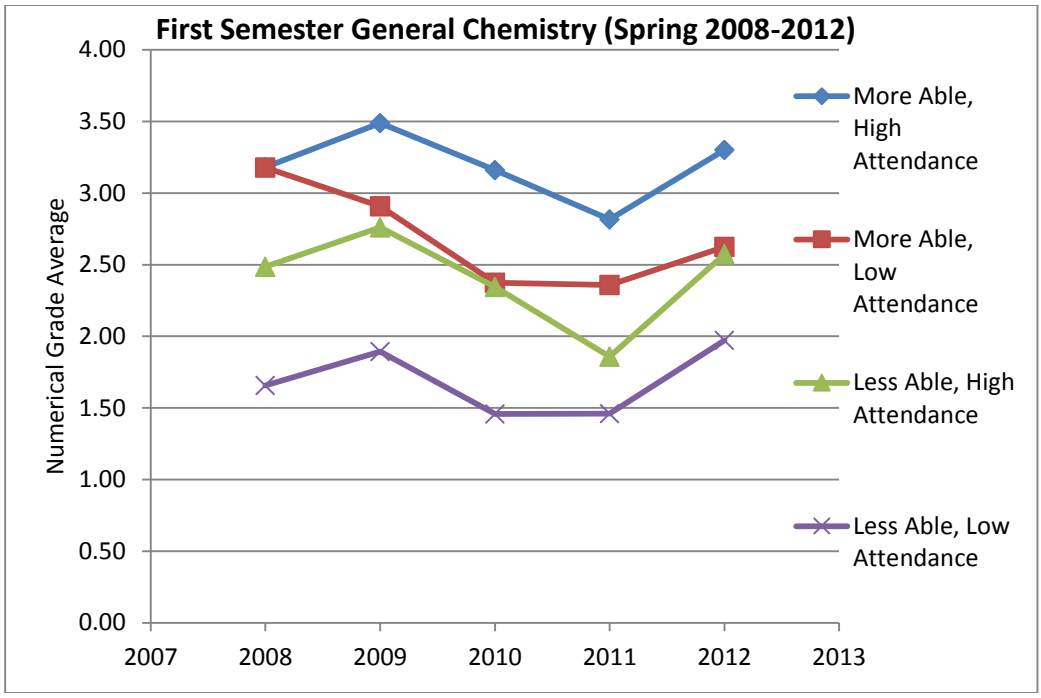

Figure 2. First-semester general chemistry for spring semesters, 2008-2012

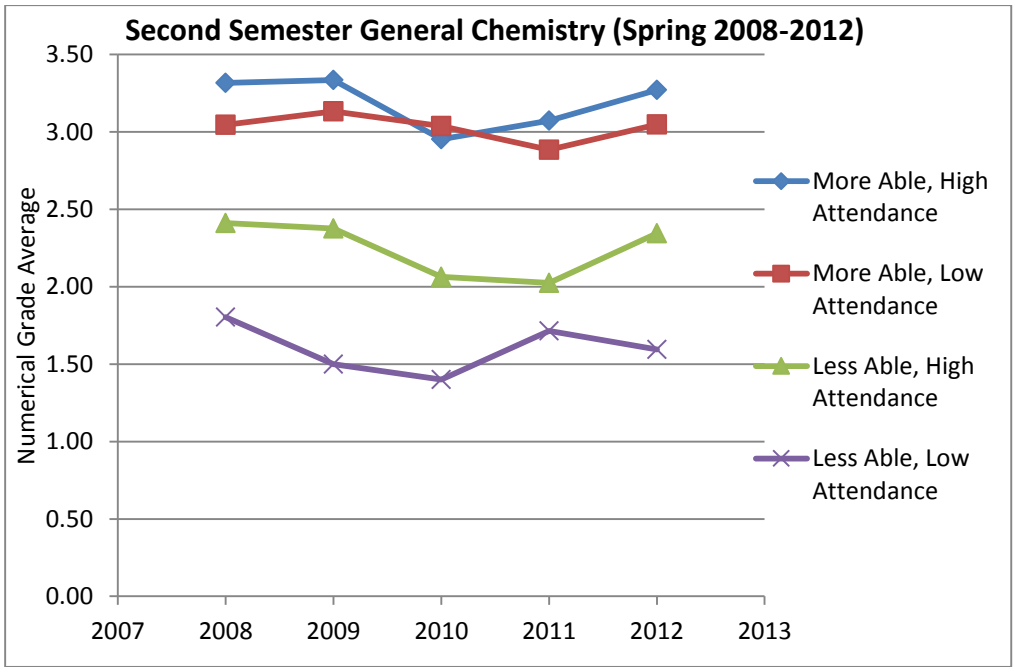

Figure 3. Second-semester general chemistry for Spring semesters, 2008-2012

Conclusions

The results clearly indicate that those attending workshop do better in general chemistry. It is especially interesting that in most cases students attending workshops regularly outperform similarly talented

students enrolled in an honors section. The reasons for this, although not indicated by the data analyzed here, can be inferred from student comments such as "It is so helpful being in a small group where we can slowly talk through this," and "My leader and the other group members really help me understand." The effect of simply spending two additional hours per week thinking about and working through problems should not be discounted either.

Acknowledgments

National Science Foundation Grant #9950575 was the beginning of PLTL workshops in general chemistry. Colleagues among the Chemistry Department faculty have cooperated in the development of the PLTL model at UWG, especially Dr. Farooq Khan, who pushed for inclusion of PLTL in physical chemistry. Ms. Dusty Otwell has been an invaluable colleague in keeping PLTL going as well as assisting with many technical aspects of the program. Colleagues at other institutions, particularly AE Dreyfuss, have kept urging me to do something with all these data accumulated over more than a decade of PLTL workshops at UWG. Finally, thanks go to over 370 (and counting) students who have been peer leaders.

Cite this paper as: Garmon, L.B. (2012). Why attendance is mandatory in workshops: Comparison of course grades of workshop attendees vs. non-attendees with similar GPA and SAT scores. *Conference Proceedings of the Peer-Led Team Learning International Society*, May 17-19, 2012, New York City College of Technology of the City University of New York, www.pltlis.org; ISSN 2329-2113.