

Class Attendance, Course Performance, and Course Evaluation: A Case Study of an Introductory Plant Science Course¹



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Abstract

Class lecture attendance by students in an introductory undergraduate plant science course had not been consistent, and the impact of attendance on student grades and their perception of the course or instructor was unknown. This study was conducted to determine the influence of class lecture attendance on academic course performance and student perceptions of the course and the instructor. Course performance was based on the final course grade derived from exam, quiz, and group project scores. Analysis of class lecture attendance and final course grade of 237 students from four course sections over three semesters revealed a positive trend of higher final course grade associated with higher class lecture attendance. An end-of-semester survey was used to determine student rankings of the course and instructor. The evaluation of the course and instructor was higher or more favorable among students with $\geq 50\%$ class lecture attendance versus those students with 50% attendance.

Introduction

“Plants, People, and Places” is an undergraduate plant science course (BIOL 20) for non-science majors offered in-residence since 2001 at the Berks Campus of the Pennsylvania State University, located in Reading, Pennsylvania. The specific course focus is plant biology and the utilization of cultivated agricultural crops by humans and society (Levetin and McMahon, 2003). BIOL 20 is a three-credit course taught during both spring and fall semesters, and is delivered in three, 50-minute lectures (Monday, Wednesday, and Friday) over a 15-week academic semester. BIOL 20 satisfies core curriculum or general education requirements for three credits each in the natural sciences and international /intercultural (i.e., diversity) competency categories.

Student attendance of BIOL 20 class lectures is regularly recorded, and attendance and participation in lecture is highly encouraged by the instructor. In previous classes, a lower final course grade has been observed among those students with poor lecture

attendance versus those students who frequently attended lecture. In addition, course and instructor evaluation scores from the end-of-semester Student Rating of Teaching Effectiveness (SRTE) survey were lower in those semesters when overall lecture attendance was noticeably lower compared to semesters when the majority of enrolled students regularly attended lecture. The influence of class attendance and active participation on an undergraduate student's learning and course performance has been investigated (Van Blerkom, 1992; Willits et al., 1997). Also, the effect of class attendance on student perceptions of teaching and learning effectiveness has been studied (Frey et al., 1975; Marsh and Dunkin, 1997; Wilson, 1986). Information on both topics is sparse, however, for undergraduate courses in the agricultural and natural sciences (Enerson et al., 1997; Moore et al., 2003). Therefore, the objectives of this investigation were to determine the relationship between a student's academic course performance and classroom lecture attendance in BIOL 20, and to compare SRTE results between students who regularly attend class lecture versus those students who do not attend class on a regular basis.

Materials and Methods

During the 15-week semester in Spring 2004 (one class section beginning at 9:00 am), Fall 2004 (two sections offered at 9:00 am and again at 10:00 am), and Spring 2005 (one section at 9:00 am), the BIOL 20 course consisted of 45 class meetings: 38 for lecture, four for exams, and three for student presentations of a group project. Final course grade was based on four exam scores, ten quiz scores (each quiz administered on-line through the course website), and a group project score. The final course grade was calculated as a percentage from the total exam, quiz, and project scores as follows: A = 100 to 90%, B = 89 to 80%, C = 79 to 70%, D = 69 to 60%, and F \leq 59%. Supplemental course material, study guides, and additional lecture notes also were available on the course website.

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Attendance and Academic Performance

For each course section during each semester of this investigation (one section in Spring 2004, two sections in Fall 2004, and one section in Spring 2005), a total of 38 class lectures were monitored for student attendance. The attendance was recorded at the start of each lecture period. A student arriving more than 15 minutes late was not counted in attendance for that day. Lecture attendance as a percentage of classes attended was compared to percent final course grade using linear regression (Borg and Gall, 1989; SAS Institute, 1987).

Attendance and SRTE Survey

Lecture attendance records for Spring 2004 indicated that the geometric mean for the entire class was 52.4% or approximately 19 of 38 lectures. Therefore, at the conclusion of the course in each semester (one section in Spring 2004, two sections in Fall 2004, and one section in Spring 2005), students were categorized into one of two groups: Group I consisted of students that attended $\geq 50\%$ of class lectures, and Group II students attended $< 50\%$ of all lectures. This amount or pattern of class attendance is consistent with other studies of first-year science courses for non-science majors in large classroom sizes (Friedman et al., 2001; Romer, 1993).

During the last scheduled class period in the semester, students were asked to complete an SRTE survey that consisted of 16 questions to evaluate the course and the instructor. Responses were based on a seven-point modified Likert-type scale, where lowest rating = 1, average rating = 4, and highest rating = 7 (Likert, 1967). The SRTE survey was administered in class with the instructor not present. Upon completion of the survey, students were asked to place their completed SRTE form in an envelope where their name appeared, and to check-off their name indicating that they completed the survey. Two envelopes were prepared with student names in Group I printed on the first envelope, and student names in Group II printed on the second envelope. SRTE responses were compiled and results compared between students who completed the survey in Group I versus Group II. Survey response data were subjected to analysis of variance conducted on Statistical Analysis Software (SAS Institute, 1987), and data means were compared by

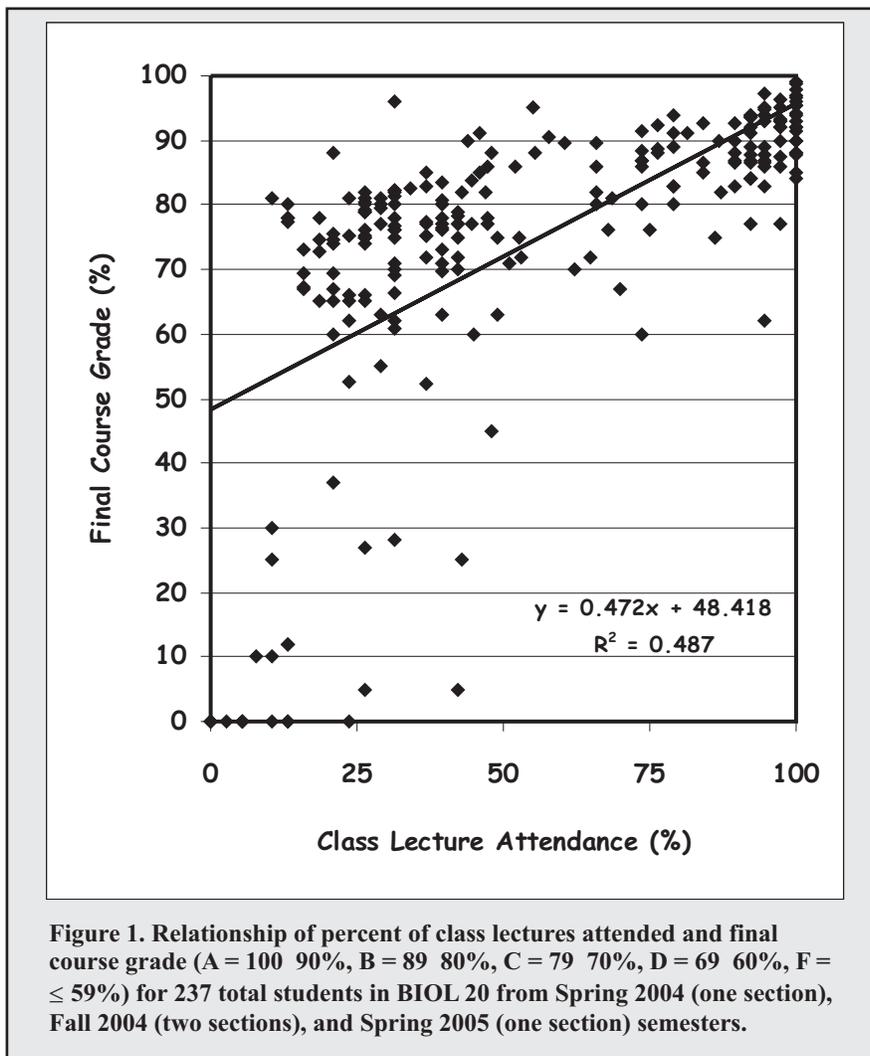
preplanned orthogonal contrasts from Fisher's protected least significant different test at $P \leq 0.05$ (Borg and Gall, 1989).

Results and Discussion

A total of 237 students enrolled in BIOL 20 during the Spring 2004 (59 students), Fall 2004 (63 students in section one and 57 students in section two), and Spring 2005 (58 students) semesters.

Attendance and Academic Performance

The comparison of academic performance to class lecture attendance revealed a positive trend of higher final course grades associated with higher attendance (Figure 1). These results are consistent with other studies that correlate better or improved course grades with consistent class lecture attendance and active class participation (Enerson et al., 1997; Hovell et al., 1979; Van Blerkom, 1992; Willits et al., 1997). Other research has shown that class lecture attendance can be influenced by whether students get academic credit (i.e., receive points) for attending class (Launius, 1997). In BIOL 20, students currently do not receive points for attendance. Future offerings



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of BIOL 20 could examine the impact of points for attendance on class lecture attendance and final course grade.

Although class lecture attendance is a positive indicator of a student's final course grade, attendance is not the only factor that influences academic performance (Gump, 2005; Moore et al., 2003). Large class sizes, especially in introductory-level courses, tend to reinforce a student's role as a passive learner who retains lecture information only long enough to take the exam (Moore, 1996). As college faculty shift from teacher-centered to learner-centered practices in the approach to lectures and teaching, students that do not attend class struggle to benefit from this active or inquiry-based approach to teaching and learning (Baxter-Magolda, 1999; Glasson and Lalik,

1993). Poor or low class lecture attendance among some students in BIOL 20 may have been attributed to the notion that they could substitute attending lecture with accessing support materials on the course website. More research, however, would be needed to further investigate the influence of a course website and supplemental web-based instructional support material on class lecture attendance and course performance.

Since the 237 students were almost equally divided as 53% male and 47% female, the effect of gender on class attendance or course performance was not originally considered in this study. A later comparison, however, revealed no statistical difference among gender versus attendance or course performance (data not shown). Since this course was

Table 1. Mean responses to the Student Rating of Teaching Effectiveness (SRTE) survey.

Survey Questions:	-- Group ^z --		Statistical Comparison ^y
	I	II	
Rate the overall quality of this course.	6.08	4.17	***
Rate the overall quality of the instructor.	6.51	4.43	***
Rate the clarity of the instructor's presentations.	6.37	4.91	***
Rate the instructor's skill in handling students' questions and comments.	6.31	4.67	***
Rate the instructor's pacing of lectures and presentations to allow for note taking.	6.42	5.44	*
Rate the adequacy of the instructor's knowledge of the subject matter.	6.57	6.12	NS
Rate the organization of the course material.	6.11	5.28	**
Rate the instructor in terms of his preparation for class.	6.31	5.09	**
Rate the clarity of the syllabus in stating course objectives, course outline, and criteria for grades.	6.41	6.17	NS
Rate the extent to which interest in the subject matter was generated by this course.	5.32	4.18	**
Rate the instructor's enthusiasm about the subject matter.	6.35	5.13	**
Rate the instructor's apparent interest in teaching the course.	6.52	5.19	**
Rate the importance of the knowledge learned in this course.	5.47	4.29	*
Rate the effectiveness of the instructor in stimulating your thinking.	5.79	4.25	**
Rate the adequacy of physical facilities for instruction (classroom/lecture hall, indoor/outdoor lab, etc.).	5.68	4.97	*

^zA total of 237 students were enrolled in BIOL 20 during Spring 2004 (one section), Fall 2004 (two sections), and Spring 2005 (one section) semesters. Group I consisted of 88 of 105 students that attended $\geq 50\%$ of class lectures and completed the SRTE survey, and Group II consisted of 65 of 132 students that attended $< 50\%$ of all class lectures and completed the SRTE survey. Survey response per question was based on a 1 to 7 scale, where 1 = lowest rating, 4 = average rating, and 7 = highest rating.

^yData means between groups were compared by orthogonal contrasts from Fisher's protected least significance difference test, where NS equals not significant, and *, **, and *** equals significant at $P \leq 0.05$, 0.01, and 0.001; respectively.

offered at 9:00 or 10:00 am, it is uncertain from this investigation if class meeting time was a reason for low attendance. Although 57% of students lived on-campus and 43% lived off-campus, the impact on attendance or course performance was not statistically different when comparing students classified in those two categories (data not shown). Also, class rank was not considered an important influence on lecture attendance in this case study, with total enrollment categorized as 93% freshman, 6% sophomores, and 1% other.

Attendance and SRTE Survey

Among the 237 total students enrolled in BIOL 20, Group I ($\geq 50\%$ class lecture attendance) consisted of 105 students, and 132 students placed into Group II ($< 50\%$ attendance). Students in Group I attended an average of 87% of the 38 class lectures during the semester versus an average of 32% in group II. Eighty-eight of 105 students in Group I completed the SRTE survey, whereas 65 of 132 students in Group II completed the survey (Table 1). Mean questionnaire ratings were significantly higher in 13 of 15 items from Group I versus Group II students (Table 1). The largest differences between groups were the ratings of overall course quality, overall quality of the instructor, clarity of the instructor’s presentation, and the instructor’s skill in handling students’ questions and comments, where Group I rated those items significantly higher than Group II (Table 1). Students perceptions of the instructor’s knowledge of the subject matter and the clarity of the course syllabus were the two items ranked similar or

not significantly different between groups (Table 1). The overall mean of all 15 questions was 6.15 for Group 1 and 4.95 for Group II. These results are consistent with other studies where class lecture attendance and higher course grades were associated with better students perceptions of the course and course instructor (Frey et al., 1975; Marsh and Dunkin 1997; Willits et al., 1997; Wilson, 1986).

An additional question was asked on the SRTE survey: “What grade do you expect to earn in this course?” (Table 2). Students who regularly attended class had a more realistic expectation of final course grade versus students with poor attendance. In Group I, 100% of students expected a final course grade of “B” or better, where 86% actually earned this grade (Table 2). In Group II, 78% of students expected a final course grade of “B” or better, but only 33% actually did (Table 2). Despite low attendance, however, 14% of students in Group II earned a grade of “A” while the majority earned a grade of “C” (Table 2). Only 2% of students in Group II expected a final course grade below “C,” but 19% actually earned a “D” or “F” (Table 2). Other studies have indicated that students want their course grade to reflect effort weighted as much as mastery of subject matter, and that course grade should be determined on a modified curve rather than an absolute scale or standard (Launius, 1997; Miley and Gonsalves, 2004). During informal end-of-semester conversations with BIOL 20 students, some students in Group II commented that low class lecture attendance and poor exam scores would be off-set by good quiz scores, a good group project score, frequent use of materials on the

Table 2. Student expectations of final course grade as recorded on the Student Rating of Teaching Effectiveness (SRTE) survey compared to actual final course grade.

Group ^z	Final Course Grade ^x				
	A	B	C	D	F
	-----% ^x -----				
I:					
What grade do you expect to earn in this course?	32	68	0	0	0
Actual final grade	43	46	9	2	0
II:					
What grade do you expect to earn in this course?	27	51	20	2	0
Actual final grade	14	19	48	16	3

^zA total of 237 students were enrolled in BIOL 20 during Spring 2004 (one section), Fall 2004 (two sections), and Spring 2005 (one section) semesters. Group I consisted of 88 of 105 students that attended $\geq 50\%$ of class lectures and completed the SRTE survey, and Group II consisted of 65 of 132 students that attended $< 50\%$ of all class lectures and completed the SRTE survey.

^yFinal course grade, where A = 100 - 90%, B = 89 - 80%, C = 79 - 70%, D = 69 - 60%, and F = $\leq 59\%$.

^xPercent student response for each final course grade category.

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course website, and a final course grade based on a curve even though the instructor emphasized no curve or grade modification. Further research is needed to study the relationship between student course grade expectations and actual academic performance in BIOL 20.

Summary

In conclusion, data from this investigation revealed a positive trend of higher final course grades among BIOL 20 students with increased or consistent class lecture attendance. BIOL 20 students with $\geq 50\%$ class lecture attendance had assessed the course and the instructor with higher or more favorable rankings versus students with a low attendance rate of $< 50\%$. Future research with the BIOL 20 course should consider the underlying causes for poor attendance, as well as investigate the impact of “mandatory” (i.e., policy of lowering one course letter grade for every three lectures missed) class lecture attendance on academic course performance and SRTE results.

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