

Student Perspectives on Teaching Techniques and Outstanding Teachers

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Abstract: The increased use of instructional technology in the past decade has brought about many changes in college teaching, including changes in the lecture format. We surveyed students in six science courses to obtain their opinions regarding technology use, as well as non-technological instructional techniques, and the characteristics of outstanding teachers. This article reports on and analyzes the responses of 158 students, and recommends strategies instructors can use to increase their teaching effectiveness by engaging students in lecture and other aspects of their courses.

Keywords: student survey, instructional techniques, teaching effectiveness, teacher characteristics, instructional technology.

I. Introduction.

Despite recent pedagogical research questioning the effectiveness of the lecture format in higher education (Handelsman et al., 2004, Udovic, Morris, Dickman, Postlethwait, and Wetherwax, 2002), that format is still very important in college teaching. Although students are separated into small groups for laboratory portions of science courses, they are usually grouped into much larger lecture sections (up to several hundred students in larger universities). The financial realities of cost effectiveness suggest that relatively large classes will remain a component of college courses in the years to come (Brown and Gamber, 2002). Therefore, one of the major challenges for educators is to increase the effectiveness of this teaching format by incorporating techniques that facilitate the development of critical thinking skills and active learning among students (Ebert-May, Brewer, and Allred, 1997, Cronin Jones, 2003, Litke, 1995).

Many studies have focused on the pedagogical value of various techniques from the educators' perspective (Barr and Tagg, 1995, Lord, 1994, Zoller, 2000), and some have reported on students' opinions (Feldman, 1988, Feldman, 1976). We recently published the results of a fall 1998 survey of college students' preferences of lecture techniques and the characteristics that they feel exemplify outstanding high school and college teachers (Chen, Lawler, and Venso, 2003). Since our initial survey, our university (like many across the country) has seen many changes in teaching, particularly the increased use of instructional technology in and out of the classroom. These changes include increased use of e-mail, the Internet, slide presentation technology, such as PowerPoint, and course management systems, such as Web CT (Green, 2003, Green, 2004). We thought it important to solicit students' opinions of these uses. In addition, we wanted to explore lecture and instructor characteristics identified by students in

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open-ended questions on our first survey. Consequently, we undertook a second survey to ascertain student opinions of new technology-based teaching techniques and teacher characteristics and to determine whether changes in instructional technology have influenced students' judgments of the following:

- Non-technology based teaching techniques
- Lecture format
- Important characteristics of outstanding high school teachers
- Important characteristics of outstanding university teachers

These opinions allowed us to make comparisons with our earlier study and between different groups of students identified in student profiles.

Learning is more likely to take place when students feel comfortable and relaxed, and enjoy the learning experience (Berk, 1996, Mantei, 2000). Therefore, taking students' preferences into consideration and using them to guide our teaching when appropriate can enhance the effectiveness of our endeavors.

II. Method.

A. Survey Design.

Our survey questionnaire (Appendix) consisted of three sections: 1) student profile, 2) objective questions regarding teaching format and use of technology in and out of the classroom, and 3) a two-part section in which students ranked a) techniques teachers can use to make lectures interesting and b) important characteristics of outstanding high school and college instructors from those identified on our previous survey.

Section 1: Student Profile. The six questions (#1-6) in this section allowed us to make comparisons between the responses of groups of students based on gender, class status, school of major and overall grade point average (GPA).

Section 2: Teaching Format and Technology Use. The second section (questions #7-17) was designed to obtain students' opinions regarding lecture format, out-of-classroom experiences, and the use of technology in and out of the classroom. A number of the questions (#7, 11, 12, 16 and 17) in this section were identical to questions in our previous survey. This repetition was included in order to determine whether changes in instructional techniques (particularly technology use) have influenced students' opinions of non-technology based techniques.

Section 3: Preferred Lecture Methods and Outstanding Teacher Characteristics. Our previous survey (Chen, Lawler, and Venso, 2003) included a section with open-ended questions. Based on the responses from that study, we prepared and included on the current survey lists of:

- “things a professor can do to make lecture interesting as well as informative” (#18-32 on the present survey)
- “most important characteristics of an outstanding high school teacher” (#33-50)
- “most important characteristics of an outstanding college professor” (# 51-68)

Student participants were instructed to select from each of these lists the five items they thought were most important and rank them according to importance on a computerized answer sheet where “a” was most important; “b,” the second most important; through “e,” the fifth-most important.

B. Survey Administration.

The survey was given at approximately mid-semester in spring 2003 in an anonymous and volunteer fashion in the six courses we were teaching. We gathered data from students during class to ensure opinions that were free of other students' influence. Students taking two or more courses from us were instructed to participate only once. Other than that, essentially all students present when the survey was administered participated. Although the six courses were all science courses (in biology, environmental health science, and geography and geosciences), they included general education as well as science major courses. Student participants included majors in the other three schools in our university in addition to majors in the school of science and technology.

C. Data Analysis.

Analyses of the three sections of the survey included 1) summary analysis of student characteristics for Section 1: Student Profile; 2) Chi-square (χ^2) to determine significant differences of opinions between student profile groups, and correlation analysis (r) to determine significant similarities between the present and previous surveys for Section 2: Teaching Format and Technology Use; and 3) weighted ranking of student responses in Section 3: Preferred Lecture Methods and Outstanding Teacher Characteristics.

Section 1: Student Profile. We totaled student characteristics by gender, enrollment status, GPA, class status, and school of their majors. This allowed us to separate and analyze the responses to the remaining sections according to these profile characteristics.

Section 2: Teaching Format and Technology Use. In processing and analyzing the survey data, we summarized the overall pattern of student opinions. Subgroup comparisons were analyzed by the Chi-Square test; a p value of 0.05 or less was considered significant. In addition, we used a correlation analysis to compare the current responses to five questions with those to identical questions in our previous survey.

Section 3: Preferred Lecture Methods and Outstanding Teacher Characteristics. Students were asked to select and rank from lists of characteristics shown in # 18-32 the five items they thought were most important in making a lecture interesting as well as informative. Students also chose the five most important characteristics of an outstanding high school teacher (#33-50) and the five most important characteristics of an outstanding college professor (#51-68). We analyzed the responses in this section in two ways. First, we calculated the frequency (F) that each choice was selected, regardless of the ranking of importance by individual students. Secondly, we made a weighted ranking (WR) of responses for each question. For this ranking, each time a student chose a particular item as the most important ("a"), it was multiplied by 5; choices of second most important were multiplied by 4, third by 3, fourth by 2 and fifth by 1. These values were then totaled for ranking.

III. Results and Discussion.

A. Section 1: Student Profile (Table 1).

Of the 177 students who participated in the survey, the responses of 158 students were analyzed for this paper. Nineteen of the students did not properly follow instructions for all parts

of the survey and, therefore, their survey responses were not used. Ninety-four percent (94%) of the 158 students were enrolled full-time (question 4) and 86% had enrolled in college within two years of high school graduation (question 3). The majority of the respondents were female (67%, question 5). Fifty-one percent (51%) of the students had majors within the School of Science and Technology (question 2). Our population was composed of 9% freshmen, 43% sophomores, 24% juniors and 22 % seniors (question 1). In our analysis, we compared responses of upper and lower classmen (52% and 46%, respectively) and of science majors and non-science (liberal arts, business and education) majors (51% and 46%, respectively).

Table 1. Responses to Student Participant Profile (#1-6) and to Objective Questions of Preference for Teaching Techniques (#7-17).

Question Number	Percentage of surveyed students in each answer category					
	(a)	(b)	(c)	(d)	(e)	No Answer
1	8.9	43.0	24.1	21.5	n/a	2.5
2	50.6	25.9	4.4	11.4	4.4	3.2
3	86.1	12.0	n/a	n/a	n/a	1.9
4	93.7	5.7	n/a	n/a	n/a	0.6
5	32.3	67.1	n/a	n/a	n/a	0.6
6	24.7	55.1	17.1	0.6	1.3	1.3
7	3.2	50.0	5.1	40.5	n/a	1.3
8	46.2	37.3	12.0	2.5	0.6	1.3
9	10.1	52.5	31.6	5.1	n/a	0.6
10	25.3	11.4	62.0	n/a	n/a	1.3
11	27.8	37.3	5.7	28.5	n/a	0.6
12	27.2	7.6	11.4	52.5	n/a	1.3
13	49.4	21.5	17.7	7.6	3.2	0.6
14	14.6	53.2	31.0	0.0	n/a	1.3
15	46.8	37.3	13.9	n/a	n/a	1.9
16	36.7	6.3	15.8	12.7	27.2	1.3
17	85.4	10.8	0.6	1.3	n/a	1.9

B. Section 2: Student Responses Regarding Teaching Format and Technology Use.

Overall Responses (Table 1). Most students preferred a structured lecture format with a free exchange of questions. In response to question 8, almost half (46%) the students selected 90% or more lecture and 10% or less student group work as their ideal proportion of activities in the classroom. Another 37% preferred 75% lecture and 25% student group work. Regarding preferred format of student work in the classroom (question 11), 37% preferred “Work on solving/answering problems/questions given by the instructor” and 28% preferred “Structured group discussion with given topics.” Few students (6%) preferred “Unstructured group discussion,” and 29% preferred classes without group work. Although the majority of students preferred that most of class time be devoted to lecture, they also preferred a class with the opportunity to ask and answer questions throughout (question 12). The majority (53%) chose “Instructors should ask many questions and encourage students to do the same.”

Most preferred use of visual aids in lectures. In response to question 7, the percentage of students that preferred “Lectures supported with visual aids” (50%) was slightly larger than the percentage with preferences for “Lectures with visual aids, questions/discussions and student

group work” (41%). Only 3% favored “95% of time for straight lecturing” and 5% “lectures with student discussions/group work.” These results are interesting in light of the work of Cronin-Jones (2003) who states that relatively few of today’s college students are good auditory learners and that they need additional stimulation to aid in their learning.

Homework was preferred course-related activity (question 16). The largest number chose “Homework” (37%), with 27% choosing “Combination of activities.” Fewer preferred “Project report/term papers” (16%), “Team reports/projects” (13%) and, lastly, “Student presentations” (6%).

Students seemed to be comfortable with instructional technology and, in some cases, preferred it over traditional techniques. The majority of students surveyed (53%) indicated that computer presentation technology such as PowerPoint is more effective in most cases than more traditional aids (blackboard, overheads, slides), and a sizeable number (32%) suggested that this technology is “occasionally” more effective (question 9). Only 5% felt it is rarely or never more effective. These results are similar to those of other recent studies (Frey and Birnbaum, 2002, Lowry, 1999, Mantei, 2000). However, while some recent studies of PowerPoint use in the classroom show a direct correlation between increasing students’ interest during class and their performance on subsequent evaluations (Lowry, 1999, Mantei, 2000), others find mixed results (Szabo and Hastings, 2000). Harris (2002) warns that observed changes in students’ attitudes and even performance in response to multimedia presentations may simply be an example of the Hawthorne Effect, temporary responses to changes in the learning environment. Clark (1983) reviewed the literature on media and learning effectiveness and concludes that changes in the media used to deliver instruction rarely alter the final outcomes. Technology should be considered a tool to assist, but not replace, traditional teaching techniques.

In addition, 62% of our respondents thought that presentation technology was especially important for large classes (question 10). This is valuable information in light of Litke’s work (1995) stressing the need for teachers to be particularly cognizant of students’ opinions regarding teaching effectiveness in large classes.

Student preferences for the use of PowerPoint in lectures may be related to prior experience or the fact that it aids visual stimulation in learning. However, results from a study by Bartsch and Cobern (2003) indicate that not all visual stimulation is equally effective; PowerPoint presentations that include irrelevant images are less effective in conveying information than PowerPoint presentations with no images whatsoever.

Another reason for students’ preferences for use of PowerPoint in lecture may be the fact that this technology allows for easy distribution of notes via computer (Mantei, 2000) or in a printable handout (Frey and Birnbaum, 2002). In our survey, the majority of students preferred computer transmission of notes prior to (49%) or after (22%) lecture as compared to notes available by other methods (question 13). In addition to technology in the classroom, students in our survey were very comfortable with technology as a means of communication with professors outside of class. Although none of our participants indicated a preference for communicating with professors exclusively via e-mail, 31% preferred it over in-person conferences, and 53% would use it occasionally to supplement in-person conferences (question 14). Only 15% preferred in-person conferences exclusively. In addition, the majority thought that posting of class announcements via e-mail or on the web is essential (47%) or helpful but not necessary (37%, question 15). In light of today’s information overload, it is crucial that instructors consider students’ preferences and use methods such as these to effectively transmit their messages.

Students considered themselves as most responsible in achieving a high GPA (question 17). Eighty-five percent (85%) of students surveyed considered themselves to have the most responsible role in achieving a high GPA. Only small percentages of students felt their professors or their parents were most responsible.

Variation in Responses between Student Profile Groups. Overall, there were relatively few significant differences among the student profile groups, and there were no significant differences between the responses of upper and lower classmen to any question. Males and females differed significantly in their responses regarding preferred lecture format (question 7), with proportionately more men preferring “Lectures with visual aids, discussions and student group work” and more women preferring “lectures supported by visual aids” ($p \leq 0.05$). They also differed significantly regarding the relationship between class size and format (question 10), with proportionately more males responding that class size does not affect format and more females responding that computer presentation technology is especially important in larger sized classes. ($p \leq 0.025$).

Science majors and students with other majors differed significantly in their responses to two of the questions regarding lecture format (question 7). Proportionately more non-science majors preferred “Lectures with visual aids, discussions and student group work,” while more science majors preferred “Lectures supported by visual aids” ($p \leq 0.05$). And, although the top choice for the proportion of class time spent in lecture (question 8) was the same for both science and non-science majors (90% or more), more non-science than science majors selected “25 % lecture and 75% student group work” ($p \leq 0.025$). In addition, there was a significant difference ($p \leq 0.001$) between science and non-science majors regarding the transmission of lecture notes (question 13); a larger percentage of science majors preferred notes available in a course booklet and a higher percentage of non-majors preferred notes available on reserve in the library. This may be related to what students are accustomed to in their specific courses. The fact that a large number of science majors were enrolled in a course that employed a course booklet may have influenced this difference.

Students in the three GPA categories differed in their responses to two questions relating to interactions within the classroom. With regard to student group work in the classroom (question 11), the top response for students with a middle GPA was “Work on solving/answering problems/questions posed by the instructor,” whereas the top response for the high and low GPA groups was a preference for no group work ($p \leq 0.05$). Although the top answer for all GPA groups regarding the appropriate number of questions asked (question 12) was “Instructor should ask many questions and encourage students to do the same,” proportionately more of the high GPA and fewer of the low GPA groups chose that response. In addition, more of the low GPA and fewer of the high GPA groups preferred that only the instructor ask many questions ($p \leq 0.05$).

Comparison with Responses in Previous Study. Although the specific questions related to instructional technology in this survey differed from those in our previous survey (because our uses of technology have changed dramatically in the intervening five years), responses to the two surveys suggest that students are now more comfortable with technology use, particularly its use outside the classroom. On the other hand, student opinions regarding lecture format, number of questions asked during lecture, student group work in class, related activities and responsibility for achieving a high GPA were unchanged from the results of our initial survey (Chen, Lawler and Venso, 2003). The responses to all five identical questions had correlation coefficients of 0.9

or higher indicating that the increased use of instructional technology and students' preference for this technology has not changed their attitudes regarding basic lecture techniques.

C. Section 3: Student Preferences regarding Lecture Methods and Outstanding Teacher Characteristics.

Overall Responses. *Students indicated that lectures are most interesting when instructors show enthusiasm for the subject, have good presentation skills and explain complex concepts clearly (Table 2).* These three clearly stood out from the 15 listed characteristics, both in term of frequency of selection (F) and perception of importance (WR) by the respondents overall. These characteristics were also listed as important by students in the studies of Feldman (1976), and Smith, Medendrop, Ranck, Morrison, and Kopfman (1994). Although selected much less frequently, the other two choices in the top five (by both F and WR) were provides comfortable atmosphere and “Adds personal stories/experiences/research.”

Student opinions were also very clear with regard to the things they consider less important in lecture. The four lowest ranking choices (by both F and WR) were “Rarely strays from lecture topics,” “Includes time for student group work,” “Moves about classroom” and lastly “Includes student presentations.” Although our previous survey (Chen, Lawler and Venso, 2003) indicated that students prefer a teacher that moves about the front of the classroom (as compared to one that stays in one location or moves about the room amongst the students), this survey indicated that it is not as important as many other options in making a lecture interesting. So low ranking of characteristics by students in this survey does not necessarily mean that students considered those characteristics unimportant, just less preferred than other choices presented.

Table 2. Frequency and Weighted Ranking of the Five Most Important Things a Professor Can Do to Make Lectures Interesting as Well as Informative (# 18-32).

F	FxW	WR	Lecture Characteristics
109	414	1	Shows enthusiasm for subject
106	401	2	Has good presentation skills
103	300	3	Explains complex concepts clearly
73	217	4	Provides comfortable/relaxed atmosphere
81	185	5	Adds personal stories/experiences/research
59	172	6	Uses visual aids
57	156	7	Illustrates concepts with analogies/examples
53	137	8	Makes lectures relevant to students' interests and experiences
39	121	9	Encourages student participation through open ended questions
41	100	10	Uses innovative methods
25	75	11	Varies format/pace/amount of lecture versus other activities
17	45	12	Rarely strays from lecture topic
13	30	13	Includes time for student group work
12	25	14	Moves about classroom
8	12	15	Includes student presentations

F = frequency, number of times characteristic was selected regardless of individual student ranking

F x W = frequency times weighting

WR = weighted rank, according to F x W

Students considered being “Approachable” and “Concerned whether students understand the material” to be the two most important characteristics of outstanding teachers (Table 3). These were the top two responses among the 18 characteristics of high school teachers and college professors based on both F and WR. Other characteristics valued highly by the respondents were: knowledgeable, organized, gets to know students as individuals, intelligent, encouraging and supportive, and enthusiastic. Among the characteristics that were ranked low for both high school and college teachers were challenging and “Uses methods that require us to use critical thinking skills.”

These results suggest that although students appreciate a teacher’s professional qualities, the ways in which a teacher interacts with them directly are paramount in their educational experience. Although these results are similar to the results of our previous survey (Chen, Lawler and Venso, 2003) and those of Smith, Medendrop, Ranck, Morrison, and Kopfman, (1994), the format of this survey allowed for clearer ranking than those previous studies. Similarly, in Feldman’s research review (1976), friendliness, helpfulness, and encouragement were among the top preferences of students at that time.

Table 3. Frequency and Weighted Ranking of the 5 Most Important Characteristics of Outstanding High School Teachers (#33-50) and College Teachers (# 51-68)

High School Teacher (#33-50)				College Teacher (#51-68)			
F	FxW	WR	Characteristic	F	FxW	WR	Characteristic
67	222	1	Approachable	81	280	1	Concerned if students understand material
69	210	2	Concerned if students understand material	76	252	2	Approachable
61	200	3	Gets to know as individuals	66	232	3	Knowledgeable
55	185	4	Knowledgeable	59	166	4	Organized
53	162	5/6t	Encouraging and supportive	48	160	5	Intelligent
53	162	5/6t	Organized	54	157	6	Enthusiastic
52	158	7/8t	Relates to students	48	133	7	Encouraging and supportive
49	158	7/8t	Enthusiastic	40	129	8	Fair
38	129	9	Intelligent	37	114	9	Gets to know as individuals
41	121	10	Humorous	41	113	10	Relates to students
39	107	11	Fair	46	110	11	Available outside classroom
31	91	12	Challenging	36	101	12	Humorous
33	90	13	Requires critical thinking	34	87	13	Requires critical thinking
29	72	14	Maintains discipline	27	73	14	Challenging
29	64	15	Shows respect for students	28	70	15	Shows respect for students
10	36	16	Empathetic	11	47	16	Empathetic
18	33	17	Provides and requests feedback	14	34	17	Provides and requests feedback
12	24	18	Available outside classroom	6	8	18	Maintains discipline

F = frequency, number of times characteristic was selected regardless of individual student ranking

FxW = frequency times weighting

WR = weighted rank, according to FxW

t = tie in ranking

Although the responses for characteristics of outstanding high school teacher and outstanding college professor were surprisingly similar, there were some interesting differences. A number of nurturing characteristics (i.e., getting to know students as individuals, being encouraging and supportive, and relating to students), as well as maintaining discipline ranked as more important characteristics for high school teachers. Although this may reflect the typically smaller classes and increased contact between high school teachers and their students, it may also suggest that students recognize the importance of becoming more independent and self-motivated as college students. On the other hand, professional characteristics (i.e., knowledgeable, organized, and being available outside the classroom), as well as intelligent and fair ranked higher as important characteristics for college professors. It may be that the increase in importance for these characteristics in college teachers correlates with a perceived increase in the complexity of college level courses.

Variation in Responses between Student Profile Groups. There was much similarity in the top five responses of the various student profile groups regarding the things a teacher can do to make lecture interesting to students. Enthusiasm for the subject and good presentation skills were the top two choices for all subgroups (WR). “Explains complex concepts clearly” was the third ranked choice for all subgroups, with the exception of males who ranked it fourth. Students with a high GPA selected “Adds personal stories/experiences/ research” as frequently as “Explains complex concepts clearly” (based on F value), but less highly (based on WR value). The characteristics “Includes student presentations” and “Includes time for student work” were among the five lowest ranked responses in all subgroups, with student presentations always the lowest characteristic by WR.

Regarding characteristics of outstanding teachers, “Approachable” and “Concerned whether students understand the material” ranked in the top five selections of all profile groups by both F and WR. In contrast to the results of Smith, Medendrop, Ranck, Morrison, and Kopfman, (1994) both genders in our study found approachable to be important. “Knowledgeable” was also ranked in the top five by all subgroups for college professors, but its ranking for high school teachers was more variable. By weighted ranking, a high school teacher’s knowledge was ranked more highly by females than males, by upper as compared to lower classmen and by students with mid GPAs as compared to high or low GPAs.

Interesting differences among the profile groups included responses to “Humorous” which was ranked higher by males than females, higher by non-science majors than science majors, and higher by low GPA than higher GPA students (F and WR). Whereas this characteristic ranked in the top five responses of males and non-science majors for both high school and college teachers, it was ranked in the bottom half of responses of females and science majors for high school teachers (F and WR) and in the bottom five choices for college teachers. Smith, Medendrop, Ranck, Morrison, and Kopfman, (1994) also found humorous to be mentioned more frequently as an important teacher characteristic by male students. While this difference is very interesting, there are so many aspects to humor use and appreciation it is difficult to find a simple explanation for it. In their review of the literature, Robinson and Smith (2001) found much variation in studies of gender and humor appreciation; some studies found women less appreciative of humor than men, others found the reverse and still others found differences in the type of humor appreciated by the two sexes. In addition to different categories of humor, including jokes, stories and funny comments (Gorham and Christophel, 1990), humor serves a number of social functions, such as tension relief, hierarchy building and cohesion building (Robinson and Smith, 2001). Our use of the term “humorous” in the survey made none

of these distinctions and may have been interpreted differently by different individuals. In addition, student responses may have been influenced by specific instances of humor use in their experiences of which we had no control.

In another interesting difference between profile groups, female students and students with a mid GPA ranked being “Available outside the classroom” more highly than did males and students with a low GPA, who ranked this characteristic in the bottom five.

Comparison with Responses in Previous Study. We changed the format of this section from the open-ended questions of our initial survey to the ranking of given characteristics in order to better quantify student responses. However, this change makes direct comparison of the two surveys more difficult. Although we used the student responses to the first survey to formulate the lists in this section, we could not include the full range of those responses. A few similarities and differences do, however, stand out. In both surveys, having good presentation skills, getting to know students as individuals, and showing concern for students were commonly chosen as characteristics of outstanding teachers. In both studies, knowledgeable ranked higher than intelligent. Some differences between responses in the two studies were seen. Being available outside the classroom and making lectures relevant scored higher on the first survey. Being fair was mentioned more frequently than being organized or knowledgeable on the first survey, but ranked lower than those characteristics on this survey. “Empathetic” also ranked lower in this survey than we expected from the responses on the first survey. It may be that many students are unfamiliar with that word, as other interpersonal characteristics generally ranked quite high. Similarly the low ranking of “Requires critical thinking” may be due, at least in part, to students’ failure to recognize activities that require that skill. The overall similarity between the results of this and our previous study are encouraging, as they indicate that teachers do not need to totally revamp their teaching styles as they increase technology use in class to remain effective communicators.

IV. Conclusion.

In addition to providing insight into students’ preferences for various lecture techniques, this study also opens up a number of questions and avenues for future study. One important issue is whether student preferences actually correlate with their learning and performance in a course. The studies by Berk (1996) and Mantei (2000) suggest that this should be the case, but more work in this area would be very worthwhile. It would be difficult with an anonymous survey such as this to answer that question, but studies focusing on one or a few of the top ranked attributes and student performance would shed light on the question. Gorham and Christophel (1990) demonstrated that learning outcomes were positively influenced by teacher use of humor, but both the degree of humor exhibited and the positive learning outcomes reported were the perceptions of the students involved in the study. The question remains, do students’ perceptions of their learning outcomes really correlate with their actual learning? Studies on this topic would be most enlightening. Another question relates to how applicable the results of this study are to lectures in general. Although our subjects were diverse with regard to gender, class status and major, the survey was administered in science courses only. Students were directed to respond to the survey with their opinions for lecture courses overall, but they may have been influenced by the specific course and setting.

College teaching-and-learning is by all means a complex process, and there are many factors in play. As educators, we take many sources of information into consideration when

developing our teaching strategies. Student preferences can give us valuable insight into ways to reach them, but we need to consider those preferences in light of pedagogical research, our own experience in and out of the classroom, and the particular needs of specific courses. For instance, student presentations and student group work have been demonstrated to enhance student learning in a variety of educational settings (Lord, 1994, Shaw, 1999). The fact that our respondents rarely preferred these activities does not mean that we should decrease our use of them, but we need to be creative in the ways they we incorporate them into our courses. For instance, making presentations shorter, more focused on a specific topic, or less formal may decrease the anxiety some students have about this activity.

Similarly, we should not let student preferences for increased use of presentation technology such as PowerPoint allow us to overlook basic techniques we know to be effective. Rather we should use technology to complement our teaching as appropriate. Fortunately, the results of our survey suggested that student opinions regarding basic lecture techniques and characteristics of outstanding teachers did not change with increased use of and preference for such technology.

Teachers also need to be cognizant about the needs of different groups of students. Although various profile groups were in agreement regarding many teaching and teacher preferences in our survey, there were a few important differences which should be taken into account by instructors. For instance, female students preferred more passive situations in class, but they also considered it important for college professors to be available outside the classroom. Interactions outside the classroom provide the opportunity for teachers to help female students become more confident about the course and increase their participation in the classroom. Similarly, science majors had a higher preference for passive situations in lecture as compared to students with other majors. By including a variety of techniques in courses with a mixture of majors, a science professor may not only increase the interest level of non-majors, but, by pairing majors and non-majors in groups, help the science majors to become more comfortable with group discussions and activities.

It is interesting to note that many of the characteristics our students felt were important are among those cited by Lowman (1995) as associated with effective college teaching and often used as the basis for nominations for teaching awards. Furthermore, it is encouraging that the top three student choices for making lectures interesting as well as informative were: showing enthusiasm for the subject, having good communication skills and explaining complex concepts clearly. All of these important characteristics can be developed and improved by all teachers, regardless of personality, discipline and class format.

Appendix 1. A Survey of Students' Opinions Regarding College Teaching.

For Questions 1-6, select the choice that describes your current status and fill in on scantron.

1. Your Classification:

- | | |
|--------------|---------------|
| (a) Freshman | (b) Sophomore |
| (c) Junior | (d) Senior |

2. Your major is within which school:

- (a) Henson School of Science and Technology
- (b) Fulton School of Liberal Arts
- (c) Seidel School of Education and Professional Studies

- (d) Perdue School of Business
- (e) Undeclared major

3. Did you enroll in college within two years of high school graduation?

- (a) Yes
- (b) No

4. You are:

- (a) Full-time
- (b) Part-time

5. You are:

- (a) Male
- (b) Female

6. Your current GPA is:

- (a) 3.5 – 4.0
- (b) 2.5 – 3.49
- (c) 2.0 – 2.49
- (d) less than 2.0
- (e) I am a first semester freshman

For Questions 7-17, select your TOP PREFERENCE (select ONE only) and fill in on scantron.

7. Preferred lecture format:

- (a) 95% of time for straight lecturing
- (b) Lectures supported with visual aids (PowerPoint, slides, VCR tapes, etc.)
- (c) Lectures with student discussions/group work
- (d) Lectures with visual aids, questions/discussions, and student group work

8. The ideal proportion of lecture (including use of various visual aids) and student group work in the classroom is:

- (a) 90% or more lecture and 10% or less student group work
- (b) 75% lecture and 25% student group work
- (c) 50% lecture and 50% student group work
- (d) 25% lecture and 75% student group work
- (e) 10% or less lecture and 90% or more student group work

9. A lecture using computer presentation technology (such as PowerPoint) is more effective than a lecture supplemented by traditional aids such as blackboard, overheads and slides.

- (a) True for all cases.
- (b) True for most cases.
- (c) Occasionally true.
- (d) Rarely or never true.

10. Class size and format:

- (a) Class size does not affect format. (The same format works equally well for large and small classes)
- (b) In large classes, “traditional” lecture techniques (using blackboard, overhead projector, slides) are especially important.
- (c) In large classes, computer presentation technology (such as PowerPoint) is especially important.

11. Preferred format of student group work in classroom:

- (a) Structured group discussion with given topics
- (b) Work on solving/answering problems/questions given by instructor

- (c) Unstructured group discussion (no detailed instructions from the instructor)
- (d) I prefer classes without group work

12. Number of questions:

- (a) Instructor should ask a few questions of students.
- (b) Instructor should ask many questions of students.
- (c) Instructor should not ask questions, but encourage students to do so.
- (d) Instructor should ask many questions and encourage students to do the same.

13. Preferred supplemental transmission of information/lecture notes:

- (a) Notes available via computer (web page, web CT or n-drive) PRIOR to class
- (b) Notes available via computer (web page, web CT or n-drive) AFTER class
- (c) Notes available in course booklet (purchased at U bookstore)
- (d) Notes on reserve at library
- (e) None of the above are necessary

14. Preferred communication WITH instructor outside of classroom:

- (a) In person (during office hours or by appointment) exclusively.
- (b) Prefer in person, but will use e-mail or web CT occasionally for convenience.
- (c) Prefer via e-mail or web CT, but will use in-person conferences when necessary or convenient.
- (d) Via e-mail or web CT exclusively.

15. Communications FROM instructor outside of classroom:

- (a) Posting class announcements and deadlines on the web or via e-mail is essential.
- (b) Posting class announcements and deadlines on the web or via e-mail is helpful, but not necessary.
- (c) It doesn't matter to me if instructors post class announcements and deadlines on the web or via e-mail.

16. Preferred related activities:

- (a) Homework
- (b) Student presentations
- (c) Project report/ term paper
- (d) Team reports/projects
- (e) Combination of the above

17. For you to achieve a high GPA in your college learning, who plays the most responsible role?

- (a) Myself
- (b) Professors
- (c) Parents
- (d) Other

18-32. From the list below, choose the FIVE most important things a professor can do to make lectures interesting as well as informative. Rank these five in order of importance, by filling the "a" bubble on the appropriate line of the scantron for the most important, "b" for the second most important, then "c", "d" and "e" in descending order. Leave all other rows in this group blank on the scantron.

- 18. Has good presentation skills- has clear and expressive voice, speaks at good pace, makes eye contact
- 19. Shows enthusiasm for subject
- 20. Encourages student participation through open ended questions
- 21. Varies format/pace/amount of lecture as compared to other activities
- 22. Uses visual aids
- 23. Rarely strays from lecture topic

24. Uses innovative methods
25. Adds personal stories/experiences/research
26. Includes student presentations
27. Illustrates concepts by giving analogies or describing specific examples
28. Provides comfortable/relaxed atmosphere that encourages students to ask questions/join in discussions
29. Makes lectures relevant to students' interests and experiences
30. Includes time for student group work in most/all classrooms sessions
31. Explains complex concepts clearly
32. Moves about classroom

33-50. From the list below, choose the FIVE most important characteristics of an outstanding HIGH SCHOOL TEACHER. Rank these five in order of importance, by filling the "a" bubble on the appropriate line of the scantron for the most important, "b" for the second most important, then "c", "d" and "e" in descending order. Leave all other rows in this group blank on the scantron.

33. Empathetic
34. Approachable
35. Enthusiastic
36. Gets to know students as individuals
37. Humorous
38. Relates to students
39. Intelligent
40. Knowledgeable
41. Encouraging and supportive
42. Challenging
43. Available outside the classroom
44. Fair
45. Provides and requests feedback
46. Organized
47. Concerned whether students understand the material
48. Shows respect for students
49. Maintains discipline in the classroom
50. Uses methods that require us to use critical thinking skills

51-68. From the list below, choose the FIVE most important characteristics of an outstanding COLLEGE PROFESSOR. Rank these five in order of importance, by filling the "a" bubble on the appropriate line of the scantron for the most important, "b" for the second most important, then "c", "d" and "e" in descending order. Leave all other rows in this group blank on the scantron.

51. Empathetic
52. Approachable
53. Enthusiastic
54. Gets to know students as individuals
55. Humorous
56. Relates to students
57. Intelligent
58. Knowledgeable
59. Encouraging and supportive
60. Challenging
61. Available outside the classroom
62. Fair
63. Provides and requests feedback

64. Organized
65. Concerned whether students understand the material
66. Shows respect for students
67. Maintains discipline in the classroom
68. Uses methods that require us to use critical thinking skills

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