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**Gender Gaps:  
Understanding Teaching Style Differences Between Men and Women**

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## **Gender Gaps: Understanding Teaching Style Differences Between Men and Women**

### *Abstract*

Using data from over 9,000 faculty that participated in the Faculty Survey of Student Engagement, this study found gender differences in the percentage of class time spent on various activities, a measure of teaching style, but that the gaps between men and women in lecturing and active classroom practices, for example, can vary by factors including disciplinary area and course size.

### **Gender Gaps: Understanding Teaching Style Differences Between Men and Women**

“Teaching requires skill, insight, intelligence, and diligence, and faculty struggle and succeed in a variety of ways to meet the challenges of the classroom” (Kardia & Wright, 2004). While apparently both men and women faculty members exhibit these traits, research suggests that they may meet the challenges in different ways. Understanding how and why men and women teach differently is critical to assisting faculty in their efforts to improve their teaching.

Student evaluations are a common, if flawed, method for faculty to receive feedback about their teaching. Research has shown that students’ evaluations can be significantly influenced by the gender of their instructors. Many studies reveal that students tend to rate female faculty members’ differently than male faculty members (Whitworth, Price & Randall, 2002; Basow & Silberg, 1987; Goodwin & Stevens, 1993; Tartro, 1995). Reasons for these findings are multifaceted. For example, students may hold biased perceptions of the differences between men and women faculty (Andersen & Miller, 1997; Burns-Glover & Veith, 1995). Such a gap may be attributable to the disciplinary area; some fields, like education or nursing, for example, have many more female faculty members on average than other fields. It is also possible, however, that students are accurately assessing the difference between teaching styles that is attributable to the gender of the faculty member (Centra & Gaubatz, 2000). A study by Basow (1995) revealed that students perceived female instructors to be more sensitive and considerate of student ideas whereas male instructors were believed to be more knowledgeable. If students are, even in part, picking up on real differences, understanding the effect of gender on teaching styles is important.

Outside of the literature on student evaluations, a limited amount of research on gender differences in teaching styles has been conducted. Findings from these studies have yielded

mixed results, but part of this variability stems from researchers using different criteria for assessing teaching styles. A study by Lacey, Saleh, and Gorman (1998) examined teaching styles at one institution through measures of inclusion and sensitivity preferences. They found that the styles of male and female faculty differed, especially with how much each of the genders valued student inclusion. Whereas over half of the female faculty members believed that students should be allowed to define the learning experience for themselves and discern their own style, male faculty believed they are the holder of the information and know what it is best for students.

Using a larger sample of institutions and faculty, Grasha (1994) assessed teaching style using the following categories: expert, formal authority, personal model, facilitator, and delegator. The results suggest that women were more likely to use a facilitator or delegator style that emphasizes relating to students as a guide, consultant, or resource as opposed to transmitting knowledge, setting goals, and providing feedback. A similar study by Singer (1996) investigated the espoused teaching paradigms of faculty through the use of a survey instrument that asked faculty to assess their own attitudes and behaviors. Factor analysis was used to construct seven scales that represented the paradigms: attitudinal (content-oriented, process, motivation) and behavior (student involvement, discipline-centered, management of feedback, and professor involvement). Results from the regression analyses indicated that gender was a significant predictor of each of the paradigms. Females were more likely than males to utilize motivation or process paradigms yet they were less likely to support a content-oriented paradigm. Moreover, they found that “women were more likely than men to invest time planning their courses, designing learning activities, and assessing student learning” (p.673).

Statham, Richardson, and Cook (1991), found that gender differences persisted even after controlling for course level, class size, professor’s rank, and the gender ratio of the faculty in a

given department. Women professors spend significantly ( $p < 0.05$ ) greater proportion of time encouraging and allowing student participation than men professors. For example, women spent 4.7% of their time soliciting students' input, whereas men spent only 2.9%. Similarly, men only solicited responses from students 3.7% of the time, where as women did this 5.1% of the time.

In a recent study, Starbuck (2003) examined gender differences in teaching styles while also controlling for disciplinary area. Given that faculty from some fields are predominantly women, controlling for discipline is important. Starbuck measured 22 different teaching activities, ranging from class discussion and group projects to simulations and role plays. She found that only three of the activities were significantly different by gender: small group discussion, lecture, and the use of power-point slides. However, these differences became non-significant once the analyses controlled for discipline.

Results from the Faculty Survey of Student Engagement (FSSE) also suggest ways in which men and women teach differently. Women faculty members emphasize higher order thinking skills, active and collaborative learning, and diversity experiences more than men (National Survey of Student Engagement, 2005). Also, even after controlling for disciplinary and other differences, "women are more likely than their counterparts to value and use effective educational practices" (Kuh, Nelson Laird, & Umbach, 2004, p. 29), such as placing an emphasis on academic challenge and enriching educational experiences.

That Starbuck (2003) found no gender differences after controlling for discipline where others see differences even after controlling for discipline (e.g., Kuh et al., 2004), may be an indication that gender differences are not consistent across disciplinary areas and, perhaps, other context indicators. So beyond understanding how men and women faculty teach differently, it is also essential to examine whether and how gender differences may change based on various

course characteristics, such as disciplinary area, class size, or whether the course is part of the general education curriculum.

### Purpose of the Study

The purpose of this study is to compare teaching styles of men and women and determine whether gender differences vary by context (e.g., disciplinary area and other course characteristics). This study specifically focuses on the way in which faculty members allocate their time in the classroom in terms of lecturing and active classroom practices as a reflection of teaching style. For example, do women faculty members allocate a greater or smaller proportion of their class time to lecturing? Further, how is the gap between men and women dependent on characteristics of the course like discipline or size? Based on previous research, it is likely that we will find men and women allocate their time differently even after controlling for a host of faculty characteristics and institutional factors. However, by examining if the gaps become smaller or wider under certain conditions, we can better understand the effect of gender on teaching styles within the contexts in which the effect appears.

### Methods

#### *Data Source*

The data for this study come from the 2006 administration of the Faculty Survey of Student Engagement (FSSE), an annual survey of faculty teaching undergraduates at baccalaureate degree-granting colleges and universities across the U.S. designed to complement the National Survey of Student Engagement by asking faculty about the value and emphasis they place on activities that prior research has connected to valued outcomes (Chickering & Gamson, 1987; Kuh, 2001, 2003; Pascarella & Terenzini, 2005). Institutions that participate in NSSE can choose to participate in FSSE and select their own sample of faculty to survey. Given that the

focus of the survey is on undergraduate teaching and learning, institutions are encouraged to submit contact information only for those faculty members who teach undergraduates. The vast majority of institutions survey all undergraduate teaching faculty.

Of the 131 institutions that participated in FSSE 2006, responses are used from faculty at the 107 U.S. institutions where faculty had valid responses for the variables used in the analyses (see Appendix A). Most of the institutions dropped from the study did not have tenure systems.

Although not sampled to represent all U.S. colleges and universities, the 107 institutions represent a wide cross-section of U.S. baccalaureate degree-granting institutions. For example, of the 107 institutions, 21% are doctoral, 41% are master's, 31% are baccalaureate level. In addition, slightly over half of the institutions are public (56%).

The instrument focuses on faculty perceptions of how often their students engage in different activities, the importance faculty place on various areas of learning and development, the nature and frequency of faculty-student interactions, and how faculty members organize class time. The survey is available at the FSSE website, [www.fsse.iub.edu](http://www.fsse.iub.edu). For many questions on the survey, including allocated classroom time discussed below, faculty respondents were instructed to answer based on a particular course taught during the 2005-06 academic year.

FSSE is administered online, requiring about 15-20 minutes to complete. Faculty members were contacted up to four times and their responses were kept anonymous to their institutions to encourage participation. These survey design, content, and administration elements contribute to the relatively high response rates observed at participating institutions. After adjusting for faculty who could not be reached (usually because of incorrect email addresses), the average institutional response rate for 2006 was 54%, with a range from 26% to 86%. The response rate for FSSE across all institutions was 46%.

### *Sample*

The sample for this study, after deletion for missing data, consists of 9,647 cases. Out of the total number of respondents, approximately 46% were female, 84% were White (4% African American, 5% Asian, 4% Hispanic, < 1% Native American, 1% other racial/ethnic background, and 1% multi-racial or ethnic), and about 84% were working full-time. In addition, about 31% were not on the tenure track, 23% were untenured on the tenure track, and 45% were tenured. The average faculty member taught 5 courses in the current academic year.

Faculty members responding to the survey picked a course they taught in the 2005-06 academic year about which they would respond to survey questions. Of the respondents in this study, 57% responded regarding an upper division (mostly juniors and seniors) course and 49% responded about a course that met a general education requirement. The average faculty member had a course of about 40 students and had previously taught the course 11 times.

Faculty members were also asked to identify the field of study within which the course was being offered. Courses from 62 disciplinary areas were included. Based on the work of Biglan (1973a,b), Braxton and Hargens (1996), and Stoecker (1993), areas were mapped into Biglan's original categories (see Table 1). We dropped faculty from fields not yet categorized in the research literature (such as gender studies as well as library, computer, and military science). Of the faculty members in the sample, 28% were in hard (rather than soft) fields, 65% were in pure (rather than applied) fields, and 35% were in life (rather than non-life) fields.

### *Measures*

FSSE contains several sets of items that could be considered indicators of teaching style. Of particular interest in this study is the set of 10 items where faculty were asked to estimate the percentage of class time devoted to activities such as lecturing, teacher-led discussions, teacher-

student shared responsibility, small group activities, student presentations, performances in applied and fine arts and experiential activities. Faculty responded to these items on an eight-point scale (0, 1-9, 10-19, 20-29, 30-39, 40-49, 50-74, and 75 or more) and their responses were coded as the mid-points of the ranges given. Based on their responses and this coding, the average faculty member in our sample spends 45% of class time lecturing and 42% of class time on active classroom practices, a summation of the percent of class time spent on teacher-student shared responsibility, small group activities, and student presentations. Far too many faculty members spent no class time on the other activities in this set to make them suitable for analysis. For example, when we attempted to analyze the summation of experiential and performance activities, we found that about 54% of faculty spent no time on either of these activities. With such a skewed distribution, the model explained very little variance in the dependent measure (in this case about 3%), which suggests the resulting coefficient estimates may be unstable. Consequently, we focused this study on the two indicators mentioned above, lecturing and active classroom practice, which make up the bulk of faculty members' reported classroom activities and fit well with the focus of past research on teaching styles.

Based on prior research (e.g., Kuh et al., 2004, Nelson Laird, Shoup, & Kuh, 2006; Umbach & Wawrzynski, 2005), we hypothesized that teaching style, as measured by our dependent measures, is predicted by faculty characteristics (gender, race/ethnicity, employment status, tenure status, and course load), course characteristics (discipline, course level, whether the course meets a general education requirement, course size, and the number of times the course the previously taught by the same instructor), and institutional characteristics (Carnegie classification and institutional control). Faculty and course characteristics are self-reported and descriptions of all independent measures are contained in Appendix A.

*Data Analyses*

Using ordinary least squares, we regressed each dependent measure on the full set of independent measures, which were entered in two blocks. First, we examined the effect of gender on the dependent measures controlling for other faculty characteristics as well as course and institutional characteristics. In order to examine whether gender differences varied by course characteristics, the second block contained measures equal to the product of gender and each of the course characteristic variables (seven interaction terms in total). Prior to entry into the regression models and prior to the calculation of the interaction terms, all independent variables were grand mean centered, which simplified the calculation of estimated gender differences by individual course characteristics based on the coefficients from the full model.

*Limitations*

Several factors limit the generalizability and conclusions drawn from this study. First, faculty respondents are not randomly sampled. They are from institutions that chose which faculty to survey in 2006. This suggests that caution should be used when generalizing our findings to faculty at other institutions of higher education. Fortunately, the 107 institutions included in this study represent a wide cross-section of U.S. four-year colleges and universities where, in nearly all instances, all undergraduate teaching faculty or simply all faculty members were surveyed. In addition, response rates for nearly all campuses were respectable (greater than 30%). Although similar study done on faculty from a particular segment of institutions (e.g., elite research universities) might produce quite different results, it would be surprising if other studies done on faculty from U.S. institutions in general did not find similar results.

Second, faculty members chose which of their courses they would have in mind while answering questions. While course characteristics (e.g., upper or lower division and size)

indicated a wide cross-section of course types covered in the survey, there is the possibility that faculty members' choices were not entirely random. For example, there could be a bias toward selecting smaller lower division courses, when possible. Caution should therefore also be used when generalizing beyond the courses covered by faculty responses.

Third, due to the strong relationship among certain variables, we limited the number of variables in our model. For example, tenure status and rank are very closely connected. Tenure status was chosen because its correlation with other independent variables was generally smaller than rank. In addition, rank and age correlated highly with the number of times a course had been taught. Consequently, age was also not used. The implication of these choices is that the meaning of an effect on teaching style may be clouded. For example, is an effect of times taught really an effect of age? We try to highlight the multiple possible interpretations when appropriate. However, truly unpacking how these variables influence faculty teaching practices is fertile ground for future research into how teaching experience, age, rank, and tenure status influence the classroom.

## Results

Results from our study suggest that, compared to men, women spend a smaller proportion of class time lecturing and a greater proportion of class time on active classroom practices. In addition, the gap between women and men on both dependent measures varies by several course characteristics. In these analyses, we report the unstandardized regression coefficients because they reflect the difference a one-unit change in the independent measure would have on the percentage of class time spent on different teaching activities. For a 15-week course that meets three hours per week, one percent of class time is equivalent to slightly less than half an hour over the course of the term.

*Lecturing*

Based on the results in Table 2, the average woman faculty member spends about 10 percent less class time lecturing than her male counterpart after controlling for other faculty, course, and institutional characteristics ( $B = -10.03$ ,  $p < 0.001$ ). We also find that, compared to White faculty members, Asian and Pacific Islander faculty tend to spend a greater proportion of time lecturing ( $B = 6.61$ ,  $p < 0.001$ ), while multiracial faculty tend to spend a smaller proportion of time lecturing ( $B = -5.11$ ,  $p < 0.05$ ). Tenure status does not seem to make much of a difference, though faculty on the tenure track but not yet tenured tend to lecture slightly more than their non-tenure track colleagues ( $B = 2.14$ ,  $p < 0.05$ ). Course load also plays a small role. For each additional course taught in a term, our results suggest faculty would reduce their lecturing by one half of a percent ( $B = -0.49$ ,  $p < 0.001$ ).

The percentage of time lecturing is also affected by course characteristics. On average, faculty members in hard disciplines spend almost 16 percent more class time lecturing than faculty in soft disciplines ( $B = 15.72$ ,  $p < 0.001$ ). Faculty members in pure disciplines lecture a smaller percentage of time than their applied colleagues ( $B = -3.28$ ,  $p < 0.001$ ) and faculty in life fields lecture a greater percentage of the time than faculty in non-life fields ( $B = 5.99$ ,  $p < 0.001$ ). In addition, faculty with general education courses (GECs) lecture one percent more than non-GEC faculty ( $B = 6.61$ ,  $p < 0.001$ ) and, all else held constant, we would estimate that increasing one's course size by 10 students would result in 1.3 percent more time being devoted to lecturing ( $B = .13$ ,  $p < 0.001$ ). Interestingly, the more times a faculty member had taught their course, the greater percentage of time spent lecturing. Since this is a cross-sectional study, it is unclear whether that is a result of older faculty (those more likely to have taught their course more times) being more likely to lecture or whether it is the case that repeatedly teaching a course increases

the percentage of time devoted to lecture. Institutional characteristics, mostly included for control purposes, had small effects on this dependent measure.

After explaining slightly over 20 percent of the variance in the percent of class time lecturing with faculty, course, and institutional characteristics, interaction terms were added to test whether the difference found between women and men varies by course characteristics. The model 2 results in Table 2 suggest that that the gender gap is dependent on course context, though the differences in the gender gap are not large. In particular, women in the life fields spend eight percent less class time on lecturing than men, while women in the non-life fields lecture slightly over 11 percent less than men in the non-life fields (see Figure 1).

Figure 2 illustrates how the gender gap is different depending on course level. On average, men spend about the same percentage of class time lecturing regardless of course level while women lecturing less in upper division courses than lower division courses. Figure 3 illustrates how the gender gap gets slightly larger as the number of times the instructor has taught the course goes up.

#### *Active Classroom Practices*

Based on the results in Table 3, the average woman faculty member spends more than 13 percent more class time on active classroom practices than her male counterpart ( $B = 13.7$ ,  $p < 0.001$ ). Similar to lecturing, we found that race/ethnicity was a significant factor among faculty members allocating their time to active classroom practices. On average, faculty of color tend to devote more time to our dependent measure even after controlling for other faculty, course, and institutional characteristics. In particular we found African Americans tend to spend over 20 percent more time ( $B=21.65$ ,  $p < 0.001$ ), Hispanic/Latinos about 12 percent more time ( $B=11.78$

$p < 0.001$ ), and Asian/Pacific Islanders over 5 percent more time on active classroom practices ( $B=5.19$ ,  $p < 0.01$ ) than their White counterparts.

The effect of employment status was not appreciably different from zero non-significant, but when compared to non-tenure track faculty members, both tenured and tenure track faculty members tend to devote 5 percent less class time to active practices ( $B=-5.36$ ,  $p < 0.001$ ;  $B=-5.78$ ;  $p < 0.001$ ). As with lecturing, course load plays a small role. For each additional course taught in a term, our results suggest a faculty member would increase active practices by one half of a percent ( $B = 0.46$ ,  $p < 0.001$ ).

Course characteristics also seem to affect the proportion of time spent on active classroom practices. Most notably faculty members in the hard disciplines, compared to soft, devote 10 percent less class time on active classroom practices ( $B = -10.26$ ,  $p < 0.001$ ). Furthermore, faculty members in life disciplines devote slightly less time to active practices than their non-life colleagues ( $B = -4.03$ ,  $p < 0.001$ ). Unlike lecturing, faculty members teaching a selected course in pure and applied fields devote about the same percentage of time to active classroom practices on average.

We found a slight difference between faculty members who taught a GEC and non-GEC course, with GEC faculty allocating more time to active classroom practices ( $B = 1.76$ ,  $p < 0.05$ ). And, with all else held constant, we found that by increasing one's course size by 10 students, we would estimate a faculty member would spend 1.2 percent less time on active classroom practices ( $B = -0.12$ ,  $p < 0.001$ ). The effect for the times a faculty member had taught a course was quite small ( $B= -0.06$ ,  $p < 0.05$ ).

Collectively, faculty, course, and institutional characteristics, explained about 12 percent of the variance in the percent of class time faculty devoted to using active classroom practices

within their selected course section. The interaction terms added a small, but significant, amount to the explained variance in the model. The Model 2 results in Table 3 suggest that the gender gap is, again, dependent on course context. In particular, women in the pure fields spend 12 percent more time on active practices than men, but, in the applied fields, the gap between women and men is slightly larger with women allocating 16.6% more time to active classroom practices (see Figure 4). Similarly, the difference in the gaps for life and non-life fields was about 4.4%, with the female-male gap equaling 10.9% for life and 15.4% for non-life fields (no figure is shown for this result).

Figure 5 illustrates how the gender gap is different depending on teaching a general education requirement course. On average, men devote about the same percentage of class time to active practices regardless of whether their course is a GEC, while women tend to devote more time to active practices in GECs than non-GECs. Lastly, Figure 6 illustrates how the gender gap is slightly smaller as the classroom size grows. Our model estimates that women allocated nearly 15% more classroom time to active practices compared to men for a class of 14 students, whereas the gap shrinks to less than 10% when the class size is over a 100.

### Discussion and Implications

Unlike Starbuck (2003), but similar to prior research on FSSE and other data (e.g., Kuh et al., 2004; Statham et al., 1991), we found that gender differences in teaching styles persist even after controlling for faculty, course, and institutional characteristics. Similar to other studies (Grasha, 1994; Kuh et al., 2004), we found that women faculty members tend toward active and interactive activities to a greater degree than men. In fact, there seems to be a pretty close trade-off between lecturing and active practices. At least in the aggregate, the affect for gender was approximately the same magnitude, but opposite in direction for the two dependent measures.

This same shift in effect is apparent for several variables in the models, which suggests that a reduction in lecturing is like to result in an increase in active practice.

Interestingly, the largest disciplinary differences exist between hard and soft fields, suggesting that these fields have different preferred teaching styles. However, our results do not suggest that disciplinary socialization impacts how gender effects teaching style along this disciplinary division. We found that the gap between men and women in life fields is smaller on both dependent measures than for non-life fields. This suggests some interaction between gender and disciplinary socialization or norms. Among the respondents, a majority of faculty members in the life fields were women (54%) whereas non-life fields are majority men (59%). Socialization into life fields may diminish the gender effect as a result of the gender balance. It may also be that life fields are more likely to deal with gender differences as a part of course content, which could have an effect on how instructors decide to teach. Interestingly though, life fields tend to lecture more and do less active practices than non-life fields, even after controlling for other disciplinary and course characteristics. We also saw a difference in the gender gap for active practices between pure and applied fields (Figure 4). Both pure and applied fields are male dominated, so the diminishing of the gender differences may be due to the strong traditions about teaching in pure fields.

That most other course characteristics interacted with gender in one model or the other suggests that gender dynamics in teaching are complex. Norms about teaching particular types of courses may affect how gender effects teaching, which could explain why we observe differences in the gender gaps for lower and upper division courses and GECs and non-GECs. For example, faculty may feel that they have more instructional freedom at the upper division level and thus gender differences are enhanced, whereas the perceived constraints of teaching a

lower division course may inhibit gender differences. To complicate this further, it may be that faculty conceptions of the constraints may vary by gender, which would help explain why men do not appear to adapt the percentage of class time on active practices by whether a course is a GEC or not, but why women teaching GECs use active practices more than women who are teaching non-GECs.

The interaction between course size and gender is an indication that some practicalities can interrupt gender differences. It may simply be too difficult once a course reaches a certain size to continue to use active practices. Interestingly, this diminished gap in active practices for larger classes does not manifest itself as a significant diminishing of the gap in lecturing, suggesting that women tend to move away from active practices toward something other than lecturing.

This study has several key implications for future research. First, while there is an overall effect of gender supporting the notion that women have a greater affinity for active practices, gender should not be treated as if it effects all groups of faculty with the same strength. The difference in the gender gaps between disciplinary groupings is a perfect example. Explaining why these differences exist seems like a logical follow-up to this work. Understanding how disciplinary socialization and gender function together would be essential to this work. As researchers move forward, they should also not ignore any of the Biglan (1973a,b) categories. While some research has found that there are not differences between life and non-life faculty (Braxton & Hargens, 1996), our study suggests that this is an important disciplinary distinction for some aspects of teaching style, particularly when the interaction of discipline and gender are considered.

Biglan's categorization (1973a,b) is not the only scheme for grouping the many disciplinary areas. This raises the question of what insight could be gained by examining how gender interacts with discipline as described by Holland (1997; see also Smart & Umbach, 2005), for example, or others.

Implications of this study for practice revolve around disciplinary socialization and faculty development. Though some research suggests that active practices result in better student outcomes (see Pascarella & Terenzini, 2005), we have intentionally avoided making judgments about the appropriateness of using more or less lecturing or active practices. Agents of disciplinary socialization and faculty development professionals should be mindful of the existence of gender differences in teaching style and address them with their faculty colleagues. Is there a perceived need for the gender differences in teaching? In other words, is it that men and women are, in general, equally equipped for effective instruction, but they differ in their practice because they actively choose their instructional methods based on an understanding of what will work best for their students? Alternatively, is the gap simply a product of tradition or a byproduct of gender socialization (i.e., women, because of social norms, tend to pay more attention to their teaching and do better at matching instructional modes to their classroom needs)?

### Conclusion

Importantly, the gap between men and women is not consistent across all contexts and other faculty characteristics. As research on gender continues, it will be crucial to determine how and why the gaps are different. Faculty may be developing their own teaching style based on their perceptions of students and peer expectations. While faculty may have a personal preference for teaching in a certain way, some could feel pressured to alter their style based on

the classroom environment, students, or lack of time due to their other commitments to research and service. Understanding how and why the gaps vary may also be related to faculty's views on student learning and how they determine their teaching goals for a particular context.

Determining further explanations will require not only an assessment faculty's current practices but also how they developed over time through their socialization into academia.

Understanding the relationship between gender and teaching style can also have implications for practice. Faculty development programs should be aware of results from this study that indicate that gender differences do exist. However, while paying attention to gender and teaching styles is important; practitioners must be careful not to assume that the gap is the same regardless of other faculty and course characteristics. Moreover, although some research indicates that active teaching practices are more effective than lecturing, it is imperative not to assume women are teaching "better" than men. Instead, results from this study can be used as a springboard for conversations about how and why teaching style varies by gender and the best way to meet the needs of both faculty and students in different environments.

## References

- Andersen, K. & Miller, E.D. (1997). Gender and student evaluations of teaching. *Political Science & Politics*, 30, 216-219.
- Baslow, S.A. (1995). Student evaluations of college professors: When gender matters. *Journal of Educational Psychology* 87(4), 656-665.
- Basow, S.A. & Silberg, N.T. (1987). Student evaluations of college professors: Are female and male professors rated differently? *Journal of Educational Psychology*, 79(3), 308-314.
- Biglan, A. (1973a) The Characteristics of Subject Matter in Different Scientific Areas. *Journal of Applied Psychology*, 57, 195–203.
- Biglan, A. (1973b) Relationships between Subject Matter Characteristics and the Structure and Output of University Departments. *Journal of Applied Psychology*, 57, 1204–1213.
- Braxton, J. M. & Hargens, L. L. (1996) Variation among academic disciplines: analytical frameworks and research. In J.C. Smart (Ed.), *Higher Education Handbook of Theory and Research*, XI, pp. 1–46.
- Burns-Glover, A.L. & Veith, D.J.(1995). Revisiting gender and teaching evaluation. Sex still makes a difference. *Journal of Social Behavior & Personality: Special Issue: Gender in the workplace*, 10(6), 69-80.
- Centra, J.A. & Gaubatz, N.B.(2000). Is there gender bias in student evaluation of teaching? *Journal of Higher Education*, 71(1), 17-33
- Chickering, A. W. & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 39(7), 3-7.
- Goodwin, L.D. & Stevens, E.A. (1993). The influence of gender on university faculty members' perceptions of "good" teaching. *The Journal of Higher Education*, 64(2), 166-185
- Grasha, A. F. (1994). A matter of style: The teacher as expert, formal authority, personal model, facilitator, and delegator. *College Teaching*, 42(4), 142-149.
- Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed.). Odessa, FL: Psychological Assessment Resources.
- Kardia, D.B. & Wright, M.C. (2004). Instructor identity: The impact of gender and race on faculty experiences with teaching. *Occasional Paper*. University of Michigan Center for Research on Learning and Teaching.
- Kuh, G. D. (2001). Assessing What Really Matters to Student Learning: Inside the National Survey of Student Engagement. *Change*, 33(3), 10-17, 66.

- Kuh, G. D. (2003). What we're learning about student engagement from NSSE. *Change*, 35(2), 24-32.
- Kuh, G. D., Nelson Laird T. F., & Umbach, P. D. (2004). Aligning faculty and student behavior: Realizing the promise of Greater Expectations. *Liberal Education*, 90(4), 24-31.
- Lacey, C.H., Saleh, A., & Gorman, R. (1998). Teaching nine to five: A study of the teaching styles of male and female professors. Paper presented at the Annual Women in Education Conference, Lincoln, Nebraska, October 11-12.
- National Survey of Student Engagement (2005). *Exploring different dimensions of student engagement*. Bloomington, IN: Indiana University Center for Postsecondary Research.
- Nelson Laird, T. F., Shoup, R., & Kuh, G. D. (2006, May). *Measuring Deep Approaches to Learning using the National Survey of Student Engagement*. Paper presented at the Annual Forum of the Association for Institutional Research, Chicago, IL.
- Pascarella, E. T. & Terenzini, P. T. (2005). *How college affects students: A third decade of research*. San Francisco: Jossey-Bass.
- Singer, E. (1996). Espoused teaching paradigms of college faculty. *Research in Higher Education*, 37(6), 659-679.
- Smart, J. C. & Umbach, P. D. (November, 2005). *Faculty and academic environments: Using Holland's theory to explore differences in how faculty structure undergraduate courses*. Paper presented at the 30<sup>th</sup> Annual Meeting of the Association for the Study of Higher Education, Philadelphia, PA.
- Starbuck, G.H. (2003). College teaching styles by gender. Paper presented at the Western Social Science Association Annual Meeting, Las Vegas, NV, April 9-12.
- Statham, A. Richardson, L. & Cook, J.A. (1991). *Gender and university teaching: A negotiated difference*. Albany: State University of New York Press.
- Tartro, C.N. (1995). Gender effects on student evaluation of faculty. *Journal of Research and Development in Education*, 28(3), 169-73.
- Umbach, P. D. & Wawrzynski, M. R. (2005). Faculty do matter: The role of college faculty in student learning and engagement. *Research in Higher Education*, 46(2), 153-184.
- Whitworth, J.E., Price, B.A. & Randall, C.H. (2002). Factors that affect business college students opinion of teaching and learning. *Journal of Business Education*, May/June, 282-289.

Appendix A  
Independent Variables

Variable	Description
<b>Faculty Characteristics</b>	
Gender	0 = Male, 1 = Female
Race/ethnicity <sup>a</sup>	African American, American Indian, Asian American, White <sup>b</sup> , Hispanic, Other, Multiple ethnic identifications
Employment status	0 = Part-time, 1 = Full-time
Tenure status <sup>a</sup>	Not on track <sup>b</sup> , On track, Tenured
Course load	Number of courses taught in the current academic year
<b>Course Characteristics</b>	
Disciplinary categories <sup>c</sup>	
Hard	0=Soft, 1=Hard
Pure	0=Applied, 1=Pure
Life	0=Non-life, 1=Life
Course level	0 = Lower division, 1 = Upper division
General education course (GEC)	0 = Non-GEC, 1 = GEC
Course size	Number of students enrolled in course
Course times	Number of times course was previously taught by the same instructor
<b>Institutional Characteristics</b>	
Carnegie classification <sup>a</sup>	Doctoral - Extensive, Doctoral - Intensive, Master's Colleges and Universities I & II, Baccalaureate - Liberal Arts <sup>b</sup> , Baccalaureate - General, Other classification
Institutional control	0 = Public, 1 = Private
<b>Context Interaction Terms</b>	
Gender*Hard	
Gender*Pure	
Gender*Life	
Gender*Course level	
Gender*GEC	
Gender*course size	
Gender*course taught	
Values for the interaction terms equal the product of the values for the two variables being interacted	

Note: All variables except interaction terms mean centered prior to entry into regression models.

<sup>a</sup> Coded dichotomously (0 = not in group, 1 = in group)

<sup>b</sup> Reference group

<sup>c</sup> Based on Biglan (1973a, b)

Table 1.  
Disciplinary Areas by Biglan Categories

	Hard	Soft
Pure-Life	Biology (general) Biochemistry or biophysics Botany Environmental science Microbiology or bacteriology Zoology Kinesiology	Anthropology Ethnic studies Political science (including government, international relations) Psychology Sociology
Pure-Non-Life	Astronomy Atmospheric science (including meteorology) Chemistry Earth science (including geology) Mathematics Physics Statistics	Art, fine and applied English (language and literature) History Language and literature (except English) Music Philosophy Theater or drama Geography
Applied-Life	Speech Medicine Dentistry Veterinarian Pharmacy Agriculture	Business education Elementary/middle school education Music or art education Physical education or recreation Nursing Allied health/other medical Social work Family Studies Criminal justice
Applied-Non-Life	Aero-/aeronautical engineering Civil engineering Chemical engineering Electrical or electronic engineering Industrial engineering Materials engineering Mechanical engineering General/other engineering	Journalism Accounting Business administration (general) Finance Marketing Management Architecture Urban planning Economics Communications Public administration

Categorization based on Biglan (1973a,b), Braxton and Hargens (1996), and Stoecker (1993)

Table 2.  
Unstandardized Results of Faculty, Course, and Institutional Characteristics Regressed on  
Percentage of Class Time Lecturing

Variable	Model 1	Model 2
	B	B
Intercept	44.64 ***	44.49 ***
Female	-10.03 ***	-10.10 ***
African American/Black	-0.98	-0.95
American Indian	-3.51	-3.77
Asian/Pacific Islander	6.61 ***	6.53 ***
Hispanic/Latino	-0.42	-0.37
Other	-3.78	-3.73
Multiracial	-5.11 *	-5.03 *
Full-time status	0.62	0.58
Tenure track	2.14 *	2.14 *
Tenured	0.02	0.03
Course load	-0.49 ***	-0.47 ***
Hard	15.72 ***	15.67 ***
Pure	-3.28 ***	-3.03 ***
Life	5.99 ***	5.93 ***
Upper division	-1.01	-1.05
General education requirement	1.22 *	1.27 *
Course size	0.13 ***	0.13 ***
Course times	0.12 ***	0.11 ***
Doctoral-Extensive	2.79 *	2.92 *
Doctoral-Intensive	-0.11	-0.02
Master's	3.58 **	3.66 **
Baccalaureate-General	3.13 *	3.20 *
Other	-2.13	-1.99
Private	-2.35 ***	-2.30 **
Female*Hard		-0.16
Female*Pure		0.63
Female*Life		3.27 **
Female*Upper division		-2.49 *
Female*Gen ed		-1.52
Female*Course size		0.02
Female*Course times		-0.09 *
	R <sup>2</sup>	
	0.205	0.207
	R <sup>2</sup> Change	0.002

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Table 3.  
Unstandardized Results of Faculty, Course, and Institutional Characteristics Regressed on  
Percentage of Class Time on Active Classroom Practices

Variable	Model 1	Model 2
	B	B
Intercept	41.91 ***	42.01 ***
Female	13.73 ***	13.80 ***
African American/Black	21.65 ***	21.62 ***
American Indian	13.83 *	14.15 *
Asian/Pacific Islander	5.19 **	5.48 **
Hispanic/Latino	11.78 ***	11.82 ***
Other	7.57 *	7.72 *
Multiracial	11.37 **	11.03 **
Full-time status	-1.38	-1.24
Tenure track	-5.36 ***	-5.46 ***
Tenured	-5.78 ***	-5.86 ***
Course load	0.46 **	0.46 **
Hard	-10.26 ***	-10.07 ***
Pure	0.11	-0.32
Life	-4.03 ***	-4.21 ***
Upper division	5.55 ***	5.61 ***
General education requirement	1.76 *	1.75 *
Course size	-0.12 ***	-0.12 ***
Course times	-0.06 *	-0.07 *
Doctoral-Extensive	-5.45 **	-5.61 **
Doctoral-Intensive	0.42	0.33
Master's	-2.77	-2.88
Baccalaureate-General	-0.43	-0.49
Other	0.58	0.46
Private	0.96	0.93
Female*Hard		0.27
Female*Pure		-4.30 *
Female*Life		-4.43 **
Female*Upper division		2.88
Female*Gen ed		4.45 **
Female*Course size		-0.04 *
Female*Course times		-0.01
	R <sup>2</sup>	
	0.119	0.121
	R <sup>2</sup> Change	0.002

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Figure 1.  
Effect of Gender on the Percentage of Class Time Lecturing by Academic Discipline

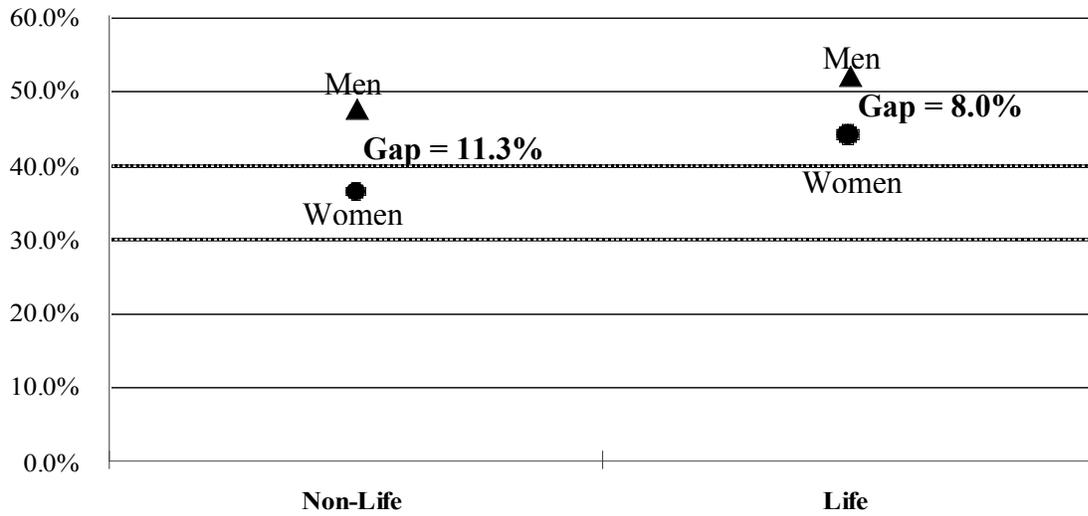


Figure 2.  
Effect of Gender on the Percentage of Class Time Lecturing by Course Level

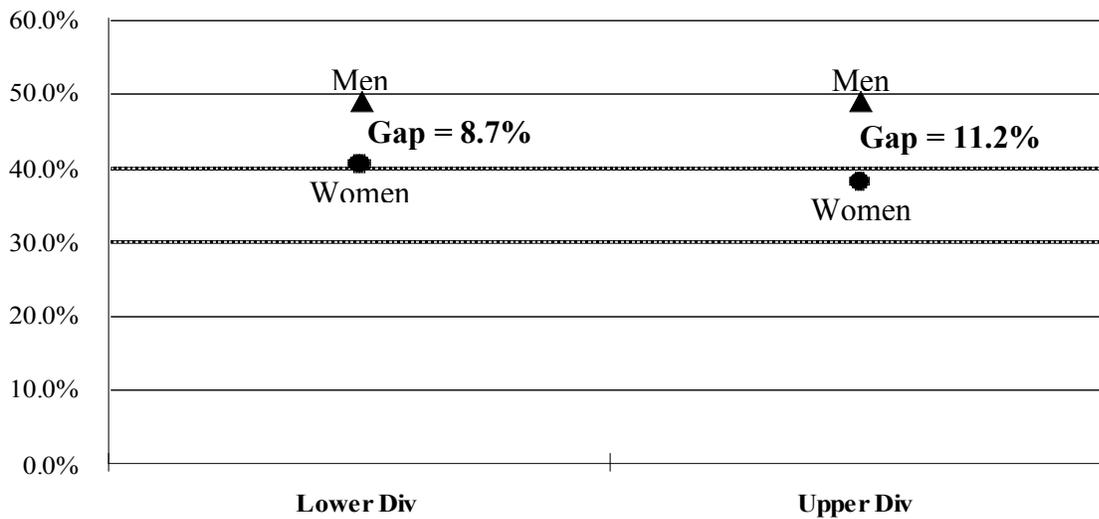


Figure 3.  
Effect of Gender on the Percentage of Class Time Lecturing by Course Times

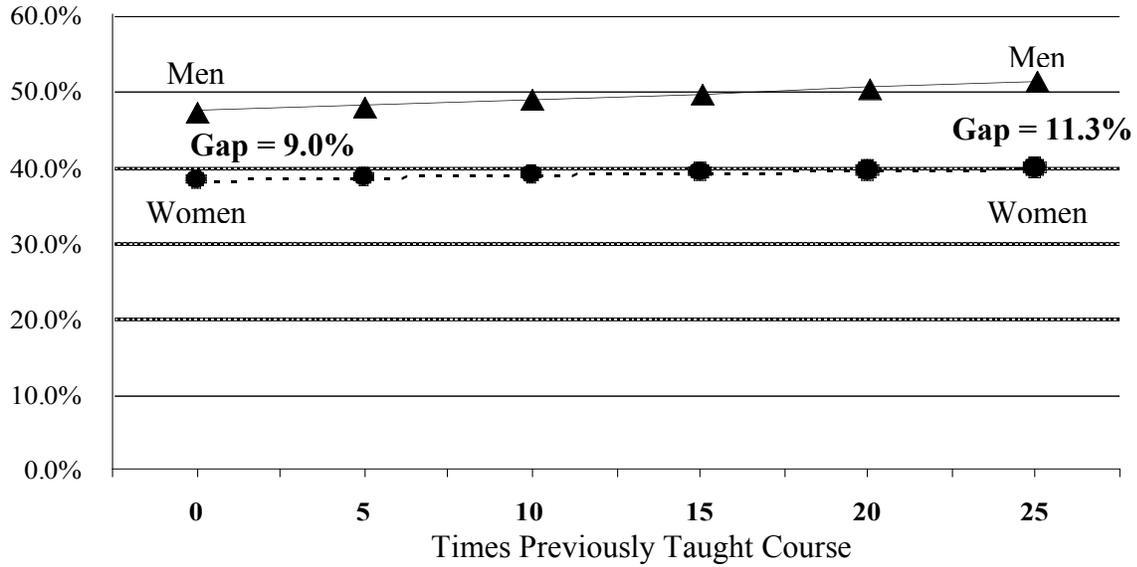


Figure 4.  
Effect of Gender on the Percentage of Class Time on Active Practices by Academic Discipline

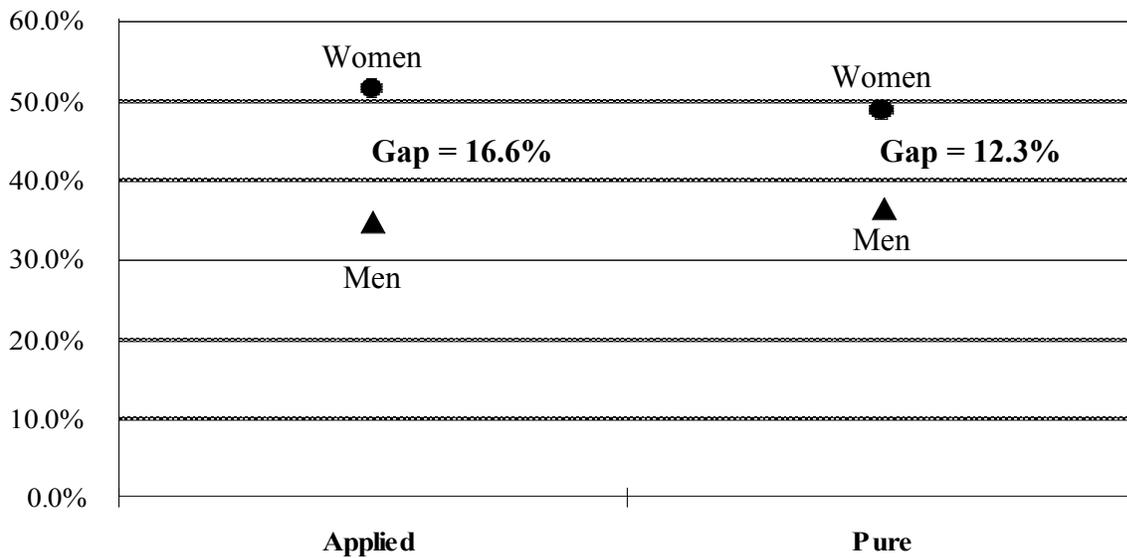


Figure 5.  
Effect of Gender on the Percentage of Class Time on Active Practices by General Education Requirement

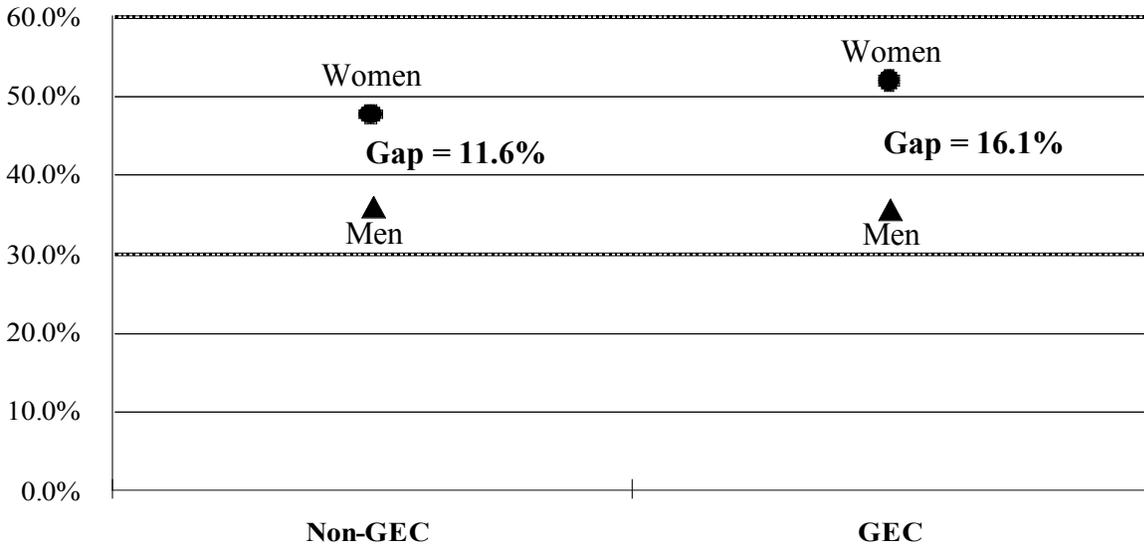


Figure 6.  
Effect of Gender on the Percentage of Class Time on Active Practices by Class Size

