

Gender and the adoption of teaching practices at a small selective liberal arts college

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Abstract:

Carleton College participates in the HERI (Higher Education Research Institute) surveys of faculty. We examined data from 2001-02, 2004-05 and 2007-08 to determine factors most correlated with adoption of teaching practices at Carleton College. Of the variables of faculty gender, faculty rank, faculty race, faculty participation in teaching enhancement workshop, and survey year, only gender and participation in teaching enhancement workshop consistently correlate significantly with adoption of teaching method. This paper examines the correlation between faculty gender and adoption of teaching method. The 2008 HERI results, for instance, show that women faculty at Carleton adopted twelve of 27 listed teaching methods at 10% or higher rates than do male faculty. Male faculty adopt one teaching method at a 10% or higher rate than do women faculty.

Introduction and Methods:

Faculty survey data from HERI (Higher Education Research Institute) provide a wealth of data on changes in faculty perceptions. These data can be used to track certain features of an institution's faculty through time and to compare faculty characteristics across institutions. In one section of the HERI survey, faculty self-report on the teaching methods they use. In other sections, faculty are asked about other student/faculty activities, such as joint research. We used a selection of these questions to explore the relationship between gender of instructor and teaching practice at Carleton College.

Carleton College is a four-year, selective, undergraduate liberal-arts college, with an average on-campus student population of 1820 students. It was founded in 1866. The total number of full-time faculty was 184 in 2001-02, 186 in 2004-05 and 207 in 2007-08 (the three years of the HERI surveys used here). The number of faculty respondents to individual questions considered here ranges from about 93 in 2001-02 to about 120 in 2007-08.

Carleton explicitly values teaching and learning in its mission statement, in its criteria for promotion and tenure of faculty, and in its range of faculty development activities available, many of which are organized by the Perlman Center for Learning and Teaching, started in 1991. Thus, we expect that Carleton faculty use a range of teaching methods in their classes, and this, in fact, is true.

Data from the HERI surveys were compared by percent of a group employing a teaching method (or group of methods). The data were further analyzed with SPSS for standard errors, t values, statistical significance and other parameters. The data were analyzed both in aggregate (all three years of the survey) and by individual years. Data were recoded as necessary to dichotomous variables. For instance, we recoded data on faculty race into two codes (1=non-white; 0= white).

We chose to use “faculty rank” rather than “faculty age” as a demographic control. At Carleton, faculty age and rank are roughly associated the way one would expect (faculty over 50 tend to be concentrated in the full professor rank, while those in their early 30s tend to be mostly assistant professors). However, the distribution of rank for those in their 40s is more complex. For women, 25.9% of those aged 40-44 are professors, 51.9% associate professors and 22.2% assistant professors (the remainder are lecturers). For men aged 40-44, 37.1% are professors, 45.7% associate professors and 17.1% assistant professors. For those aged 45-49, two-thirds are full professors (a virtually equal percent for men and women); but 16.7% of the women in this age category are assistant professors, as are 11.5% of the men. The distribution of rank for men and women in the 35-39 age category are also noteworthy: while 2/3 of the women in this age category are assistant professors, just less than half of the men are at this rank. Given these patterns and their complications, we believe that rank is a better demographic control rather than age, because rank would most likely better correspond to stages in a faculty life cycle (or perhaps “career cycle”) than would chronological age.

Results:

Of the demographic variables assessed, only gender and “participation in a teaching enhancement workshop (within two years of taking the survey)” show consistent and statistically significant correlations with teaching method.

Table 1 shows the aggregated data from three years of HERI surveys (2001-02, 2004-05 and 2007-08). According to these grouped data, a robust proportion of the Carleton faculty adopt a variety of teaching methods. Ten methods (indicated by asterisks on the table) show a spread of more than ten percent between adoption by female faculty and adoption by male faculty. In six of these ten cases, the statistical significance is ≤ 0.01 . Two of the methods with a wide spread between genders (extensive lecturing and teaching a first-year seminar) were adopted by more male faculty than female faculty; all of the others were adopted by more female faculty. A higher percentage of female faculty than male faculty also use most methods, even in cases that have a lower statistical significance and a lower percent spread between genders.

Table 1 -Teaching Activities by Gender at Carleton College – All Survey Years

Teaching activity used in courses	Percent “Most or All”		Sign.	N
	Men	Women		
*Class discussions	72.5	82.7	.04	298
*Cooperative learning (small groups)	55.0	80.5	.000	299
Experiential learning, field studies	19.5	22.1	.650	204
Teaching assistants	14.0	15.9	.659	297
Recitals, demonstrations	22.9	15.9	.132	296
*Group projects	24.1	43.7	.000	296
*Extensive lecturing	41.5	27.0	.010	297
*Multiple drafts of written work	18.2	31.5	.009	297
*Readings on racial, ethnic issues	20.0	40.5	.000	296
*Readings on women and gender issues	17.6	37.8	.000	297
Student-developed activities (assignments, exams)	11.0	16.7	.245	202
Student-selected topics for course content	6.4	10.2	.233	298
Reflective writing, journaling	8.9	16.7	.089	213
Community service as part of coursework	0.6	1.6	.400	297
Electronic quizzes with immediate feedback in class	0	2.1	.225	118
*Using real-life problems	28.6	46.9	.04	119
*Using student inquiry to drive learning	42.9	54.2	.227	118
	Percent “Yes”			
Developed a new course	78.1	84.1	.195	295
*Taught a seminar for first-year students	37.3	25.6	.073	208
Engaged undergraduates on your research project	60.9	63.3	.792	118
Worked with undergraduates on a research project	78.0	77.6	.939	293

Table 2 shows how gender and teaching method correlations for 13 methods have changed through the past three iterations of the survey. (The range of methods reported here is somewhat smaller than on Table 1 because not all methods were listed in each year). While men lecture more and use small groups less, the most recent survey ('07-'08) shows a movement toward less extensive lecturing and increased use of small groups, compared to previous surveys. This shift is also apparent among women) when compared with earlier responses ('04-'05).

The largest single change in teaching methods from '04-'05 to '07-'08 was among women utilizing student evaluations of each other's work (16% increase; men also increased about 7%).

Table 2 - Percent using various teaching methods in “most or all” courses by gender, for each survey year, at Carleton College

	2001-02		2004-05		2007-08	
	Male	Female	Male	Female	Male	Female
Class discussions	68.8	83.8	73.6	81.0	74.3	83.3
Cooperative learning (small groups)	50.0	81.1*	54.7	76.2**	58.6	83.7*
Experiential learning/field studies	16.7	13.5	na	na	21.4	28.6
Teaching assistants	12.5	16.7	13.2	14.3	15.7	16.7
Recitals/demonstrations	22.9	22.2	22.6	11.9	23.2	14.6
Group projects	17.0	41.7**	28.3	42.9	25.7	45.8**
Extensive lecturing	41.7	16.7**	45.3	33.3	38.6	29.2
Multiple drafts of written work	10.4	29.7**	28.8	38.1	15.7	27.1
Student-developed activities (assignments, exams)	4.2	5.6	na	na	15.7	25.0
Student-selected topics for course content	2.1	8.1	5.7	9.5	10.0	12.5
Student evaluations of each other’s work	8.3	11.1	7.5	7.1	14.3	27.1
Community service as a part of coursework	2.1	2.7	2.1	2.1	0	2.4
Electronic quizzes with immediate feedback	na	na	na	na	0	2.1
Using real-life problems	na	na	na	na	28.6	46.9*
Using student inquiry to drive learning	na	na	na	na	42.9	54.2
Reflective writing/journaling	na	na	7.5	14.3	10.0	18.8
Readings on racial and ethnic issues	14.6	50.0**	20.8	35.7	23.2	37.5
Readings on women and gender issues	16.7	43.2*	17.0	35.7**	18.8	35.4**

Other methods not included because they were asked in only one year or (in the case of community service) there was no variation.

* Gender difference significant at $p < 0.01$

** Gender difference significant at $p < 0.05$ and > 0.01

The results in Tables 1 and 2 indicate gender differences in the use of most teaching methods, though the differences are not large enough to be statistically significant in most cases. Interestingly, there seems to be some convergence across gender in many of these teaching techniques from earlier to later surveys. The finding that women are more likely to use cooperative learning and group projects in most or all of their courses is relatively stable across time.

Many authors, notably Belenky et al. (1986) recognize learning styles dominant in women students. Our analysis of HERI results suggests that these learning styles may translate into differences in teaching style, as found in the examples studied by Kahle (1990), for instance.

Cooperative learning: looking deeper at a single example

A case in point is the adoption of cooperative learning (small groups) at Carleton. Using aggregated data from the last three HERI surveys, the chi-square relationship between gender of instructor and adoption of this teaching method is statistically significant at $p < 0.001$ and the absolute values of the standardized residuals ranges from 1.8 to 2.4. Gender of instructor has a stronger relationship to adoption of cooperative learning than do any of the following variables: age of faculty, tenure status of faculty, ethnicity of faculty (white/Caucasian), particular survey year, and participation in a teaching enhancement workshop during the past two years. In this case and others, age and tenure status of faculty (possible confounding variables) are less important than gender.

In all three survey years, women at all ranks were nearly always more likely to report using cooperative learning in most or all of their courses than were men. For full professors, the gaps were most striking: in the 2001-02 survey year, 81.1% of the women vs. 50% of the men reported using cooperative learning in most or all courses; in 2007-08, 83.7% of the women and 58.6% of the men reported using this technique in most or all courses. For women, the percent of assistant professors reporting using this technique was roughly equivalent to the percent of full professors doing so, while for men, a much higher percent of assistant professors used cooperative learning techniques compared to full professors (in 2007-08, 75% of the male assistant professors reported using cooperative learning in most or all classes, versus 52.4% of the male full professors).

Participation in a teaching enhancement workshop also has interesting interactions with rank and gender as it relates to the use of cooperative learning strategies. For men, there was almost no difference in the percent reporting that they used cooperative learning in most or all of their courses by either rank or participation in a teaching enhancement workshop (between 51% and 59% in every category). For women, there was no discernible effect of participation in a teaching enhancement workshop on the use of cooperative learning, but the percent of women using this technique was much higher than that of men using the technique (81-85% vs. 51-59%). In sum, though the numbers are too small to produce statistically significant results, these patterns suggest that gender gap (at least in this case) persists across survey year, faculty rank and faculty workshop participation.

Table 3 compares the statistical correlation of faculty gender, rank, race and participation in teaching enhancement workshop as well as survey year, with a composite measure of collaborative or reciprocity-based teaching methods: Use of cooperative learning (small groups), Use of group projects and Student evaluation of each other's work. The scale varies between 0 (indicating that the faculty member didn't report using any of the three activities in most or all courses) and 3 (using all activities in most or all courses). The independent variables were all recoded as dichotomous variables.

The collaborative teaching activities were chosen for this analysis because the questions were asked in all three survey years, maximizing sample size. Only sex and participation in a teaching enhancement workshop have statistically significant effects on the use of collaborative learning practices (using the 5% level of significance as the cutoff) and the gender correlation is more significant.

Table 3. Regression of collaborative teaching activity scale on selected independent variables.

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Gender (1=female)	0.489	0.108	0.264	4.551	0.000
Rank (1=Assistant Professor)	0.001	0.131	0.006	0.105	0.916
Participant in teaching enhancement workshop (1=yes)	0.237	0.116	0.123	2.043	0.042
Race (1=nonwhite)	-0.165	0.138	-0.070	-1.191	0.235
1=2007/08 survey year	0.219	0.129	0.118	1.695	0.091
1=2004/05 survey year	0.003	0.137	0.017	0.244	0.808
(Constant)	0.674	0.124		5.435	0.000

R-squared = .0089 (std. error 0.874)

F = 5.60 (p=0.000)

N =283

Carleton instituted a New Faculty Winter Workshop (NFWW), emphasizing active learning pedagogies, in about 1993. Thus, most associate professors and assistant professors (and some full professors) will have participated in the workshop. The percentage of women is higher in the associate professor and assistant professor ranks than it is among full professors (34.0% of full professors are women, compared to 43.9% of associates and 58.3% of assistant professors). Although rank alone is not correlated significantly with adoption of teaching methods, it is possible that a higher proportion of female faculty have participated in this particular annual workshop. One might expect to see a greater usage of cooperative learning in this group, regardless of gender, since that workshop emphasizes active learning and social pedagogy, based on the most recent scholarship concerning student learning. Unfortunately, we do not see this effect. We see the opposite, in fact. Women report extensive use of cooperative learning in most or all of their courses at all ranks (83.0% for full professors, 75.9% for associate professors, and 78.6% for assistant professors), while a lower percentage of male faculty report that they use this method in most or all of their classes (54% for associate and full professors, and 60% for assistant professors). Although the proportion of male faculty employing these methods appears to rise at the assistant professor rank, the difference is not statistically significant.

However, faculty members who report participating in a workshop in the last two years (including, but not limited to the NFWW) also report using cooperative learning in most or all of their courses at higher rates (57% for those not participating in a workshop as opposed to 70.8% for those who do). The percentage spread is roughly doubled for female faculty, however (69.7% for females not participating as opposed to 85.7% for those who do), in comparison with male faculty (50.7% for non-participants and 57.4% for participants).

Discussion:

Patterns for other teaching practices also showed a persistence of gender effects even when other factors were controlled. Women were more likely to report using group projects in most or all of their courses. The patterns did not change significantly over survey years, but female assistant professors in the most recent survey were most likely to use this technique. Other techniques, like student-based inquiry, showed association with both rank and gender, with women at all ranks more likely to use this technique in most or all of their courses than men, and assistant professors more likely than their associate or full professor counterparts to use them for both genders.

Male full professors were more likely than female full professors to report that they employ extensive lecturing in most or all of their courses in all survey years by a wide margin (39% compared to 25%), and more likely than women to employ extensive lecturing whether or not they had participated in a teaching enhancement workshop. However, male full professors who had participated in a teaching enhancement workshop were statistically significantly less likely to use extensive lecturing in most or all of their classes than were male full professors who had not participated in a workshop (29.4% vs. 51%). A somewhat higher proportion of female assistant professors (34%) reported using extensive lecturing in most or all courses compared to their male counterparts (27%).

There are also gender differences in the practice of service or community-based teaching activities. When gender differences are examined by rank, the percentage differences, though in the expected direction, are not statistically significant. But the gaps are much larger at the associate and assistant level than at the full professor level.

Although these patterns suggest that the gender gap persists over time and when other factors are controlled, the patterns are complex and the sample size means that few associations reach statistical significance. For instance, the relatively high percent of female assistant professors compared to male counterparts who report using extensive lecturing may be explained by discipline (17% of female assistant professors are in the natural sciences, mathematics and computer science). Two other factors that may be involved are the amount and kind of previous teaching experience, or to different ways male and female faculty acquire new teaching methods. Differences in adopting teaching methods, for instance, may help explain the finding that women use “extensive lecturing” less than men and use small groups more with a wider gap among those who say they have participated in a teaching workshop in the last two years. However, in many cases, the numbers were so small that it was impossible to draw any firm conclusions.

These differences do not necessarily mean a difference in teaching effectiveness, despite research on learning (e.g. National Research Council, 2005) that suggests that teaching methods influence student learning and studies suggesting that students believe effective teachers use a variety of teaching methods (e.g. Greimel-Fuhrmann and Geyer, 2003). One reason is that the list of teaching techniques used by HERI is not exhaustive and some of the terms used may not correspond to those typically used at Carleton.

The data also indicate that women are more likely than men to have participated in a teaching-enhancement workshop. For all three survey years combined, 59.8% of the men and 73.4% of the women had participated in a teaching-enhancement workshop. The difference was statistically significant ($p=0.015$). An accompanying paper explores the connections between workshop participation and teaching method.

Another possible confounding factor is class size, which also correlates with gender. For instance, males in the '07-'08 HERI survey report teaching more classes over 21 students than female faculty (52.8% versus 38.7% for their first course and 45.6% versus 25.6% for the second course). It is possible that this difference accounts for some of the teaching method choices faculty are making.

Discussion: Role of educational goals

Teaching methods are correlated with gender, but both characteristics may be correlated with something else. We also examined the relationship between gender and educational goals. Table 3 shows the percentage of Carleton faculty considering twelve educational goals to be “essential” or “very important,” comparing results from 2004-05 with those from 2007-08.

Every category showed an increase in both male and female faculty reporting goals as essential or very important, with the exception of a slight dip (-1.2%) in women faculty responding to “help master knowledge in a discipline”. In fact, eight of the eleven categories that could increase saw double-digit growth between the two survey dates, and five categories increased by more than 20%. While there are still significant gaps between men and women in “provide for students’ emotional development” and “enhance students’ knowledge of and appreciation for other racial/ethnic groups,” most of the other ten categories are virtually identical between women and men in the '07-'08 survey. Even in those two categories where large gaps remain, men showed significant increases (9.6% and 24.8% respectively).

A higher percentage of female faculty rate “provide for students’ emotional development,” “instill in students a commitment to community service,” and “teach students tolerance and respect for different beliefs” as very important or essential goals than do their male counterparts. These results suggest that female faculty favor the more affective and community-centered educational ideal advocated by National Research Council (2005).

The rating of learning goals provides a stark contrast between the 2004-2005 and the 2007-2008 surveys. We hypothesize that the change results from several faculty development initiatives (e.g. quantitative reasoning, visual learning) as well as the increased attention brought to student learning goals as a result of our campus-wide discussions of climate and diversity issues, the three-year consideration of updating our graduation requirements (which was itself cast as a form of faculty development), and our recent accreditation self-study that produced Carleton’s first Mission Statement. It may well be that there is a “lag” between the increased recognition of the importance of certain student learning goals and the implementation of new teaching methods to address them. In that case, we might expect to see a similar closing of the gap between men and women in teaching methods in the next HERI survey.

Table 4. Importance of goals to male and female faculty at Carleton College, comparing 2004-05 and 2007-08. 92-93 faculty replied in 2004-05 and 118-119 replied in 2007-08

Teaching method	2004-05			2007-08			Difference		
	M	W	T	M	W	T	M	W	T
Develop ability to think critically	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0
Help master knowledge in a discipline	94.2	95.1	94.6	95.7	93.9	94.9	1.5	-1.2	0.3
Promote ability to write effectively	92.3	92.7	92.5	97.1	100.0	98.3	4.8	7.3	5.8
Instill a basic appreciation of the liberal arts	84.6	80.5	82.8	90.0	93.9	91.6	5.4	13.4	8.8
Enhance students' self-understanding	56.9	75.6	65.2	77.1	77.6	77.3	20.2	2.0	12.1
Prepare students for graduate or advanced education	65.4	70.7	67.7	84.1	85.7	84.7	18.7	15.0	17.0
Provide for students' emotional development	33.3	31.7	32.6	42.9	59.2	49.6	9.6	27.5	17.0
Help students develop personal values	41.2	53.7	46.7	65.2	69.4	66.9	24.0	15.7	20.2
Develop moral character	41.2	48.8	44.6	66.7	67.3	66.9	25.5	18.5	22.3
Enhance students' knowledge of and appreciation for other racial/ethnic groups	54.9	68.3	60.9	79.7	95.9	86.4	24.8	27.6	25.5
Develop creative capacities	68.6	48.8	59.8	90.0	85.7	88.2	21.4	36.9	28.4
Prepare students for employment after college	36.5	31.7	34.4	65.2	61.2	63.6	28.7	29.5	29.2

It seems clear that campus-wide discussions about the curriculum and student learning are increasing awareness among faculty about important learning goals for undergraduates that had been of lower priority in the past. It will be important for Carleton to provide new faculty development opportunities to help insure that these goals are honored, and to be certain that evaluation of teaching effectiveness includes the full range of teaching practices that can foster the accomplishment of those goals.

In the meantime, the differences in reported teaching methods by gender have implications for practices such as peer classroom observations for promotion and tenure.

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