

Investigation of the Underrepresentation of Women in the G. R. Brown Teaching Awards at Rice University

Abstract

During 2000-2007, only three of the 28 unique winners (11%) of the G. R. Brown Award for Teaching at Rice University were women. In addition, none of the winners were women in the science or engineering faculty, whereas eight men in these areas were winners. The purpose of this project is to investigate the reasons for the underrepresentation of women faculty, particularly the women faculty in science and engineering, in the most prestigious teaching awards at Rice University.

We explored the process for administration of the G. R. Brown Teaching Awards. Only tenure-track and tenured faculty are eligible for this award; seven total awards are given each year. Rice University alumni who graduated two and five years ago vote on the award winners. The voting is done by mail through ballots. During the last four years, 11-14% of alumni have participated. The selected winners are simply the faculty members with the most votes.

Considering the ranks of Full Professor and Associate Professor (likely ranks, given that alumni vote), 16% of the faculty are women. Thus, on a percent basis, women are underrepresented as winners in the G. R. Brown Teaching Awards. While excluded from the G. R. Brown Teaching Awards, 31% of the women faculty are at the Lecturer rank. Thus, the exclusion of non-tenure-track faculty disproportionately disadvantages women faculty members.

Considering the number of unique winners (28 total in 8 award years), there is an overrepresentation of winners in Humanities (36% of winners vs. 28% of total faculty) and Social Sciences (32% vs. 12%). There is an underrepresentation of winners in Engineering (11% vs. 24%), Natural Sciences (18% vs. 22%), Architecture (0% vs. 5%), and Music (4% vs. 8%). The situation is even more pronounced when considering the total number of awards given (54 in 8 award years). In this case, Social Sciences receives three times more awards on a percentage basis than its faculty represents, and Engineering receives about half of awards that would be expected, based on the number of faculty in each school at the university. Thus, one explanation for the absence of women award winners who teach in science and engineering is that all faculty in the areas of Science and Engineering are underrepresented.

One distinguishing feature between winners and non-winners is the average number of undergraduates taught per semester. Winners teach statistically significantly more students than non-winners (t-test, $P < 0.0005$). Investigating the large courses in the Colleges of Natural Science and Engineering, 71% of male faculty (32 of 45) teaching large courses are tenured or tenure-track, whereas 72% of female faculty (10 of 14) teaching large courses are Lecturers or Instructors. Thus a second possibility for the absence of women award winners who teach in science and engineering is that most female faculty who teach large numbers of undergraduate students are disqualified from the award due to rank.

Recommendations to modify the selection process to ensure equitable recognition are given.

Introduction

At Rice University, the quality of teaching by the faculty is evaluated in two ways. First, anonymous student evaluations are completed at the end of each semester to determine the perceived strengths, weaknesses, and overall effectiveness of each faculty member teaching a particular course as well as the overall quality of the course. Second, current upper-class students and recent alumni vote for the faculty that they feel were the most effective during their time at Rice. In this second group, there are three awards: the Phi Beta Kappa Teaching Award, the Nicolas Salgo Teaching Award, and the G. R. Brown Teaching Awards. The selection process for the Salgo and G. R. Brown Awards is meant to single out faculty who have had the most substantial impact on the largest number of undergraduate students. The G. R. Brown Teaching Awards are generally considered the most prestigious of the teaching awards.

Many factors have been suspected of causing bias in the instructor evaluation process, which can be generally grouped into three categories: teacher characteristics, course characteristics, and student characteristics.¹

The most notable teacher characteristic is gender. In the literature, it has not been shown that male or female instructors are consistently given higher evaluations over the other, but many important trends have been noted.² First, positive evaluations of male and female instructors are associated with different qualities.³ For example, charisma and warmth are important factors for determining the perceived quality of a female instructor. A more important quality for male instructors is a good speaking ability.² It is likely that this is associated with perceived gender roles and cultural stereotypes.⁴ Second, the gender pairing of student and teacher often has a notable effect on the evaluation process. Typically if a bias is observed, the tendency is a preference for an instructor of the same sex.² Specifically, male students consistently rank male instructors higher, and female students rank female instructors higher. However, it is unclear whether this is attributed to gender bias, or whether it is a result in differences in teaching styles among male and female teachers.⁵ For example, it has been suggested that women teachers tend to use discussion based lessons rather than lecture style courses.⁵ In addition, non-white instructors are discriminated against.⁶

The nature of the course is another important factor affecting the instructor evaluations. There is often a correlation between the evaluations and the motivation for attending class.⁷ This includes more positive evaluations for elective courses in which the course is chosen by the student solely out of interest. In addition, positive evaluations are typically associated with art and humanities courses, small class size, and higher-level material.^{8,9} Natural science and engineering courses typically receive the most critical evaluations.⁹

The evaluations also depend on the students themselves. Students expecting high grades in a course give higher ratings than students expecting low grades.¹⁰ Female students tend to rate instructors with higher marks than do male students.

A system that recognizes the best undergraduate teachers regardless of department, class size, or gender is in the best interest of the faculty, students, and university as a whole. It is necessary to ensure that the selection process of winners for the G. R. Brown Teaching Awards is unbiased

and that women in the STEM fields are excelling in teaching so as to be viable candidates for these awards.

Data Collection and Award Administration

The study has focused exclusively on faculty and courses at Rice University. Faculty rank, affiliation, and gender were obtained from the Office of Institutional Research. Course information, including class size, instructor, whether the course counted as distribution (i.e., general education elective), etc. was obtained through the Registrar's office and on-line documentation. Reliable and easily retrievable files were available only back to 1999. Faculty across all departments at Rice were considered in this analysis, since the G. R. Brown Teaching Awards are open to all tenure-track and tenured faculty.

We explored the process for administration of the G. R. Brown Teaching Awards by the Dean of Undergraduates Office. Only tenure-track and tenured faculty are eligible for this award; non-tenure-track faculty such as Instructors and Lecturers are not eligible. Stipulations for eligibility were established when the award was initiated in 1967. Each spring, an invitation to nominate up to three faculty members for the award is mailed to each Rice undergraduate student who graduated two and five years ago. The invitation instructs students to nominate only tenured and tenure-track faculty; however, non-tenure-track faculty are nominated and the staff in the Dean of Undergraduates Office disqualifies those nominees. During the last four years, 11-14% of the alumni have returned the form, with between 150 and 175 different faculty nominated. Thus, up to 25% of the faculty are nominated each year. The selection of the winners is simply determined as the faculty members with the most votes. Winners of the awards typically receive 10-30 votes. Seven award winners are announced each year near graduation in May. No data (e.g., student major and gender) are collected about the students who nominate candidates. No adjustments, such as related to class size, are made to the results. However there are processes to "retire" routine winners and to "spread out" the awards over time for routine, non-retired winners. Both of these processes are documented in the Dean of Undergraduates Office and are followed.

Results

Faculty Demographics

We evaluated historical institutional data (1999-2000, 2003-2004, 2007-2008) to determine the percent of male and female faculty members. Data from 1999 and 2003 are used for numerical comparisons because alumni are surveyed and students taking classes with faculty in 2007 would not be voting yet. (We recognize that to strictly compare percents of women faculty with award winners back to 2000 would require data from 1991. However, reliable data is only available back to 1999.) Unless otherwise stated, all percentages are averages of the 1999 and 2003 data.

Figure 1 shows the percent of female and male faculty members (all ranks). Including all ranks, 25% of the faculty are women. However, most of the award winners are at the Full Professor and Associate Professor levels (see Table 1), thus the above number might slightly overpredict the percent of female faculty members. Figures 2 and 3 show the percent of female and male faculty at the ranks of Full Professor and Associate Professor, respectively. Considering these

two ranks, 16% of the faculty are women. Thus, on a percent basis, women are underrepresented as winners in the G. R. Brown Teaching Awards (25% or 16% vs. 11%).

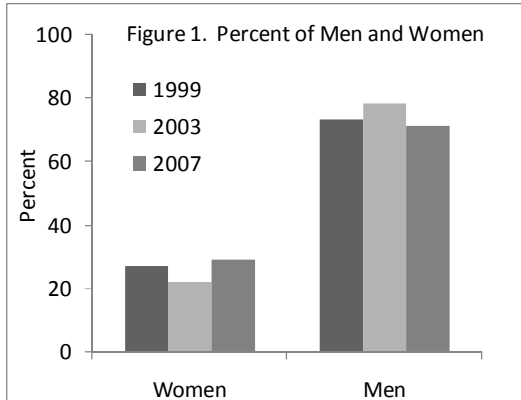


Fig. 1: Percent of total women and men who are faculty members at Rice University in 1999, 2003 and 2007. All tenured, tenure track, and untenured ranks are included.

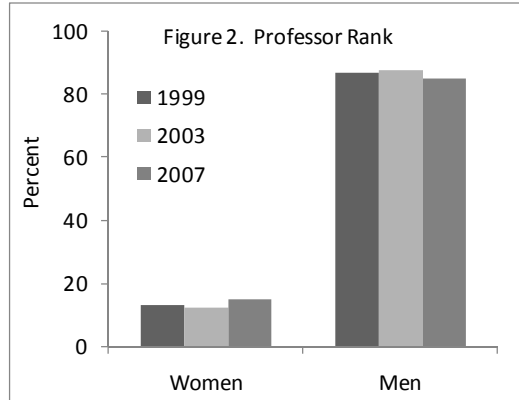


Fig. 2: Percent of total women and men at the rank of Professor at Rice University in 1999, 2003 and 2007.

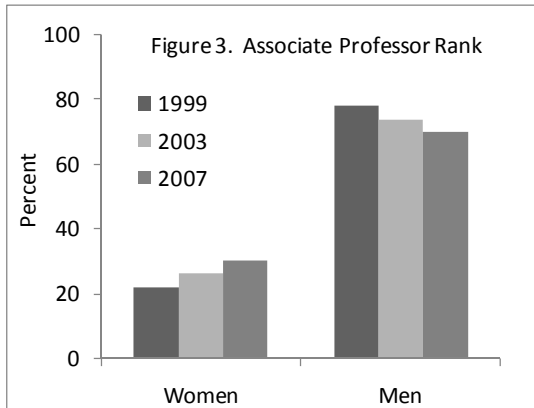


Fig. 3: Percent of total women and men at the rank of Associate Professor at Rice University in 1999, 2003, and 2007.

Figures 4 and 5 show the percent of women and men who occupied various ranks. While excluded from the G. R. Brown Teaching Awards, 31% of the women faculty are at the Lecturer rank. Contrary to the trend for women, the percentage of men decrease as rank decreases. Only 13% of the men faculty are at the Lecturer level. This suggests that the exclusion of non-tenure-track faculty from receiving the G. R. Brown Teaching Awards disproportionately disadvantages women faculty members. In other words, women are teaching at Rice and many may be excellent, but because they are not tenure-track or tenured, they are ineligible for the awards.

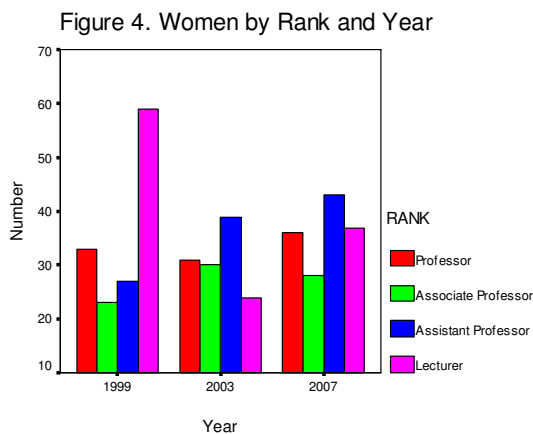


Fig. 4: Number of women at the ranks of Professor, Associate Professor, Assistant Professor and Lecturer in 1999, 2003 and 2007

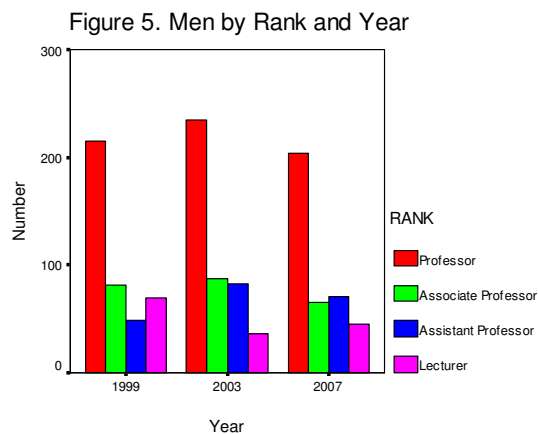


Fig. 5: Number of men at the ranks of Professor, Associate Professor, Assistant Professor and Lecturer in 1999, 2003 and 2007.

Profiles of Winners

We have conducted a careful analysis of the award winners. Table 1 shows the winners, their academic college, gender, rank at the time that they received the award, and number (#) of years won during the 2000-2008 period. Data on the total number of undergraduate (UG) students, the number of semesters taught, and the number of undergraduate students taught per semester were computed for the time period of spring 2004 to spring 2008 inclusive (9 semesters total). We recognize that this data does not actually reflect the size of courses taught during the time that the winners received an award; however, this is the only data available from the Registrar. Thus, only general trends and patterns can be considered.

Table 1 shows that 8 of the 28 unique winners are from Science and Engineering but that none of them are women. For winners, the average number of undergraduate students taught by the winners was 343 ± 254 (mean \pm standard deviation) during the 9 semester period and the average number of undergraduate students taught per semester by the winners was 56 ± 44 . Eighty-eight (88) non-winners were selected at random from the full faculty list by the Registrar (data not shown). The authors do not know how many of the non-winners may have been nominated for the G. R. Brown Teaching Awards, as information about nominees who did not win is not available from the Dean of Undergraduates Office. For non-winners during the same 9 semester period, the average number of undergraduate students taught by the non-winners was 182 ± 168 and the number of undergraduate students taught per semester by the non-winners was 29 ± 22 . Thus, both the values of the average number of total undergraduate students taught during the 9 semester period and the average number of undergraduate students taught per semester is almost twice as high for the winners, as compared to the non-winners. In addition, there is a statistically significant difference between the winners and non-winners for both computed values (t-test, $P < 0.0005$). Since the G. R. Brown Teaching Awards are based on the total number of alumni votes, it makes sense that the winners would be teaching more students on average than non-winners.

Table 1. Anonymous listing of winners of G. R. Brown Teaching Awards

Winner	# of Awards in 2000-2008	College	Rank	Gender (M/F)	UG students	# of semesters	# UG stud/sem
Winner 1	2	Social Science	Full	M	365	9	41
Winner 2	1	Humanities	Associate	M	170	6	28
Winner 3	3	Engineering	Full	M	132	4	33
Winner 4	1	Humanities	Full	M	219	5	44
Winner 5	1	Music	Associate	M	384	8	48
Winner 6	3	Social Science	Full	M	322	8	40
Winner 7	1	Humanities	Assistant	M	108	6	18
Winner 8	2	Engineering	Full	M	339	7	48
Winner 9	2	Social Science	Full	M			
Winner 10	1	Humanities	Full	M	340	9	38
Winner 11	3	Social Science	Full	M	203	5	41
Winner 12	3	Humanities	Assistant	M	252	8	32
Winner 13	1	Humanities	Full	M	175	5	35
Winner 14	1	Humanities	Full	M			
Winner 15	3	Sciences	Associate	M	681	5	136
Winner 16	4	Social Science	Associate	F	770	9	86
Winner 17	2	Humanities	Full	F	74	3	25
Winner 18	2	Sciences	Full	M	922	6	154
Winner 19	1	Engineering	Full	M	90	5	18
Winner 20	1	Social Science	Full	M	198	7	28
Winner 21	1	Social Science	Full	F	262	9	29
Winner 22	1	Sciences	Full	M	896	7	128
Winner 23	2	Sciences	Full	M	526	3	175
Winner 24	3	Social Science	Associate	M			
Winner 25	2	Social Science	Full	M	671	9	75
Winner 26	1	Sciences	Full	M	133	3	44
Winner 27	3	Humanities	Associate	M	138	5	28
Winner 28	3	Humanities	Full	M	218	6	36

Data omitted from Winners 9, 14 and 24 since they were not teaching at the university during the time of the data collection (spring 2004 - spring 2008).

Considering the number of unique winners in Table 2 (28 total in 8 award years), there is an overrepresentation of winners in Humanities (36% of winners vs. 28% of total faculty) and Social Sciences (32% vs. 12%). Considering the number of unique winners, there is an underrepresentation of winners in Engineering (11% vs. 24%), Natural Sciences (18% vs. 22%), Architecture (0% vs. 5%), and Music (4% vs. 8%). The situation is even more pronounced when considering the total number of awards given (54 in 8 award years). In this case, Social Sciences receives three times more awards on a percentage basis than its faculty represents, and Engineering receives about half of awards that would be expected, based on the number of faculty in each school at the university. Thus, one explanation for the absence of women award winners who teach in Science and Engineering may be that all faculty in the areas of Science and Engineering are underrepresented.

Table 2. Breakdown of winners by College

College	Faculty Count	% Faculty of Total	# of Winners [^]	% of Winners [^]	# of Awards*	% of Awards*
Engineering	150	24	3	11	6	11
Humanities	178	28	10	36	17	31
Natural Sciences	140	22	5	18	9	17
Social Sciences	79	12	9	32	21	39
Music	50	8	1	3	1	2
Architecture	31	5	0	0	0	0
Other	8	1	0	0	0	0
Total	636	100	28	100	54	100

[^]Each winner is counted one time.

*Each award is counted one time.

Exploration of Class Size

Considering spring 2005 and fall 2006 enrollment information for courses in the Colleges of Natural Sciences and Engineering, 59 courses have student enrollments of 50 or greater. Many of the courses are introductory mathematics, chemistry, biology, physics, and earth science courses, but the list includes some 200- and 300-level in-major courses in biology, bioengineering, mechanical engineering, and applied mathematics. Table 3 shows the number and percent of faculty by gender at the various ranks teaching these large courses in the Colleges of Natural Science and Engineering.

Table 3. Rank and gender of faculty teaching courses in the Colleges of Natural Science and Engineering in which enrollment is 50 or greater

Rank	Male		Female	
	Number of Faculty	% of Faculty	Number of Faculty	% of Faculty
Full	17	38	2	14
Associate	9	20	0	0
Assistant	6	13	2	14
Lecturer	13	29	10	72
Total	45	100	14	100

Thus, in the two selected semesters, only 4 tenured or tenure-track women taught a course with 50 or more students in comparison to 32 tenured or tenure-track men. Considered another way, 71% of male faculty (32 of 45) are tenured or tenure-track whereas 72% of female faculty are non-tenure-track. Of the teachers of large courses in science and engineering, 11% (4 of 36) of the tenured and tenure-track faculty are women.

As discussed above, winners taught almost twice as many students on average than non-winners. Thus, class size is an important determinant of who wins and who does not. Thus, a second reason for the absence of women award winners who teach in Science and Engineering may be that women teaching large courses in science and engineering are disproportionately at the rank of Lecturer, thus ineligible for the teaching awards.

Finally, a regression analysis was done to explore the factors that contribute to predicting winners. A multinomial logistic regression was completed using SPSS Version 16.0 software.¹¹

Factors included in the regression were College (Humanities, Social Sciences, Natural Sciences, Engineering and Music) and Gender (Male or Female). Also, the average number of students taught per semester was compared as a covariate. The results of the likelihood ratio test show significance for students per semester ($P < 0.001$) and gender ($P < 0.08$). College was not significant ($P > 0.5$). The regression equation is given as:

$$y = 2.552 - 0.031 \frac{\#}{\text{semester}} + 1.166[F] + 0[M]$$

where #/semester is the number of undergraduates taught per semester, [F] is included for female faculty and [M] is included for male faculty. A y-value less than zero predicts a winner. This equation shows that female faculty are less likely to win than their male counterparts due solely to their gender. This equation also shows the importance of the number of students taught per semester in predicting winners.

Other Teaching Awards

The Nicholas Salgo Distinguished Teaching Award and the Phi Beta Kappa Teaching Prize are two other teaching awards at Rice University. Each year, the Beta of Texas chapter of Phi Beta Kappa at Rice University recognizes a non-tenured Assistant Professor for outstanding teaching performance. An ad hoc committee of the general membership of Phi Beta Kappa reviews student evaluations for non-tenured Assistant Professors and typically selects one (or occasionally two) winner(s) each year. Each year, the Nicolas Salgo Award is awarded for excellence in teaching to a faculty member at any rank. Voting for this award, which is normally given to one faculty member, is by the current junior and senior classes. Ballots are distributed and counted by the Office of the Dean of Undergraduates. The winner is the faculty member with the most votes.

The gender profiles for the winners of the Nicholas Salgo Distinguished Teaching Award and the Phi Beta Kappa Teaching Prize are shown in Table 4. (Data is shown back to 1990 since fewer awards per year are given as compared to the G. R. Brown Teaching Awards.) While the percent of women for these awards varies, an average value is 38%, well above the percent of winners for the G. R. Brown Teaching Awards. We recognize that the pool of teachers considered is different, as well as the method of selection, especially when comparing the G. R. Brown and Phi Beta Kappa Teaching Awards. Nonetheless, more female faculty are being selected for these awards. Considering women in the Colleges of Natural Science and Engineering, no women have been selected for the Nicholas Salgo Teaching Award, whereas two women have been selected for the Phi Beta Kappa Teaching Award (1999, 2006).

Table 4. Nicholas Salgo and Phi Beta Kappa Teaching Awards by gender

Nicholas Salgo Teaching Award	# of Male Faculty	% of Male Faculty	# of Female Faculty	% of Female Faculty
2000-2007	4	57	3	43
1990-2007	13	76	4	24
Phi Beta Kappa Teaching Award	# of Male Faculty	% of Male Faculty	# of Female Faculty	% of Female Faculty
2000-2008	7	64	4	36
1990-2008	11	52	10	48

The College of Humanities awards the Sarofim Teaching Awards for Lecturers in the Humanities. This is the only award specifically targeted to non-tenure-track faculty. To the best of the authors' knowledge, this is the only teaching award for which non-tenure-track faculty are eligible. Thus, for faculty not in the College of Humanities, non-tenure-track faculty are not eligible for any award that recognizes their teaching, which is their primary contribution to the university.

In summary, on a percent basis, women are underrepresented as winners in the G. R. Brown Teaching Awards (25% or 16% vs. 11%). There are a disproportionately high number of women (as compared to men) in the rank of Lecturer. Notable in the Colleges of Natural Science and Engineering, the women teaching large courses are mostly at the rank of Lecturer. The average number of undergraduate students taught during the 9 semester period and the average number of undergraduate students taught per semester is almost twice as high for the winners, as compared to the non-winners. There is an overrepresentation of winners in Humanities and Social Sciences as compared to Natural Science and Engineering. A regression analysis shows that gender and the number of undergraduate students taught per semester are significant predictors of winners. Finally, two other teaching awards have recognized more women than the more prestigious G. R. Brown Teaching Awards.

Discussion

A system that recognizes the best undergraduate teachers regardless of department, class size, or gender is in the best interest of the faculty, students, and university as a whole.

As we have explored this data, two hypotheses have emerged to explain the absence of women G. R. Brown Award winners who teach in Science and Engineering. The first may be that all faculty in the areas of Science and Engineering are underrepresented as compared to the faculty in the areas of Humanities and Social Sciences. This is consistent with the work by Ory.⁹ The paucity of female winners from Engineering is also consistent with the tendency for a student to more positively rate an instructor of the same sex, as there are fewer female engineering undergraduates than male undergraduates at Rice University.² It is possible that the teaching quality by the faculty in the Social Sciences and Humanities is better than in Engineering and Natural Sciences. This paper does not seek to answer this question, nor does the data presented confirm or refute this hypothesis. The authors take as a premise that while teaching style may vary among the Colleges, teaching quality is not radically different among the disciplines.

We have shown that the average number of undergraduate students taught during the 9 semester period and the average number of undergraduate students taught per semester is almost twice as high for the winners, as compared to the non-winners. In addition, a regression analysis shows that gender and the number of students taught per semester are significant predictors of winners. Thus, a second reason for the absence of women award winners who teach in Science and Engineering may be that women teaching large courses (i.e., high value of the number of undergraduate students taught per semester) in science and engineering are disproportionately at the rank of Lecturer, thus ineligible for the G. R. Brown Teaching Awards.

To date, we have considered several preliminary recommendations. First, we recommend modifying the process for faculty member selection for the G. R. Brown Teaching Awards to increase student participation. One recommendation is to move to or supplement with an on-line nominations/voting scheme in hopes that student response rate will be greater than the current 11-14%. We also recommend that basic information about the alumni respondents including gender, major(s) and graduation date be included on the response card. This can help gather information to inform whether alumni from particular Colleges are voting in larger numbers. These recommendations are geared toward improving the process and may or may not increase the number of women faculty who win.

Second, we recommend increasing the number of awards given. Currently, only 7 faculty of a total of over 600 receive the G. R. Brown Teaching Award each year. This amounts to barely 1%, and we feel that this should be increase to 2-4%. With this award rate, 10-25 faculty would be recognized each year. Recall that up to 25% of the faculty members (150-175 different faculty) are nominated by one or more student each year. Recognizing more faculty for excellence in teaching is in line with Rice University's Mission Statement: "As a leading research university with a distinctive commitment to undergraduate education, Rice University aspires to pathbreaking research, unsurpassed teaching..."¹²

Third, we recommend reconsidering the exclusion of non-tenure-track faculty as contenders for the G. R. Brown Teaching Awards. For example, open the process to allow one or two non-tenure-track faculty members to receive an award each year. (If more awards are given, the number of non-tenure-track faculty could be raised.) This would recognize the important role that non-tenure-track faculty have in the enterprise of education and also minimize the bias against women who teach in non-tenure-track positions, particularly those in Science and Engineering, without significantly changing the spirit of the award.

Fourth, we recommend that a system be discussed with the administration that helps improve the representation of faculty from all Colleges. We know from our study that on average, winners teach more students than non-winners. The small number of students enrolled in the Music and Architecture Colleges really hinders the opportunity for excellent faculty in these schools to be recognized. With an increased number of awards, opportunities for recognition increase.

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