Carter Opportunity Award: effects of the Carter Opportunity Award on the academic achievement of female students in the Kansas State University College of Engineering

Bette Grauer

Carter Opportunity Award:
Effects of the Carter Opportunity Award on the Academic Achievement of Female Students in the Kansas State University College of Engineering

Bette Grauer

Office of Retention, Diversity, and Inclusion
College of Engineering
Kansas State University
Manhattan, KS 66503

July 20, 2013

Carter Opportunity Award:
Effects of the Carter Opportunity Award on the Academic Achievement of Female Students in the Kansas State University College of Engineering

Introduction

The Carter Opportunity Award originated as a gift from the E. Eugene Carter Foundation to pay off subsidized loans of undergraduate women who graduated from Kansas State University with a bachelor's degree in engineering. The Carter award operated as an incentive award after completion of an engineering degree rather than a scholarship awarded during college. Women selected for the award received payment of their subsidized student loans upon graduation from the College of Engineering. The goal of the award was to retain female engineering students, particularly those who were first generation to college and those of Hispanic ethnicity, by providing them with a promise of a financial award upon completion of their degrees. This study was designed to examine the effect of the Carter award on the academic achievement of recipients.

Procedure

The purpose of this study was to determine the effect of the Carter Opportunity Award on the academic achievement of women in engineering. Academic achievement of subjects was measured in terms of grade point averages, and retention and graduation rates. Two groups were selected for the study in January, 2007, and a comparison of the two groups was conducted in July, 2013. The hypothesis was that academic achievement in engineering would be significantly different between those subjects who received the Carter award and those who did not. The sample population was identified as female Kansas State University engineering majors with Stafford Loans. The sample was further stratified by first generation to college status, and ethnicity. Forty (n=40) subjects were selected and paired by demographic characteristics and randomly placed in experimental and control groups. Demographic information on the comparison groups is shown in Tables 1 and 2. The experimental group subjects were designated Carter Scholars and were informed of their selection to receive the Carter Opportunity Award once they had completed an engineering degree. The control group subjects were not contacted.

Grade point averages (GPAs) of both groups at the beginning of the study were compared. Examination of the means and a *t*-test for independent samples (α =.05) indicated no significant difference between the two comparison groups (Table 4). Academic achievement of the two groups was compared through examination of engineering retention and graduation numbers, and engineering GPAs. Descriptive and inferential statistics were examined for differences between the two groups (Table 4).

Table 1 Demographic Information – Experimental Group (Carter Scholars)

Ethnicity		First Generation		Engineering Major										Graduation
Group	Number	Yes	No	ARE	BAE	CE	CHE	CS	CNSM	CMPEN	ENUN	IE	ME	Graduated Engineering
Black	1		1		1									1
Hispanic	2	1	1	2										1
Asian														
White	17	8	9	3	4		2		2		1		5	15
Total	20	9	11	5	5		2		2		1		5	17 (7 first generation)

Table 2 Demographic Information – Control Group

Ethnicity		First Generation		Engineering Major										Graduation
Group	Number	Yes	No	ARE	BAE	CE	CHE	CS	CNSM	CMPEN	ENUN	IE	ME	Graduated Engineering
Black	4	2	2	1						1	1		1	
Hispanic	1	1								1				
Asian	1		1					1						
White	14	5	9	7		1	2				2	1	1	8
Total	20	8	12	8		1	2	1		2	3	1	2	8 (2 first generation)

Table 3 Program Retention and Graduation Rate

Group	Number	Retained in Engineering	Engineering Retention Rate	Graduated in Engineering	Engineering Graduation Rate
Experimental	20	18	90%	17	85%
Control	20	8	40%	8	40%
Total	40	26	65%	25	63%

Results

Of the 20 subjects in the control group, eight were retained and graduated with degrees in engineering. In the experimental group, 18 of the 20 subjects were retained in engineering. Of the 18 retained students in the experimental group, 17 graduated with degrees in engineering at the time of the study, and one was still enrolled as a student in the College of Engineering (Table 3). The mean grade point average (GPA) of the experimental group subjects who graduated in engineering was 3.0±.5, while the mean GPA of the control group subjects who graduated in engineering was 3.4±.4. Final grade point averages for subjects who graduated with engineering degrees were compared using a *t*-test for independent samples (α =.05). Grade point averages of the experimental and control groups (Table 4) were significantly different at the completion of the study. The hypothesis that a significant difference exists between the academic achievement of engineering students receiving the Carter Opportunity Award and students not receiving the award was supported ($p < .05$).

Table 4 Means, Standard Deviation, and *t*-Test Significance for Comparison Groups

		Experimental Group [a]	Control Group	Sig.
Initial GPA	Sample Size	n = 20	n = 20	
	Mean	2.8	2.7	.5*
	SD	.6	.8	
Engineering Graduation GPA	Sample Size	n = 17	n = 8	
	Mean	3.0	3.4	.025**
	SD	.5	.4	

[a] Carter Scholars * $p > .05$ ** $p < .05$

Discussion

The number of students in the Carter group (experimental group) retained in engineering, 18, was more than double that of the eight control group students retained in engineering. All three of the minority students in the Carter group were retained in engineering and two graduated with degrees in engineering, while none of the six minority students in the control group were retained in engineering. Seven of the nine first-generation students in the experimental group graduated with degrees in engineering, while only two of the eight first-generation students in the control group graduated in engineering. The grade point averages of engineering graduates in the Carter group (M = 3.0) were significantly lower than those of the control group (M = 3.4). Of the Carter group, 11 of the 17 engineering graduates earned GPAs less than 3.0, while only one of the eight control group engineering graduates earned a GPA less than 3.0.

The higher engineering retention numbers in the Carter group suggested the Carter Opportunity Award supported retention of women engineering students, including minority and first generation students. In addition, the lower average engineering GPA of the Carter group, (M = 3.0) suggested the award favored retention of students earning a wider range of GPAs. Results of this study suggested women engineering students receiving financial support structured as an award upon graduation may be retained at a higher rate than those without such support. Results indicated minority and first-generation-to-college women may be retained at a higher rate as well. Results also suggested a financial award upon graduation may increase retention of women in engineering who earned GPAs lower than 3.0.

Conclusion

The graduation of a nearly intact cohort of Carter Scholars suggests the award may be an effective incentive for women engineering students to complete an engineering degree regardless of GPA. The engineering graduation rate of students in the Carter group, 85%, was more than double that in the control group, 40%. In addition, the higher numbers of minority and first generation engineering graduates within the Carter group, compared to the control group, indicate the award may be effective in supporting minority students in engineering (Tables 1 and 2). Clearly the Carter Opportunity Award favors degree completion for the engineering students who receive it. Further studies to interview and examine the backgrounds, attitudes, and circumstances of the Carter Scholars who were retained and graduated in engineering could provide valuable insight into the experiences of women who study engineering and the impact of financial incentive awards on their academic success.