PREFRESHMAN AND COOPERATIVE EDUCATION FOR MINORITIES IN ENGINEERING (PREFACE)

Final Report
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ABSTRACT

The University of Dayton (UD) and Wilberforce University (WU) Preface Program provides a key component in a comprehensive and successful strategy for increasing minority group members and women students entering and graduating in engineering and engineering technology. The high school level includes programs for minority and women students, teachers, and counselors. The University level includes a Dual Degree Program (DDP) between Wilberforce University and the University of Dayton; freshman academic assistance and support programs and scholarships (PREFACE/INSTEP) for the critical freshman year; and, co-op employment to provide motivation and financial resources for students in upper classes.

In the past five years, UD and WU have awarded 89 PREFACE/INSTEP scholarships to students entering UD or DDP and 75 are still in engineering or engineering technology for an outstanding retention rate of 84.27 percent. Thirty-seven scholarships have been funded by the Department of Energy and its predecessor, the Energy Research and Development Agency with a retention rate in engineering and engineering technology of 81.1 percent. There will be ten PREFACE students graduating in engineering and engineering technology in 1980-81. The first ERDA Preface Scholar graduated in August 1980 and currently works for a DOE contractor - Monsanto Research Corporation.

OBJECTIVES, MECHANISMS, AND SCOPE

I. Objectives of the PREFACE/INSTEP Program

The first objective of the UD PREFACE/INSTEP Program is to provide a means for minority and women students to enter and remain in engineering and engineering technology through the critical freshman year by supplying academic assistance and freshman scholarships. A second objective is to demonstrate concretely to potential minority and women students and their parents, through designated co-op employment sponsorship and financial support, the appropriateness of the individual students seeking careers in engineering.

Since even many traditional students who enter engineering programs either leave or transfer out, it is imperative to provide the support systems necessary to retain a high percentage of the few minorities and women who currently enter engineering. Therefore, the third objective is to provide academic, personal, and financial support that will increase the likelihood of retention through graduation. Our 84.27 percent retention rate in engineering and engineering technology indicates our success at this.

II. Mechanisms of PREFACE/INSTEP Program

PREFACE/INSTEP provides funds for the following support services for freshmen enrolled in the regular curriculum of the UD School of Engineering.

A. Personal, Career, and Academic Counseling are provided to enhance PREFACE recipients' academic and career success. The goal is to provide the extra counseling services required to help meet the special needs of the students. This provides for increased retention by helping students gain the information they need to utilize all appropriate University resources. This element has been strongly increased in the last five years and the retention rate is a result of these support services being increased.

The co-project directors, Carol M. Shaw, Assistant Dean of Engineering and Nancy Cook Cherry, Director, Individual and Adult Oriented Programs and the Director of Student Oriented Programs Jennie Hodges Sethna provided twice monthly counseling sessions for each Preface freshman.

Upperclass PREFACE students were asked to serve as big brothers and big sisters and to contact new freshman students to provide them a student contact when they first reached campus.

B. Academic Advancement Sessions in mathematics and science are provided for all PREFACE students to maximize their possibilities of obtaining high grades. Individual tutoring is provided for students in academic difficulty.

C. A Career Education Seminar Series has been developed to provide continuing motivation through role models. We have involved co-op employers in recruiting, selecting, and freshman year follow-up sessions to widen the group of people interested in the students.

D. Freshman Year Financial Assistance is an important mechanism to convince students and parents of career potentials in engineering. Further it provides motivation for the students using the other support services before they get into academic difficulty.

E. Co-op Employment alternating with academic work allows nontraditional students opportunities to confirm career choices and to pay subsequent education expenses.

F. Prefreshman Summer Employment has been available to 20 PREFACE recipients. This summer employment experience has been highly valuable to a number of students with math and science refresher classes being provided by the employer; and frequently, the work experience itself provided valuable skills development that helped with freshman course work.

III. Scope and Results

The University of Dayton has developed a total strategy for increasing the number of women and minority students that includes career awareness and precollege support programs. The PREFACE/INSTEP Programs are the natural follow-on to these early motivational programs. PREFACE provides the mechanism to enter engineering in a private university and the support services designed for high retention of students while they are in school. The entire strategy for increasing the number of women and minorities in engineering at UD is illustrated by Figure 1.

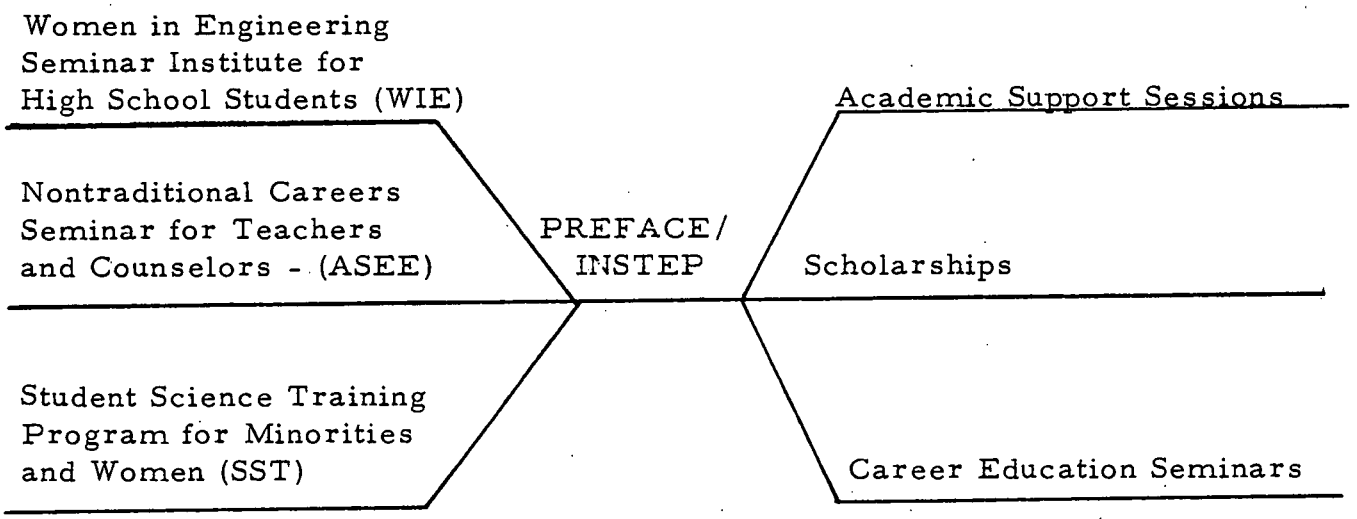

Figure 1. Diagram of University of Dayton Strategy.

The success and impact of the PREFACE/INSTEP Program on UD engineering enrollment is dramatic. In 1977-78 with only two years of funding, 10.7 per cent of all the women and 34.5 per cent of all the minority students in UD engineering were PREFACE/INSTEP scholarship recipients. In 1978-79 there were 21 per cent women and 7 per cent minority students in the entering freshman engineering class at UD. This is particularly important in the light of the dramatic increase in engineering school applications.

Without the push of the PREFACE/INSTEP Program the "non-traditional" enrollment could have been drastically lower with the onslaught of high school students seeking engineering degrees.

Experience with Recruiting Minority and Women Students

The UD School of Engineering has a long history of projects to increase the numbers of women and minority group members in engineering. The projects have included career awareness programs for high school students, teachers, and counselors including three such projects conducted in 1979: Women in Engineering (WIE), Student Science Training (SST), and ASEE Nontraditional Careers for Women (ASEE).

In addition, UD has developed support programs to increase entrance and retention of minority and women students in engineering and science, including the DDP and a National Science Foundation (NSF) funded career education workshop for 257 women from 14 different colleges (100 percent retention in 1977). The University has been funded three times to conduct Career Education Workshops for Women trained in engineering, science, and math. The first workshop was held in May 1979 with 75 participants and the second workshop was held April 1980 with 106 participants and the third workshop is scheduled for April 1981. The workshops are designed to help women upgrade their careers in science, engineering, and mathematics, to reenter careers, or to change careers. Further NSF has funded UD three times to conduct "Fast Track Late Entry" programs in engineering for adult women. The first 11-1/2-month program had an 87 percent retention rate. The second program had a 90 percent retention rate. PREFACE and INSTEP scholarships have been funded by and co-op employment provided by the Aeronautical Systems Division (ASD) and Air Force Wright Aeronautical Labs (AFWAL) at Wright-Patterson Air Force Base, and by United States Department of Energy (DOE) with co-op employment provided by Mead, Monsanto Research, and Goodyear Atomic. The nine INSTEP scholarships and co-op employment have been provided by Brockway Glass, Chrysler, Goodyear Atomic, Delco Air Division GMC, and National Cash Register (NCR).

Recruitment for the PREFACE/INSTEP Program has been based on three strategies. The first was promotion of the PREFACE/INSTEP Program for high school minority and women students who participated in the SST and WIE high school career awareness programs. The second strategy was to direct mail PREFACE/INSTEP brochures to minority students who had taken the PSAT test and allowed their names to be given out by ME^3 (Student Search Service), and thirdly, brochures were sent to 3,000 high school counselors regularly contacted by the UD Admissions Office and to teachers and counselors who participated in our ASEE Career Awareness Program. Selection was done initially by a committee consisting of the Project Directors, Carol M. Shaw and Nancy Cook Cherry, Engineering Co-op Coordinator, Earl C. Iselin, Dr. Russell A. Primrose, Dean of Engineering, and Myron Achbach, Director of Admissions. All applications are reviewed by the committee on the basis of class rank, SAT or ACT scores, recommendations by counselors and science teachers, grades in math and science courses, and statements of interest in engineering. A slate of candidates was then developed on the basis of the students' engineering majors, co-op employer needs, and location. Final selections were made on the basis of both committee recommendations and employer needs. Table I contains a profile of PREFACE students selected for 1980-81 scholarships.

Academic Performance and Retention of PREFACE/INSTEP Students

The overall retention of 84.27 percent is excellent. The freshman year support services are doing their job of retention and have been expanded during 1979-80 and 1980-81 to include support services for upper class students as well. It is particularly exciting to note that the first ERDA funded students graduated in August 1980. There are three who expect to graduate December 1980 and six who plan to graduate in April 1981 in engineering and engineering technology. The continued high retention rate is due to the continued personal interest in these students by PREFACE staff, University personnel, and co-op employers.

TABLE I

PROFILES OF 1980-81 PREFACE RECIPIENTS

NAME, ADDRESS	FUNDING SOURCE	SEX ETHNIC STATUS*	SAT SCORES	ACT SCORES	H.S. RANK	H.S. GRADE AVERAGE	SCHOOL**
James Bradford [redacted]	ASD	BM	V 380 M 480	Comp 18	5/127	3.49	UD
John Kendall Chicago, IL [redacted]	ASD	BM	- - -	Comp 20	- - -	3.10	UD
Louis Turner Dayton, OH [redacted]	ASD	BM	- - -	Comp 21	- - -	2.78	UD
David Radulescu Cleveland, OH [redacted]	ASD	WM	V 520 M 660	Comp 24	6/450	3.83	UD
Maria Concha Fairborn, OH [redacted]	ASD/DOE	MAF	V 370 M 480	Comp 20	187/660	3.198	UD
Renee Gilliard Dayton, OH [redacted]	ASD	BF	V 470 M 410	Comp 23	85/660	3.625	UD
Debbie Seitz [redacted]	DOE	WF	V 510 M 620	Comp 27	28/267	3.57	UD
Leslie Wiggins Buffalo, NY [redacted]	ASD	BF	V 470 M 500	Comp 26	13/60	3.53	UD
Angela Bailey New Carlisle, OH [redacted]	ASD	WF	V 510 M 530	- - -	36/367	9.3/11	UD
Nelline Talton Pittsburgh, PA [redacted]	ASD	BF	V 390 M 420	- - -	33/466	3.39	UD
Patricia Forbes Downington, PA [redacted]	ASD/DOE	WF	V 430 M 620	- - -	15/517	4.06	UD
Jill Johnson Kettering, OH [redacted]	ASD	WF	- - -	- - -	127/530	2.74	UD
Maria Morookian Dayton, OH [redacted]	DOE	WF	V 530 M 570	Comp 27	22/302	3.647	UD
Kelvin Brooks Charleston, SC [redacted]	DOE	BM	- - -	- - -	76/280	2.90	WU
Kenneth Dozick Detroit, MI [redacted]	DOE	BM	- - -	- - -	38/526	2.90	WU
Verniece Davis Indianapolis, IN [redacted]	DOE	BF	- - -	- - -	85/343	2.50	WU
Vickie Edwards Cincinnati, OH [redacted]	DOE	BF	- - -	- - -	41/272	3.8	WU

* B=Black; MA=Mexican American; W=White; F=Female; M=Male

** UD=University of Dayton; WU-Wilberforce University

Continuity of funding and co-op employers have allowed for strengthening of the support services, and the co-op employment experiences thereby increasing the student retention rate. Table II contains retention information, and Table III provides academic status and cumulative grade point averages for all PREFACE/INSTEP students selected for scholarships between September 1976 and September 1979. Table IV contains profiles of students funded for 1979-80.

Having analyzed that PREFACE support services have dramatically eliminated dropouts during the crucial freshman year, we proposed in the 1979 and 1980 PREFACE Proposals to ASD and AFWAL that funds be provided for small PREFACE Upper Class Awards and PREFACE support services throughout the students' college careers. These funds have allowed us to increase services for all PREFACE Upperclass students.

This year there are 18 college juniors and seniors from the PREFACE Program with ten graduates in engineering expected before the 1980-81 school year is out. The PREFACE Program is indeed producing women and minority engineers at the University of Dayton.

TABLE II

PREFACE RETENTION

Year Admitted	Funded DOE	Total Funded	DOE Retained*	Retained in Engineering or Engr. Tech.	Retained at U. Dayton or Wilberforce
1976-77	6	14	5**	12	11
1977-78	4	16	1	10	9
1978-79	6	17	4	14	14
1979-80	12	25	11	22	20
Totals	37	89	30	75	70
% Retained			81.1%	84.3%	78.7%

*DOE Retained=Students currently enrolled or graduated in an engineering or engineering technology program, regardless of school where enrolled.

**One of the five students graduated, two additional students are scheduled to graduate in the 1980-81 academic year.

October, 1980.

TABLE III

August 1980

PREFACE/INSTEP SCHOLAR GRADE AND STATUS

STUDENT	YEAR	SPONSOR	ETHNIC STATUS	GRADE POINT AVERAGES Dec. 77	May 79	May 80	June 80	SCHOOL
*Tentman	76-77	DOE/Monsanto	BM	3.56	3.49	3.41	3.36	U.D.
Bates, C.	76-77	ASD	BF	3.14	3.19	3.14	3.14	U.D.
Banks	76-77	ASD	WM	2.99	3.01	3.10	3.15	U.D.
Blum	76-77	ASD	WF	3.59	3.60	3.60		U.D.
Brown	76-77	ASD	WF	3.93	3.96	3.97		U.D.
Harrison	76-77	DOE/Mead	BM	2.22	2.26	2.19	2.25	U.D.
Knighton 11	76-77	ASD	WF			3.94		U.D.
James 3	76-77	DOE/Monsanto	BM	2.00	1.90			W.U.
Nix	76-77	DOE/Monsanto	BF	3.40	2.70			W.U.
entered U.D. in 79						1.12	1.13	U.D.
Rothwell 1	76-77	DOE/Monsanto	WF	3.38				U.D.
Howard 26	76-77	DOE/Mead	BF	2.36	2.12			U.D.
Hamilton 2	76-77	ASD	BM	2.43	2.23	2.10	2.09	U.D.
George 3 2	76-77	ASD	BM	1.20				U.D
Hannigan	76-77	ASD	WF	2.82	3.05	3.20		U.D.
Forman	77-78	DOE/Monsanto	BM	3.00	2.07	2.05		U.D.
Koester 4	77-78	DOE/Monsanto	WF	3.58	3.40	3.57	3.59	U.D.
Kirk 6	77-78	ASD	BF	1.30	1.00	2.45		U.D.
Barbour	77-78	ASD	WF	3.43	3.32	3.32		U.D.
Hiltenbeitel	77-78	ASD	WF	3.05	2.58	2.49	2.38	U.D.
Harmon	77-78	Chrysler	WF	3.70	3.53	3.51	3.50	U.D.
Hartzell	77-78	ASD	WF	3.06	3.08	3.05	3.09	U.D.
Hoene	77-78	ASD	WF	3.64	3.69	3.69	3.72	U.D.
Woeste 4	77-78	Brockway Glass	WF	3.04	3.24	2.79		U.D.
Lewis 5	77-78	DOE/Monsanto	BM	3.50				W.U.
Walker 8	77-78	DOE/Monsanto	BM		2.90			W.U.
Bankston 1	77-78	ASD	BM	1.54	1.68			U.D.
Woodard 9	77-78	ASD	BM	3.50	3.28		3.20	U.D.
Craig 3	77-78	ASD	WM	1.53				U.D.
Hileman 10	77-78	ASD	WF	2.25				U.D.
Wilson 1	77-78	Brockway Glass	WF	2.83	2.57			U.D.

* Graduated August, 1980

August 1980

PREFACE/INSTEP SCHOLAR GRADE AND STATUS REPORT

STUDENT	YEAR	SPONSOR	ETHNIC STATUS	GRADE POINT AVERAGES Dec. 77	May 79	May 80	June 80	SCHOOL
Beckles	78-79	ASD	BM		2.66	2.39	2.29	U.D.
Boos	78-79	ASD	WF		3.62	3.45		U.D.
Clark	78-79	ASD	WF		3.73	3.46	3.33	U.D.
Deming	78-79	ASD	WF		3.06	2.75	2.77	U.D.
Moore	78-79	ASD	BM		2.39	2.42	2.50	U.D.
Rooths	78-79	ASD	BF		2.73	2.51	2.57	U.D.
Russell	78-79	ASD	BM		2.35	2.40	2.37	U.D.
Schoen	78-79	ASD	WF		2.33	2.29	2.13	U.D.
Smith[6]	78-79	ASD	BM		1.92	2.83	3.02	U.D.
Rogers	78-79	Chrysler	BF		2.25	2.28	2.25	U.D.
Fortkamp	78-79	DOE/Mead	WF		3.25	3.07		U.D.
Simmons	78-79	DOE/Mead	BF		2.25	2.25	2.37	U.D.
Westrick	78-79	DOE/Monsanto	WF		3.51	3.27	3.34	U.D.
Daniels[3]	78-79	DOE/Monsanto	BF		2.90			W.U.
Henderson	78-79	DOE/Goodyear	BF		3.09		3.09	W.U.
Breslin[3]	78-79	ASD	WM		2.03			U.D.
McDonald[7]	78-79	DOE/Monsanto	BM		1.99	1.84		U.D.
Bates, T	79-80	ASD	BM			2.03		U.D.
Baum[3]	79-80	Goodyear Atomic	WF			1.62		U.D.
Carter[3]	79-80	DOE/Monsanto	BF			1.08		U.D.
Chambers	79-80	DOE/GMC	BM			2.44	2.39	U.D.
Egger	79-80	Brockway/DOE	WF			2.52		U.D.
Fannin	79-80	ASD	WF			2.21		U.D.
Feldman	79-80	ASD	WF			2.65		U.D.
Fiorina	79-80	DOE/Monsanto	WF			2.51	2.51	U.D.
Gray	79-80	DOE/Goodyear Atomic	BF			1.00		U.D.
Hoke	79-80	ASD	WF			3.66		U.D.
Kirtley	79-80	ASD	BF			2.68		U.D.
Leftrict[6]	79-80	NCR	BM			1.94		U.D.
Logan	79-80	ASD	WF			3.30		U.D.
McGarvey	79-80	ASD	WF			2.58		U.D.
Nash	79-80	ASD	WM			3.90		U.D.
Wetzel[1]	79-80	DOE/Monsanto	WF			3.70		U.D.
Daley	79-80	DOE/Brockway	WF			3.12		U.D.

August 1980

PREFACE/INSTEP SCHOLAR GRADE AND STATUS

STUDENT	YEAR	SPONSOR	ETHNIC STATUS	GRADE POINT AVERAGES Dec. 77	May 79	May 80	June 80	SCHOOL
Jones	79-80	DOE/Goodyear Atomic	BF				2.47	W.U.
Lee	79-80	DOE/Goodyear Atomic	BF				3.27	W.U.
Reid	79-80	DOE/Monsanto	BF				2.90	W.U.
Benton	79-80	DOE/U.S. Army Corps. of Eng.	BF				3.60	W.U.
Houseworth	79-80	DOE/U.S. Army Corps. of Eng.	BF				2.78	W.U.
Dirkes[2]	79-80	ASD	WF			3.78	3.80	U.D.
Ferrier[1]	79-80	ASD	BM					U.D.
Hall[3]	79-80	GMC	BF					U.D.

B= Black
W= White
F= Female
M= Male

KEY

1 Transferred to another college in engineering or technology

2 No longer co-oping with sponsor

3 Left School

4 Transferred to Arts and Sciences

5 Left school; replaced by Walker

6 Transferred to Engineering Technology

7 Left School; full time employee of Co-op sponsor

8 Replacement for Lewis: left school 1980.

9 Transferred to Howard University, Engineering; returned to UD

10 Transferred to University of Cincinnati; replaced by Knighton

11 Replacement for Hileman

TABLE IV

PROFILE OF 1979-80 PREFACE/INSTEP RECIPIENTS

Name, Address	Sex,** Ethnic Status	SAT Scores V	SAT Scores M	ACT Scores Composite	H.S. Rank	H.S. Grade Avg.	School
[redacted]							
DOE							
Carole Carter* Dayton, Ohio [redacted]	BF			12	199/418	2.40	UD
Jerome Chambers Dayton, Ohio [redacted]	BM	330	440		5/226	3.30	UD
Teresa Gray* Chillicothe, Ohio [redacted]	BF	410	510	15	108/380	2.98	UD
Dorothy Wetzel* Dayton, Ohio [redacted]	WF			20	14/305	3.92	UD
Cherese Fiorina Chesterland, Ohio [redacted]	WF	550	600	28	48/318	3.106	UD
Surlean Jones * Cleveland, Ohio [redacted]	BF	370	520			3.47	WU
Beverly A. Lee Canton, Ohio [redacted]	BF			21	100/561	3.15	WU
Jacqueline Reid* Atlanta, Georgia [redacted]	BF	360	330		38/149	3.75	WU
Donte Benton* Atlanta, Georgia [redacted]	BM	360	430		5/276	3.52	WU
Bonita Houseworth Atlanta, Georgia [redacted]	BF				4/178	3.60	WU
Cheryl Egger Oneida, NY [redacted]	WF	510	620		7/247	93.6	UD
Judy Daley Fairborn, Ohio [redacted]	WF	540	550	28	18/340	3.89	UD

TABLE IV (cont'd)

PROFILE OF 1979-80 PREFACE/INSTEP RECIPIENTS

*Name, Address SS#	Sex,** Ethnic Status	SAT Scores V	SAT Scores M	ACT Scores Composite	H.S. Rank	H.S. Grade Avg.	School
ASD							
Les Ferrier Avingdon, VA	BM	410	580		24/193	3.65	UD
T.C. Bates Farmersville, OH	BM			16	19/170	3.25	UD
Lisa Kirtley Troy, OH	BF	450	530	26	9/356	3.87	UD
Elizabeth Dirkes Dayton, OH	WF	660	650	30	25/300	A	UD
Diane McGarvey Kettering, OH	WF			24	1/285	4.00	UD
Annette Feldman Kettering, OH	WF			26	20/355	95	UD
Cindy Fannin Dayton, OH	WF	340	530		24/264	3.36	UD
Sharon Hoke Versailles, OH	WF			29	1/138	4.00	UD
Christina Logan Kettering, OH	WF	600	640		13/358	96	UD
John Nash Kettering, OH	WM	580	780		45/600	3.7	UD
INSTEP							
Fred Leftrict Dayton, OH	BM	550	520		12/207	3.20	UD
Felicia Hall Dayton, OH	BF	390	580		33/289	94	UD
Lisa Baum Chillicothe, OH	WF	520	600	26	19/353	3.778	UD

* qualifiable student (to be qualified student needs SAT total 1,000+; ACT C 30+; top 25% H.S. Class)

** B = black, W = white, M = male, F = female