WOMEN IN SCIENCE AND ENGINEERING PROGRAM: ENCOURAGING HIGH SCHOOL GIRLS' INTERESTS IN MATH AND SCIENCE

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THIS PAPER WILL DESCRIBE THE WOMEN IN SCIENCE AND ENGINEERING PROGRAM SPONSORED BY ILLINOIS INSTITUTE OF TECHNOLOGY. W.I.S.E. IS A FREE PROGRAM FOR 9TH-12TH GRADE GIRLS WHICH WAS STARTED IN 1981. DR. LOIS GRAHAM, THEN PROFESSOR OF MECHANICAL ENGINEERING STARTED W.I.S.E. BECAUSE SHE WANTED MORE WOMEN IN HER CLASSES. DR. GRAHAM WAS THE FIRST WOMAN IN THE U.S. TO EARN A PH.D IN MECHANICAL ENGINEERING WHICH SHE EARNED FROM IIT IN 1959. W.I.S.E IS PREDOMINANTLY A CAREER AND COLLEGE MAJOR EXPOSURE PROGRAM OFFERING NO COLLEGE CREDIT.

I WILL DESCRIBE OUR POSITION WITHIN THE UNIVERSITY BEFORE DESCRIBING PROGRAMS, CONTENT, AND A FEW RESULTS. I WILL CONCLUDE WITH TWO THOUGHTS ON PROGRAM PLANNING.

I SERVE AS ASSISTANT DIRECTOR OF UNDERGRADUATE ADMISSION AS WELL AS DIRECTOR OF THE WOMEN IN SCIENCE AND ENGINEERING PROGRAM. THE W.I.S.E. STAFF ALSO INCLUDES TWO PART-TIME YEAR-ROUND UNDERGRADUATE WOMEN STUDENT DIRECTORS AND UNDERGRADUATE WOMEN TEACHING ASSISTANTS HIRED FOR EACH PROGRAM. W.I.S.E. STARTED WITHIN THE COLLEGE OF ENGINEERING, BUT HAS BEEN IN ADMISSION REPORTING TO THE ASSOCIATE PROVOST FOR ENROLLMENT SUPPORT FOR SEVERAL YEARS. W.I.S.E IS FUNDED BY THE UNIVERSITY AND OCCASIONAL OUTSIDE GRANTS. THE RELATIONSHIP BETWEEN W.I.S.E. AND ADMISSION SEEMS TO BE VERY POSITIVE. WE HAVE ACCESS TO MANY NAMES OF PROSPECTIVE W.I.S.E. PARTICIPANTS, AND I AM ALREADY REGULARLY IN HIGH SCHOOLS AND AT COLLEGE FAIRS. W.I.S.E. IS ONE OF THE FIRST THINGS WE MENTION TO FEMALE HIGH SCHOOL OR JUNIOR HIGH STUDENTS. IT IS NOT PUT ON THE BACK BURNER. WOMEN'S BROCHURES AND ARTICLES DESCRIBING WOMEN IN TECHNOLOGY ARE AT THE FRONT OF IIT ADMISSION TABLES. OCASSIONALLY, WE HAVE BEEN MISTAKEN FOR A WOMEN'S COLLEGE WHICH SEEMS IRONIC SINCE WE HAVE A 75% MALE POPULATION.

W.I.S.E. HAS A THREE-FOLD PURPOSE: 1) TO PROVIDE A SUPPORTIVE ENVIRONMENT WHICH ENCOURAGES PURSUING A CAREER IN MATH AND SCIENCE; 2) TO GIVE YOUNG WOMEN EXPOSURE TO THE VARIOUS MATH AND SCIENCE RELATED MAJORS AND FIELDS ESPECIALLY THROUGH HANDS-ON ACTIVITY; AND 3) TO ADVISE PARTICIPANTS TO TAKE APPROPRIATE MATH AND SCIENCE COURSES. WE ALSO SPEND TIME WITH PARENTS, TEACHERS, AND COUNSELORS, THE PEOPLE MOST INFLUENTIAL TO THESE YOUNG WOMEN. W.I.S.E. WORKS TO SHOW THE VIABILITY OF WOMEN'S PURSUIT OF MATH AND SCIENCE CAREERS TO STUDENTS, PARENTS, TEACHERS. AND COUNSELORS.

W.I.S.E. STUDENTS ARE ETHNICALLY AND ACADEMICALLY DIVERSE REPRESENTING THE FULL RANGE OF PUBLIC AND PRIVATE HIGH SCHOOL EXPERIENCE. IT IS OUR GREATEST CHALLENGE AND A GREAT OPPORTUNITY-WE CHOOSE TO SERVE A DIVERSE POPULATION.

W.I.S.E. OFFERS FOUR TYPES OF PROGRAMS INCLUDING: A FALL SEMINAR; TWO WINTER SESSIONS; TWO SUMMER CAMPS; AND INVITATIONS TO CAMPUS THROUGHOUT THE YEAR. THE FALL SEMINAR IS OPEN TO ANY INTERESTED YOUNG WOMAN, PARENT, TEACHER, OR COUNSELOR. PARTICIPANTS MEET WITH PROFESSIONAL WOMEN IN MATH AND SCIENCE FIELDS AND TALK WITH FACULTY MEMBERS FROM MATH AND SCIENCE RELATED DEPARTMENTS. PARTICIPANTS PARTICIPATE IN ONE SMALL HANDS-ON PROJECT. AROUND 200-250 PEOPLE PARTICIPATE.

TWO WINTER SESSIONS ARE EACH HELD ON THREE CONSECUTIVE SATURDAYS. THIS PROGRAM IS SELECTIVE REQUIRING THAT STUDENTS SUBMIT A TRANSCRIPT, AN APPLICATION, AND A RECOMMENDATION FROM A MATH OR SCIENCE TEACHER. FORTY YOUNG WOMEN ARE SELECTED FOR EACH SESSION.

TWO SUMMER CAMPS WHICH ARE ALSO SELECTIVE ARE HELD ON CAMPUS. EACH CAMP LASTS FOR TWO WEEKS AND HAS BOTH DAY STUDENTS AND RESIDENCE STUDENTS. THE DAY PROGRAM IS FREE. THE COST FOR ROOM AND BOARD THIS YEAR IS \$285. FOR THE TWO WEEK PERIOD. RESIDENTIAL STUDENTS ARE SUPERVISED BY ONE PERSON WITH A SOCIAL SCIENCES BACKGROUND AND TWO UNDERGRADUATE WOMEN STUDENTS IN A MATH AND SCIENCE RELATED FIELD.

OUR FOURTH KIND OF PROGRAMMING INVOLVES AN EFFORT TO INVITE YOUNG WOMEN TO CAMPUS FOR LECTURES OR OTHER COLLEGE EVENTS THAT SEEM INTERESTING TO HIGH SCHOOL STUDENTS. WE TRY TO INCLUDE THEM IN THE LIFE OF THE UNIVERSITY IF POSSIBLE. FOR EXAMPLE, A NOTED WOMAN CHEMIST VISITED OUR CAMPUS FOR A GUEST LECTURE SERIES LAST WINTER. W.I.S.E. STUDENTS WERE INVITED TO CAMPUS FOR HER LECTURE AND FOR A SOCIAL EVENT WITH OTHER W.I.S.E. STUDENTS.

SCHEDULES OF ONE WINTER AND ONE SUMMER PROGRAM ARE ATTACHED TO SHOW OVERALL CONTENT AREAS OF W.I.S.E. PROGRAMS. WE EXPERIMENT WITH CONTENT AND EACH PROGRAM TENDS TO BE A BIT DIFFERENT AND INCORPORATE DIFFERENT THEMES. GENERAL CONTENT AREAS ARE: LABS; HANDS-ON PROJECTS; MEETINGS WITH PROFESSIONAL WOMEN; RELATIONSHIP BUILDING WITH FEMALE UNDERGRADUATE STUDENTS IN ENGINEERING AND MATH AND SCIENCE RELATED FIELDS; SMALL GROUP DISCUSSIONS; CAREER AND PERSONAL DEVELOPMENT; COMPANY TOURS; AND WOMEN'S HISTORY DISCUSSIONS.

LABS ARE GENERALLY TAUGHT BY FACULTY MEMBERS AND GIVE STUDENTS EXPERIENCE IN A COLLEGE LABORATORY. LABS THAT HAVE WORKED WELL HAVE BEEN: EXTRACTING CAFFEINE FROM TEA; INVESTIGATING EFFECTS OF CERTAIN DISEASES ON PARTS OF THE BODY; MAKING A CHEMICAL PRODUCT THAT PRODUCED A HAZARDOUS WASTE AND MAKING DECISIONS ABOUT THAT WASTE; AND WORKING WITH DNA IN A BIOTECH LAB. HANDS-ON PROJECTS ARE OFTEN DEVELOPED AND TAUGHT BY WOMEN UNDERGRADUATE STUDENTS. EXAMPLES OF SUCCESSFUL PROJECTS INCLUDE: BUILDING CIRCUITS; BUILDING A GENERATOR; EXPERIMENTING WITH AN ARCHITECT'S TOOLS; MAKING PERFUME; MAKING PAINT; BUILDING KITES; MEASURING CALORIES IN PEANUTS; INVESTIGATING HOW MATERIALS WORK TO KEEP US FROM FALLING THROUGH THE FLOOR; AND DEVELOPING AN AFTER COLLEGE BUDGET WITH A SPREADSHEET.

THE MEETINGS WITH PROFESSIONAL WOMEN ARE NOTED BY HIGH SCHOOL STUDENTS AS THE MOST HELPFUL PART OF THE PROGRAM. W.I.S.E. HAS A NETWORK OF OVER 250 WOMEN IN THE CHICAGO AREA IN A VARIETY OF MATH AND SCIENCE RELATED FIELDS WHO VOLUNTEER TO TALK WITH YOUNG WOMEN ABOUT THEIR WORK AND LIFE. WE HAVE LEARNED THE IMPORTANCE OF SHOWING FAMILIES TO THE YOUNG WOMEN PARTICIPATING IN W.I.S.E. WOMEN WITH CHILDREN AND RESPONSIBILITIES OUTSIDE THEIR WORK ARE VERY POPULAR WITH THE W.I.S.E. PARTICIPANTS. NETWORKING WITH THESE WOMEN COMBINED WITH NETWORKING WITH UNDERGRADUATE WOMEN STUDYING MATH AND SCIENCE RELATED FIELDS SEEMS TO BE AN EFFECTIVE WAY OF HELPING THE

PARTICIPANTS IMAGINE THAT THEY, TOO CAN BE ENGINEERS AND SCIENTISTS. W.I.S.E. PARTICIPANTS HAVE MEALS TOGETHER WITH WOMEN STUDENTS AND PARTICIPATE IN DISCUSSIONS AND OUTINGS TOGETHER. THE MECHANISM OF THE SMALL GROUP DISCUSSION WORKS VERY WELL IN HELPING ESTABLISH A RELATIONSHIP BETWEEN UNDERGRADUATES AND HIGH SCHOOL STUDENTS. SMALL GROUP DISCUSSION ACTIVITIES THAT HAVE BEEN MOST SUCCESSFUL INCLUDE: ETHICS CASE STUDIES DISCUSSIONS; DEVELOPMENT OF A GROUP MOON COLONY; CREATION OF A GROUP COMPANY USING ALL INTERESTS OF GROUP MEMBERS; RESEARCHING MAJORS; AND PARTICIPATING IN A DREAM EXERCISE ABOUT THEIR FUTURES.

W.I.S.E. INCLUDES CAREER AND PERSONAL DEVELOPMENT COMPONENTS. WE HAVE USED THE STRONG CAMPBELL INTEREST INVENTORY, THE MYERS BRIGGS PERSONALITY INDICATOR; AND HAVE HELD SELF-ESTEEM ACTIVITIES. W.I.S.E. HAS INCLUDED A WOMEN'S HISTORY/PROGRESS COMPONENT FOR THE LAST SEVERAL PROGRAMS WHICH HAS BEEN SUCCESSFUL IN HELPING THE YOUNG WOMEN CHECK THEIR OWN KNOWLEDGE OF WOMEN'S PAST AND TALK ABOUT THEIR OWN FUTURES. WE HOPE THAT THESE YOUNG WOMEN WILL GO BACK INTO THEIR HIGH SCHOOLS A LITTLE MORE SOPHISTICATED ABOUT WOMEN'S EQUALITY AND HISTORY. THE FINAL COMPONENT OF SUMMER W.I.S.E PROGRAMS INVOLVES COMPANY TOURS. WE DO CONTINUE TO EXPERIMENT WITH CONTENT AS WE COME TO KNOW THESE YOUNG WOMEN BETTER AND LEARN FROM THEM. ONE EXPERIMENT THIS SUMMER WILL BE THE ADDITION OF A SESSION BY AN OUTSIDE FACILITATOR ON COPING WITH DIVERSITY. GIVEN THE CLIMATE IN THE COUNTRY AND ON COLLEGE CAMPUSES FOR MINORITIES AND IN MANY CASES WOMEN, AND GIVEN THE POTENTIAL THAT THESE YOUNG WOMEN COULD BE THE OBJECT OF INTOLERENCE. WE BELIEVE IT MIGHT BE A USEFUL ADDITION.

W.I.S.E. PROGRAMS ALWAYS END WITH SOME HESITANCE TO LEAVE AND WITH MANY WARM COMMENTS. THE FOLLOWING STATEMENTS ARE FROM STUDENTS FROM THE MOST RECENT W.I.S.E. PROGRAM:

- 'W.I.S.E. INTRODUCED ME TO A VARIETY OF NEW FIELDS I NEVER THOUGHT OF AND IT PROVIDED ME WITH A LOT OF INFORMATION THAT HAS STUCK WITH ME ABOUT THEM.'
- 'IT WAS GREAT TO HAVE THE OPPORTUNITY TO EXPERIENCE DIFFERENT CAREERS HANDS-ON. IT WAS IMPORTANT FOR ME TO TALK TO FEMALE PROFESSIONALS.'
- 'IT SHOWED ME THAT OTHER GIRLS WERE ALSO INTERESTED IN SCIENCE, AND POSITIVELY ENCOURAGED ME TO DECIDE WHAT I REALLY WANT TO DO.'
- 'I WAS SO EXCITED WITH THE IDEA OF A CAREER INVOLVING MATH AND SCIENCE THAT COULD HELP CLEAN UP OUR WORLD.'
- 'IT HELPED MAKE ME FEEL WOMEN CAN DO ANYTHING.'
- 'I NEVER HEARD OF ENGINEERING UNTIL W.I.S.E., AND THE TALKS WITH THE 'PROS' THROUGH W.I.S.E. HELPED ME REALIZE THIS WAS FOR ME.'

EACH YEAR GRADUATING SENIORS WHO PARTICIPATED IN W.I.S.E. ARE SURVEYED ABOUT THEIR PLANS FOR COLLEGE. 99% OF PARTICIPANTS ATTEND COLLEGE WHILE 85% MAJOR IN SOMETHING RELATED TO MATH AND SCIENCE. PLANS ARE UNDER WAY TO SURVEY PARTICIPANTS FIVE YEARS AFTER THEIR HIGH SCHOOL GRADUATION.

THOUGH W.I.S.E. DOES NOT PROMOTE IIT ACTIVELY IN PROGRAMS, WE WOULD LIKE AS MANY OF THESE YOUNG WOMEN AS POSSIBLE TO COME TO IIT AS COLLEGE FRESHMEN. IIT HAS AN UNDERGRADUATE POPULATION OF AROUND 2000 AND A FRESHMEN CLASS OF AROUND 350. NUMBERS OF W.I.S.E. FRESHMEN AT IIT FOR SEVERAL YEARS HAVE BEEN:

1984	7
1985	12
1988	7
1989	24
1990	15

I WILL CLOSE THIS DESCRIPTION OF IIT'S WOMEN IN SCIENCE AND ENGINEERING PROGRAM WITH TWO IDEAS ABOUT PLANNING LEARNED FROM OBSERVATION OF THE YOUNG WOMEN. THOSE IDEAS INVOLVE THE ELEMENT OF CHOICE IN PLANNING AND THE USE OF UNDERGRADUATE TEACHING ASSISTANTS. IT SEEMS IMPORTANT TO GIVE THE PARTICIPANTS AS MANY CHOICES AS POSSIBLE IN A PROGRAM LIKE W.I.S.E. LOGISTICALLY, THIS CAN BE A LITTLE MORE CHALLENGING TO PLAN. WHEN THEY ARE ABLE TO CHOOSE MAJORS PRESENTATIONS AND LABS, THEY SEEM TO BE MORE ACTIVE IN THE WHOLE PROGRAM. I THINK IT IS KEY TO HELPING THEM TAKE AN ACTIVE POSITION IN CHOOSING MATH AND SCIENCE AND I AM NOT SURE THAT THE MAJORITY OF YOUNG PEOPLE HAVE MUCH EXPERIENCE IN MAKING ACTIVE CHOICES AND DEALING WITH THE CONSEQUENCES. HELPING THEM 'ACT OUT' MOVING FROM PASSIVITY TO ACTIVITY SEEMS VERY EFFECTIVE.

MY FINAL RECOMMENDATION IN PLANNING PROGRAMS LIKE W.I.S.E. IS TO USE WOMEN UNDERGRADUATE TEACHING ASSISTANTS TO DEVELOP AND LEAD PROJECTS AND SESSIONS. THEY ARE NO SUBSTITUTE FOR FACULTY MEMBERS AND THEY MUST BE CAREFULLY SELECTED AND SUPPORTED THROUGHOUT THE PROCESS. IT SEEMS IMPORTANT TO GIVE THEM THE OPPORTUNITY TO BE TEACHERS AND TO FEEL THE REWARDS OF TEACHING. THEY ARE VERY GOOD AT DEVELOPING AND RUNNING SESSIONS, AND IT MAY HELP THEM CONSIDER ACADEMIA AS A POSSIBLE PROFESSION. IT WOULD BE INTERESTING TO STUDY THE RETENTION OF THESE YOUNG WOMEN IN PREDOMINANTLY ENGINEERING FIELDS TO SEE IF THEIR HELPING YOUNGER WOMEN HELPS THEM STAY IN ENGINEERING. HAVING THE OPPORTUNITY TO HELP OTHER STUDENTS SEEMS TO BE A VERY SIGNIFICANT EXPERIENCE FOR THEM.

	DAY TWO SATURDAY, MARCH 3, 1990	GROUPS HERIWWN HALL ROOMS 301 AND 302	T.A. PRESENTATIONS/PROJECTS	AERCEDAE, CAIRELMES SELLA MATINO HERWAN HALL ROOM 303 WAR, ON MANIEM ATRICALEM AND MEASURE DISTARE, AND THE ATREDAEL. LEARN HOTE	ABOUT AEROSPACE ENGINEERING.	ACCHITCTURE JANINA KOJS C DAWN VILLIAMS HERMAN HALL ROOM 304 LEAN ABOUT TOOLS ARCHITECTS USE AND CREATE ARCHITECTURE OF THE FUTURE, LEANN WORE ABOUT	STUDYING ARCHITECTURE.	OPPORTED STERKE. DIAME BANNON MAIN BOLLONING ROOM 413 WORK ON PRESSOUN, COMPUTER AND LEVEN ABOUT SPREADOSERTS. DEVELUP YOUR OWN BADGET FOR AFTER COLLEGE.	ELECTRICAL ENGINEERING WAY WEELER & AWGLA HERWAN HALL KOWN 305 WARE A GENERATOR AND LEARN KYRE ABOUT ELECTRICITY	MUTRIALS AND MECHWICAL ENGINEERING WAY 1812 HERWAY BLAL ROAD 18 WAY DON'T YOU FALL THROUGH THE FLOOR? WAY DON'T YOU FALL THROOM THE FLOOR? WAY CERTAIN THINKS ARE WORE OF CERTAIN MITERIALS.	LUNCH	CHOOSE A T.A. PRESENTATION/PROJECT	GROUPS-MOON COLLONY HERMANN HALL ROCHS 301 AND 302
	Sur Sur Sur	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	9120 -10130 A.M.	(0,0056 0,6)			10:40 -11:50 A.M.	(CHOSE MOTHER)			12,00 -12,50 P.M.	1,00 - 2,10 P.H.	2:15 - 3:00 P.M.
	DAY DNE Saturday, January 24, 1990	MELCOME HERMANN HALL ROCH 301 AND 302	GROUP INTRODUCTIONS HERWANN HALL ROOM 301 AND 302	BFEAK	MANAGING OUR ENERGY RESOURCES Hermann Hall Room 301 and 302	LINOA J. COOPER, DIRECTOR CORPORATE PROCRAM DEVELOPMENT LITRI	LUNCH AND CAMPUS TOUR	SCIENTIFIC THEORIES AND CONFLICT INSTITUTE FOR GAS TECHNOLOX MAY NEWBERG, GAS ENGINEER IGT	YOUR GROUP- CLUSING AND HOON COLDNY		MISE THANS ATOT, THE BRUNGHICK FOUNDATIONS, 11T, AND GENERAL MOTORS FOR GENERALS, FINANCIAL SIPPORT OF PROCESSARS.	1	
O'N NO.	15 to 10 to	9100 - 9120 A.M.	9120 - 9150 A.M.	9150 - 10100 A.M.	10:00 - 11:50 A.M.		12:00 - 1:10 P.M.	1115 - 2115 P.H.	2,30 - 3,00 P.H.		WISE THANKS ATCT, THE BR		

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