

CONNECTIONS: A Program for Women Studying Science, Technology, Engineering, and Mathematics at Northeastern University.

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Paper Title:

PROGRAMMING “SUPPORT”: WHAT CAN WE OFFER COLLEGE WOMEN?

Central Question: How can a program most effectively support women studying engineering? How do I attract busy students who do not necessarily see their college or career experience in gendered terms or recognize the benefits which program support offers?

The Women Problem

The statistics on female undergraduate engineering students is well known to this audience: The national average is about 18% enrolled. A significant “leak” in the female pipeline into engineering happens at or before college. Likewise, we are also familiar with the empirical evidence on educational experiences of college women studying engineering. There appear to be “special needs” for women (and minorities) which are a function of their own under-representation in the college engineering major. Some researchers suggest that this status “automatically” put women at a psychological disadvantage with regard to a lack of confidence.¹ Gender isolation and a dearth of female role models and mentors are structural features of a college engineering major for most women in co-ed institutions.

Retaining women in engineering majors is also a challenge: once in college women and minorities drop out at higher rates than do majority students.² Women typically begin college with somewhat higher predictors of academic success than male counterparts. They do not leave engineering due to lack of performance yet they do appear to have a higher degree of academic dissatisfaction.³ In examining why undergraduate women left engineering majors, Hewitt and Seymour found 78% reported having experienced discouragement and loss of self-esteem in freshman and sophomore years.¹

Self Confidence

WEPAN’s 1999 Climate Study found that college women “report an overall lower level of academic confidence than do males.” This theme is echoed in nearly every study that

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queries for self-esteem measures. The social-psychological factors imbedded in self-confidence are pervasive issues for women in engineering: perceived ability and confidence are correlated with persistence in engineering while attacks on self-esteem is used to partly explain why women leave the major. Women are likely to take criticism personally. Female students tend to downgrade their own capabilities or do not successfully internalize them. Studies have shown women to have a propensity to explain their academic success in terms of hard work or chance while men explain their success in terms of innate ability. Conversely, women are more likely to attribute unsatisfactory work to their inadequate abilities (i.e., I must not be good at this subject) while males more often choose exogenous reasons to explain their poor performance (i.e., the test or the teacher was faulty).

The Meaning of Support

“Inadequate support” at the institutional level is repeatedly offered in the findings when studying women’s engineering education. Some studies rank the lack of support in colleges, in the form of counseling and advising, as a major barrier to female student success.⁴ Environmental factors are seen to cover a lot of ground in explaining the difficulties women face in pursuing engineering. Consistent evidence of the differential success of students in women’s colleges strongly validates the sense that something deleterious is happening to women in their “environment” of minority status.⁵

There is a general consensus that offering support to women in engineering will work. Rayman and Brett conclude, “women will have a much better chance of persisting in science when the appropriate environmental supports are present.” However, the remedy for some of these problems is hard to implement. My question here, before WEPAN specialists, is on the specific content of support which young women students need.

Offering Worms? Directions from Research

A classic illustration of the “support question” is the Gary Larson cartoon showing a baby in a stroller crying in a park. There are two birds perched next to the baby and one explains, “It’s still hungry...and I’ve been stuffing worms into it all day.” (credit to Nancy Leveson.) This suggests an inquiring perspective on support programming.

I am the director of a new university program to encourage women studying science, technology, engineering, and mathematics (STEM). Sponsored by the NSF’s Gender Equity Program, as well as from truly generous support from our university, this program is intended to provide a range of support mechanisms to attract and retain women college majors in these under-represented STEM fields. I do not actually fear that I am leading a project that is feeding worms to its students. The literature points us emphatically to several avenues of support; including improved advising, networking and mentoring,

reducing student isolation, increasing inter-student bonding opportunities, curriculum revisions, and academic skills support.

The CONNECTIONS Program at Northeastern is attempting to fill these requirements by offering:

Specialized faculty advising;

Electronic mentoring network with other students and a professional woman engineer;

Common living area in the freshman residence hall;

One all-women freshman calculus course and independent workshop with dedicated TA;

Clustering of female students in freshman Intro to Engineering course;

A Center with a dedicated computer lab for program members;

Weekly physics lab study group at the Connections lab;

A freshman retreat at the start of the fall quarter;

Weekly discussion section for members in the fall quarter;

Opportunities to work with pre-college girls through e-mentoring; computer clubhouse and school visits;

Career management workshops, i.e. on financial investing; conflict resolution; and decision-making strategies.

Periodic socials, as well as events sponsored through the Connections section of the residence hall;

And students have access to tutors through the separate WIE program here.

What Motivates Women to Participate in a Program Designed for Them?

So far our turnout for several events and overall participation rates are lower than desired in these first few months into the Connections program. In one view, of course it takes time to develop a program. However, the resistance I have encountered among students when it comes to joining this program surprises me. My goal in presenting Connections to our target groups is to demonstrate clearly that they benefit from this “support”. This can be unreliable, however. “Students themselves are not always able to recognize or articulate their own needs.”⁴

I find that some of the college women do not see their own educational environment in “gendered” terms. While the freshman year is the critical one for retaining women students in STEM fields, it may also most coincide with a stage in life when people are more likely to be insistent on viewing the world as basically fair and equitable. One of our Connections scholarship freshman students in a discussion session railed against special university programs for anyone, apparently unaware of, or untroubled by, the contradiction in her own case.

An active officer in our SWE chapter responded to our new program by saying she did not see the need for, nor want to participate in, a women’s program. When asked about

the apparent clash between that attitude alongside her interest in SWE, she unself-consciously replied that there are “plenty of guys in SWE”.

And there is the intrinsic factor in under-representation which is those women who do persevere in a field like engineering and chose it as a major in college are likely demonstrating a self-selected quality by virtue of doing so. Those who could cope better with, or remain oblivious to, encountered discrimination are more likely to succeed in the preparation to become a college engineering freshman. Young women and pre-college girls who experience a more negative impact from gender bias are probably less likely to “select” to persevere in the field. One consequence of this may be an over-representation of perseverant women to begin with. (Yet often freshman women are heavily influenced by a high school teacher, a counselor, or another adult in their lives that points the girl into engineering.)

Another aspect of this issue concerns how support programs can boost female self-confidence. The potential impact of generalized support and program components focused on building students’ self-esteem may be deeply affected by whether such programs are explicit or not. Again, it is hard to gauge how students see their needs and how they might choose to get them met, if at all.

Without guile, I invite comments, feedback, and recommendations for how to make the Northeastern University Connections’ program effective “support” for our college students majoring in STEM fields. I will bring our advertising materials to the conference for evaluation. If the secret to real estate success is “location, location, and location,” it may be that the secret to program recruitment is marketing, marketing, and marketing.

* The Connections Program includes a pre-college component in partnership with the Patriot’s Trail Girl Scout Council.

1 Hewitt, Nancy M. and Elaine Seymour, *The Problems of Women in Science, Mathematics, and Engineering*, 1991.

2 Task Force on Women, Minorities and the Handicapped in Science and Technology, *Changing America: The New Face of Science and Engineering*, 1989.

3 Adelman, C. *Women and Men of the Engineering Path: A Model for Analyses of Undergraduate Careers*. U.S. Department of Education and The National Institute for Science Education. Washington, DC. 1998 report.

4 Anderson, Vivian. *Identifying Special Advising Needs of Women Engineering Students*, Journal of College Student Development, July/August, 1995.

5 Rayman, Paula, and Belle Brett, *Women Science Majors: What Makes a Difference in Persistence after Graduation?* Journal of Higher Education, July/August 1995.

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