J. COLLEGE STUDENT RETENTION, Vol. 6(2) 155-168, 2004-2005

RETAINING UNDERGRADUATE WOMEN IN SCIENCE, ENGINEERING, AND TECHNOLOGY: A SURVEY OF A STUDENT ORGANIZATION

MARA H. WASBURN

SUSAN G. MILLER

Purdue University–West Lafayette, Indiana

ABSTRACT

National Council for Research on Women finds that much of the progress that women have made in science, engineering, and technology has stalled or eroded. As we enter the new millennium, there will be an increasing need for a scientifically and technologically literate workforce. A student organization, Women in Technology, was formed at Purdue University–West Lafayette in 1998 in response to data indicating that there had been no increase in the number of women enrolled in the University's School of Technology over the past five years. Such data were consistent with those produced by national studies indicating that the trend of increasing numbers of women enrolling in engineering, science, and technology programs in American colleges and universities, established in the preceding two decades, had ceased. The aim of Women in Technology was to attract more women to the School, and reduce the attrition rate of women already in the program by serving as a well-recognized, formal context in which they could receive mentoring and in which they could find stable social support to help them achieve their academic and career objectives. This article discusses an overview of the organization, the results of a survey of members' undergraduate classroom experiences, student-generated strategies for addressing the concerns revealed in the survey, and the implementation of those strategies.

INTRODUCTION

A variety of programs have succeeded in attracting more women into the fields of science, engineering, and technology over the past two decades. Many of these women are now in highly visible positions. However, although women constitute 46% of the labor force, less than a quarter of the scientists and engineers in this country are women (Mervis, 2000). A July 2001 report released by The National Council for Research on Women finds that much of the progress that women have made in these areas has stalled or eroded. The report underscores the increasing need for a scientifically and technologically literate workforce as we enter the new millennium. One year earlier, the Morella Commission, charged with developing strategies to attract more women and minorities into science, engineering, and technology, reported to the Committee on Science of the House of Representatives that significant barriers to attaining that goal are present from elementary school through college and beyond (Committee on Science, 2000). Women and girls will comprise half of the available science, engineering, and technology talent pool. Therefore, it becomes imperative not only to attract but also to retain women and girls in these disciplines.

As early as elementary and middle school, male/female attitudes toward science and technology begin to differ. This continues on into high school during the critical period when girls begin to develop an understanding of their socially defined gender roles (AAUW, 2000; Belenkey et al., 1986; Seymour, 1999; Welty & Puck, 2001). They have some reservations about the seemingly male "computer culture" as they watch boys utilizing computers for violent computer games and what they see as technology for its own sake (AAUW, 2000). There is little software that appeals to them. Therefore, the tendency of boys to monopolize the computers is not being vigorously challenged (Borg, 1999). As a result, girls do not take advantage of after-school computer clubs or enroll in higher-level computer classes (Sanders, 1995).

Contributing to girls' unequal participation in science, mathematics, and computer education are tracking, negative judgments about their ability, and access to qualified teachers and resources (Madigan, 1997; Oakes, 1990; Weiss, 1994). By the time they are at the point where they must choose careers, girls have less experience with computers and perceive that they are behind, decreasing their likelihood of entering the fields of science, engineering, and/or technology (Borg, 1999).

There is a dearth of young women enrolled nationwide in secondary school computer science advanced placement classes. Their absence does not appear to stem from disinterest in computers but rather from applications that seem more attuned to the interests of boys (AAUW, 2000; Molad, 2000). Hence, as young women enter colleges and universities in the areas of science, engineering, and technology, they are disadvantaged by their lack of computer experience (Sanders, 1995). They also appear to have career goals that are not as well defined

as those of their male counterparts, and often lack confidence in their abilities (Astin & Sax, 1996; Vetter, 1996). They encounter college and university classes that are unfriendly to them, impeding their learning. The absence of women faculty and mentors both within the classroom and outside of it, few women students in their classes, and the lack of supportive networks can create a "chilly climate" for women in non-traditional fields. It is during this critical period that many of them transfer into other fields (Hanson, 1997, National Council for Research on Women, 2001; Seymour, 1999; Seymour & Hewett, 1997).

This article presents a case study of Women in Technology, a student organization at Purdue University, founded by the School of Technology administration to address a flat line in the growth of the number of women students over the past five years. Unlike many other student organizations, Women in Technology students are responsible for identifying the problems they face; generating alternative strategies for dealing with those problems; and, with their faculty advisors, implementing those strategies they determine are the most promising. In this article, we examine the results of a climate survey given to members of the student organization. We then consider student members' reactions to these findings. Next, we look at the solutions proposed by the students to the problems identified in those data. Finally, we explore how a new networking mentoring/learning communities model for Women in Technology creates an environment for student-driven rather than faculty- or administration-driven solutions to their perceived problems as women in non-traditional environments.

A HISTORY OF WOMEN IN TECHNOLOGY

Purdue University–West Lafayette is a Midwestern, Big Ten, Research I University with 37,871 students, of whom 42% are women, and 1,870 faculty members, of whom 21% are women. Purdue's School of Technology consists of eight departments: Aviation Technology, Building Construction Management, Computer Graphics Technology, Computer Technology, Electrical and Computer Engineering Technology, Industrial Technology, Mechanical Engineering Technology, and Organizational Leadership and Supervision. Table 1 shows that during the past five years, the number of female faculty has remained virtually unchanged at only 12.2% of the total faculty.

In spite of the growth of career opportunities for women in all areas of technology and heavy efforts to recruit women into the areas of science, engineering, and technology, Purdue University's School of Technology experienced no growth in the proportion of women students enrolled during the most recent five year period. As shown in Table 2, women continue to represent only 15.2% of the student body.

To address this issue and to assist in the recruitment and retention of women students, the School created Women in Technology as a student organization in December 1998. Its stated purpose was "promoting the leadership of women

Table 1. Faculty by Rank and Gender at Purdue University, School of Technology

	1997				2001			
	n	Men	Women	% Female	*n*	Men	Women	% Female
Prof.	23	21	2	8.7	27	25	2	8.0
Assoc.	59	53	6	10.2	59	52	7	11.9
Asst.	44	37	7	15.9	45	38	7	15.2
Total	126	111	15	11.9	131	115	16	12.2

Table 2. Students by Gender at Purdue University, School of Technology

	1997		2001	
	n	Percentage	*n*	Percentage
Male	3,526	84.9	3,600	84.8
Female	629	15.1	646	15.2
Total	4,155	100.0	4,246	100.0

in technology through networking, encouragement, mentoring, and outreach" (Women in Technology Constitution). Seventy-five women from the School of Technology joined the new organization. Four months later, the woman who was then faculty advisor applied for funds to support Women in Technology Assertiveness Training. The grant application stated that "based upon my research, women and men in team projects need to be more assertive. Women tend to think their behavior is already assertive while their peers would disagree and label women's behavior and communication skills as unassertive. Men students generally reported that they knew they were being unassertive" (AlliedSignal Grant Application, 1999). They received the funds to conduct assertiveness workshops. As described in the grant application, the program would consist of workshops on conflict management, sexual harassment, and interpersonal communication. It was designed to last the entire school year, but fell far short of that goal, as noted below.

Upon assuming our roles as faculty advisors to Women in Technology, we found an organization that appeared to be in disarray. The membership, which had

initially stood at 75 women, had dropped significantly. Few women were attending meetings, and we were told that the assertiveness training programming scheduled for the spring semester had been canceled. The first several meetings we attended seemed largely focused on process, and there was little input from the members in attendance. Many of those members seemed not to know one another. There appeared to be no agreement on what the organization's goals should be or on how to achieve the goals that had been set.

We believed that if we did not intervene, we would find ourselves presiding over Women in Technology's demise. As we saw it, the students were taking little responsibility for the organization, looking instead to faculty for direction. We agreed that if, in fact, Women in Technology were to survive, it would have to move from a faculty-driven to a student-driven organization. For that type of change to occur, and with it an increased responsibility for the group by its members, we would need the buy-in of the officers and the members (Quinn, 1996; Schein, 1992).

One of the authors had been instrumental in creating networking mentoring groups for women faculty and staff on the Purdue campus, as well as a research support group for doctoral students (Wasburn, 2001, 2002; Wenniger, 1997). Both groups contained elements of networking mentoring and learning communities (see below). Building upon lessons learned from those groups, we believed that the networking mentoring/learning communities model held promise for rebuilding Women in Technology.

A NETWORKING MENTORING/LEARNING COMMUNITIES MODEL

Among the recommendations suggested by the National Council for Research on Women (2001) report was to support women undergraduates by investing in mentoring programs with role models who can put a human face on science, engineering, and technology. Two models for achieving these goals are networking mentoring and learning communities. Organizing students into learning communities is a strategy that can connect students on what can seem dauntingly large and lonely university campuses (Shapiro & Levine, 1999). Learning communities can be organized around common interests and curricula. "These can be used to build a sense of group identity, cohesiveness, and uniqueness . . . and to counteract the isolation that many students feel" (Astin, 1985, p. 42).

There is a long, rich tradition within academe of using networking mentoring as a strategy for bringing women together for their mutual benefit and support (Haring, 1999; Swoboda & Millar, 1986). Defined as "an ever-changing series of dyadic contacts in which each person plays the role of mentor or mentee to differing degrees in each dyad" networking mentoring is an empowering strategy that has been successful in assisting women with academic progress both as faculty members and students (Swoboda & Millar, 1986, p. 11). Its power comes

from the fact that each woman involved in a networking mentoring group spends some time as a mentor and some time being mentored, depending upon the situation. Each member is encouraged to take leadership in areas where she has particular knowledge and/or interest and to seek mentoring in those areas where she is less knowledgeable, thus lessening the hierarchy that can develop in organizations of this sort. However, if we were to be agents for change, we first needed to gain an understanding of the women students who chose to join the organization.

METHOD

The following sections describe the initial efforts of a study that we conducted to help the School of Technology understand the classroom experiences of the members currently involved with Women in Technology, and to help empower the organization to become self-directed.

Despite the fact that the school was aware that women students comprise only 15% of the total enrollment, no formal study had been conducted to investigate student views or perceptions. In order to solicit student responses regarding these factors, a survey was administered to the current members of Women in Technology. Of the 81 students involved in the group, 51 responded to the survey, for a 63% response rate.

The survey questions were modified from the WEPAN Pilot Climate Survey, designed to assess engineering students' perceptions of the educational climate at their universities (Brainard, Metz, & Gilmore, 1993). Research suggests that female students are most concerned about isolation, the perceived irrelevance of theoretical preparatory courses, negative experiences in laboratory courses, classroom climate, and lack of role models (Kramer, 1996). Other studies have suggested that the different learning styles of women may influence their desire to enter engineering or technology fields. Additional data indicate that the problem is the image that engineering and technology are not disciplines whose primary goal is to help society, a frequently cited desire of female students (Santovec, 1999).

Both open and closed form questions were utilized for the survey to allow for both structured and greater depth of responses. The structured questions were rated on a 5-point Likert scale with responses ranging from strongly agree to strongly disagree. In addition, the open form question allowed for more specific and individualized responses and minimized the imposition of predetermined responses when gathering data (Gall, Borg, & Gall, 1996).

Patton (1990) recommends utilizing multiple methodologies when studying a phenomenon in order to strengthen the design. That process is termed "triangulation." To triangulate the data, we examined the Women in Technology documents: its Constitution, program announcements, grant applications, and events brochures. However, we recognize that studying the members of Women

in Technology limits the inferences we can draw from our data. Members of an organization self-select, which means they may be more or less committed to their careers. They may also have very different experiences from the rest of their cohort. Additionally, we have neither a control group nor comparable data from male technology students from which to draw comparisons. However, we believe the findings are consistent with the literature cited above, and that the power of the women's voices will permit some limited inferences to be drawn. One final point: because Women in Technology members come from such diverse departments as Electrical and Computer Engineering Technology, Organizational Leadership and Supervision, Aviation Technology, and Computer Technology, we do not believe that findings are specific to any particular discipline, but can be applied to other non-traditional programs in which women are enrolled.

FINDINGS

Structured Questions

The structured questions focused on classroom climate, perception of technological abilities, and career choice. The results are seen in Table 3.

The data indicate that 76% of the women students responding to the survey are in predominantly male classroom environments, and nearly one-third are uncertain of or lack confidence in their technology skills. Almost one-third of the women believe that the professors in their technology classes do not treat women and men equally, and 20% of them do not feel comfortable going to them for assistance outside the classroom. Approximately 25% of the respondents indicate that they do not feel like equal participants when working on group projects with male teammates. More than 80% of the women feel they have the support from their family and friends for their intended careers, but 30% are uncertain of or do not believe that technology careers are appropriate choices for women.

By far, the most compelling results of the survey are the voices that express the individual experiences of being a female student in the School of Technology. Those responses are discussed below.

Open Questions

The survey contained three open questions:

1. Are you pleased with your choice of a career in technology? Why or why not?
2. What, if any, gender-specific problems have you encountered as a woman in technology?
3. How can the School of Technology best support its women students?

Table 3. Women in Technology Survey Responses to Structured Questions (n = 51)

Question	SA	A	U	D	SD
1. The professors in my technology classes treat women and men equally in the classroom.	20%	42%	6%	20%	12%
2. I am often one of only a few women in my technology classes.	33%	43%	4%	18%	2%
3. I participate equally in group projects with male teammates.	22%	44%	10%	22%	2%
4. I feel comfortable asking questions in class.	31%	37%	12%	18%	2%
5. I feel comfortable going to my technology professors for assistance outside the classroom.	20%	46%	10%	20%	4%
6. I feel confident in my abilities in my technlogy courses.	18%	52%	24%	6%	0%
7. I feel a technology career is an appropriate choice for women.	45%	25%	22%	8%	0%
8. My family supports my career choice.	55%	33%	4%	6%	2%
9. My friends support my career choice.	51%	31%	6%	12%	0%

The responses to the questions indicate that the students have many similar concerns. It is clear from the comments received that many female students feel outnumbered and even intimidated in class:

> I'm the only female in a class of 20. You really feet alone.
>
> I'm always one of the few females in class. That gives me a lot of pressure.
>
> I had an experience in one of my classes where I felt that men thought the women in the class did not exactly belong there or were stupid.
>
> My roommate freaked out one semester when the teacher made remarks about what she was doing in there with the guys. Something like, other girls would love to change places with her. What an idiot.

Particularly challenging for women students are the group projects that are the hallmark of science, engineering, and technology classes:

> The men don't want us to work with them on projects. When we do, they give us these stupid jobs to do. If we say anything, they look at each other, so I just stopped saying anything.
>
> My computer classes don't usually have any girls I know . . . when there are any other girls in there. I feel like all the male students know each other. I end up with the other girls whether or not I want to work with them.
>
> When I have guys who don't want me in their groups or don't give me enough to do, I just shut up. If more women would do this, there wouldn't be so many problems. I think doing stuff like this just makes it worse for everyone.
>
> I hate group projects. The guys don't really want to work with me. Most of the professors don't seem to care one-way or the other. I think they'd all be happier if we just disappeared.

Some of the women surveyed appear to be demoralized by the male students in their classes who seem more knowledgeable and confident in their abilities. They feel a lack of respect for their abilities:

> Computers are not enjoyable for me anymore because I feel stupid in my classes when guys overachieve in everything they do. They always answer all the questions.
>
> Men often times think that women are not knowledgeable with computers. They think they are more logical.
>
> Guys in my classes sometimes have that "I am better and can do it better" attitude. That really makes me mad.
>
> I know some of the members think (or SAY they think) there is no problem. There is. There is a big problem. Ignoring it won't get rid of it.

It should be noted that some women students, though a decided minority, did react positively, seeing their small numbers as a challenge to succeed:

> It is a great feeling to excel in an area that is mostly males.
>
> It gives women a great opportunity to excel in a predominantly male career.
>
> Guys tend to take over the groups and try to do everything. It's fun though, because I know more than most of them. I just sit there and wait for them to mess up.

Many of the students believe that both the male and female faculty need education about issues concerning women students in mostly male classrooms:

> Some of the professors kind of roll their eyes when you ask a question. They don't seem to think you have any brains.

> Professors sometimes disrespect me in class. That hurts.
>
> We need to learn to speak up for ourselves when we have professors who don't treat us equally. What should we say to them so that we don't get a bad grade? I feel funny saying anything when I know I may see the same professor next semester.

The students identified women mentors and role models as critical needs for women students in the School of Technology:

> I wish we had more women professors we could go to with our problems. We don't know what to do that won't make people angry with us. Who do you complain to?
>
> I'd like to meet more women who have computer-type careers. Maybe then I'd get some idea of what I'd like to do.
>
> I think I would have liked to have a mentor, maybe some one from business. I didn't meet any female professors, especially in my computer classes, who seemed to care. I'm changing majors. I think I might have stayed if I had someone to talk to.
>
> Don't worry so much about getting people to come to the school. Worry about what happens to us when we get here. I hope there's going to be a mentoring program. That's what you should really do. Get mentors for the students that are here already.

RETENTION STRATEGIES

At the end of the semester, the results of the survey were shared with the Women in Technology students. Although the members were keenly aware that women were a minority within the School of Technology, many of them were shocked by exactly how few women faculty and students there are. They were also relieved to hear how many of their struggles were shared by the other members of the group.

Some of the research surrounding empowerment through student-driven rather than faculty-driven organizations was discussed, as well as some of the theory behind networking mentoring/learning communities. Then, the students were divided into focus groups and asked to identify strategies that would address the concerns that were revealed in the surveys. Seven suggestions for the group emerged from those discussions:

1. Invite the women professors to dinner so that we can all get to know them.
2. Have a retreat so that the members will really get to know one another. Keep networks between members open. Go out to dinner, hang out, discuss things, and get to REALLY know each other.
3. Create a living-learning center so that women students in technology can study together, live together, and take classes together. (There are others on campus.)

4. Begin a mentoring program for all students. Perhaps we could also have women mentors already in the workplace, especially ones who have gone through this program.
5. Create support groups within departments so we can discuss common problems and concerns and how to deal with them.
6. Create an outreach program with area high schools to encourage more women to go into technology careers.
7. Devote one Women in Technology meeting a month to discussing the issues from the survey, like how to get more women students into the School of Technology, how to make women more comfortable in the School, etc.

One suggestion emerged for their faculty advisors: educate the faculty about issues affecting women students in the School.

Implementation of Retention Strategies

In Fall 2002, Women in Technology members, supported by their faculty advisors, began the work of implementing the strategies they had identified in their focus groups:

1. The students held a fall retreat at the home of one of their advisors. All of the 16 women professors at the School of Technology were invited; 11 attended. The students plan to invite them again to their end-of-the-year dinner. They have decided to make these annual events to ensure that the members come to know one another and the women faculty as well.

2. The students and their faculty advisors worked with the Office of the Provost to create a living/learning center for School of Technology women within the residence hall that houses the Women in Engineering center. Students will be offered the opportunity to enroll in the Women in Technology Residential Program Fall 2003. Several Women in Technology members will live on the floor as well as serve as the students' tutors and mentors. The intent of this learning community is two-fold: first, to create a supportive community of women within the school to help sustain its members through to graduation; second, to develop this community to an enduring network of colleagues who can serve as resources throughout their careers.

3. In response to the women students' expressed desire for mentors in the workplace, women alumnae from the School of Technology, who have established careers, will be invited to campus as speakers for a new freshman course entitled *Women in Technology: Exploring the Possibilities.* In this course, the alumnae will share their strategies for success and for balancing career and family with the students. They will also serve as mentors for the students throughout their student years.

4. The students wanted to encourage more women to enroll in the School of Technology. To that end, they invited a representative from Project Lead The

Way, a national alliance for pre-engineering programs in middle schools and high schools, to speak at one of their meetings. Twice a year, Project Lead The Way invites area middle and high school students to Purdue's campus for an all-day workshop. These students explore technology career options, and participate in hands-on projects in state-of-the-art on-campus laboratories. Women in Technology members will now serve as their mentors, remaining in touch with them after the program ends. It is their hope that by mentoring these middle and high school students, a significant number of them will be encouraged to attend Purdue and to enroll in the School of Technology.

CONCLUSION

The issues revealed in the survey continue to be discussed at meetings. Students also strategize about ways in which they can contribute to improving the campus climate for other women within their school, particularly by increasing the number of women students enrolled.

As the students requested, these data were shared with faculty and staff and strategies for making women students feel more welcome in technology classrooms have been explored.

Women in Technology's effectiveness as a student organization will be measured by the number of women students who actively participate, and by the number of women students the school enrolls and retains until graduation. As is the case with all student-run organizations, the turnover of the membership each year, as students graduate and new students join, threatens the continuity of initiatives, limiting the group's effectiveness.

A continual effort that seeks to understand the student issues and address their needs is a necessary first step. The faculty advisors will continue to gather data and information in order to assess the progress that has been made and to target areas that still need to be improved. The women students will continue to be involved in all efforts at effecting change. The problems identified above are, in the final analysis, their problem and they need to be at the center of any solution.

REFERENCES

AAUW. (2000). *Tech-savvy: Educating girls in the new computer age.* Washington, DC: AAUW Educational Foundation.

Astin, A. W. (1985). *Achieving educational excellence.* San Francisco: Jossey-Bass.

Astin, H. S., & Sax, L. J. (1996). Developing scientific talent in undergraduate women. In C. Davis et al. (Eds.), *The equity equation: Fostering the advancement of women in the sciences, mathematics, and engineering* (pp. 96-121). San Francisco: Jossey-Bass.

Belenkey, M. F., Clinchy, B. M., Goldberger, N. R., Tarule, J. M. (1986). *Women's ways of knowing.* New York: Basic Books.

Borg, A. (1999). What draws women to and keeps women in computing? In C. C. Selby (Ed.), *Women in science and engineering. Choices for success* (pp. 102-105). New York: The New York Academy of Sciences.

Brainard, S. G., Metz, S. S., & Gilmore, G. M. (1993). *WEPAN pilot climate survey.* Retrieved September 16, 2001 from the Women in Engineering Programs and Advocates Network Web site: http://www.wepan.org.

Committee on Science, House of Representatives. (2000). *A review of the Morella Commission report recommendations to attract more women and minorities into science, engineering, and technology, Serial No. 106-83.* Washington, DC: U.S. Government Printing Office. *Education, 6*(10), 1-2.

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* (6th ed.). New York: Longman.

Hanson, S. L. (1997). *Lost talent: Women in the sciences.* Philadelphia, PA: Temple University Press.

Haring, M. J. (1999). The case for a conceptual base for minority mentoring programs. *Peabody Journal of Education, 74*(2), 5-14.

Kramer, P. (1996). Engineering up front: Why hands on engineering education works for women and girls. *GATES, 3*(1), 39-44.

Madigan, T. (1997). *Science proficiency and course taking in high school: The relationship of science course-taking patterns to increases in science proficiency between eighth and twelfth grades (NCES 97-838).* Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Mervis, J. (2000). Diversity: Easier said than done. *Science, 289*(5478), 378-379.

Molad, C. B. (2000). *Women weaving webs: Will women rule the Internet?* Houston, TX: CBM Press.

National Council for Research on Women. (2001). *Balancing the equation: Where are women and girls in science, engineering and technology?* New York: National Council for Research on Women.

Oakes, J. (1990). *Multiplying inequalities: The effects of race, social class, and tracking on opportunities to learn mathematics and science.* Santa Monica, CA: The Rand Corporation.

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage Publications.

Quinn, R. E. (1996). *Deep change: Discovering the leader within.* San Francisco: Jossey-Bass.

Sanders, J. (1995). Girls and technology: Villain wanted. In. S. V. Rosser (Ed.), *Teaching the majority: Breaking the gender barrier in science, mathematics, and engineering* (pp. 147-159). New York: Teachers College Press.

Santovec, M. (1999). Campus climate affects female engineering undergrads. *Women in Higher Education, 8*(7), 5.

Schein, E. H. (1992). *Organizational culture and leader* (2nd ed.). San Francisco: Jossey-Bass.

Seymour, E. (1999). The role of socialization in shaping the career-related choices of undergraduate women in science, mathematics, and engineering majors. In C. C. Selby (Ed.), *Women in science and engineering: Choices for success* (pp. 118-126). New York: The New York Academy of Sciences.

Seymour, E., & Hewett, N. H. (1997). *Talking about leaving: Why undergraduates leave the sciences.* New York: Westview Press.

Shapiro, N. S., & Levine, J. H. (1999). *Creating learning communities.* San Francisco: Jossey-Bass.

Swoboda, M. J., & Millar, S. B. (1986). Networking-mentoring: Career strategy of women in academic administration. *Journal of NAWAC, 50*(1), 8-13.

Vetter, B. M. (1996). Myths and realities of women's progress in the sciences, mathematics, and engineering. In C. Davis et al. (Eds.), *The equity equation: Fostering the advancement of women in the sciences, mathematics, and engineering* (pp. 29-56). San Francisco: Jossey-Bass.

Wasburn, M. H. (2001). Creating a community to help ABDs graduate. *Women in Higher Education, 10*(1), 36-37.

Wasburn, M. H. (2002). Rebuilding community. *College &University, 78*(1), 13-16.

Weiss, I. R. (1994). *A profile of science and mathematics education in the United States: 1993.* Chapel Hill, NC: Horizon Research.

Welty, K., & Puck, B. (2001). *Modeling Athena: Preparing young women for citizenship and work in a technological society.* University of Wisconsin–Stout.

Wenniger, M. D. (1997). New networking model of mentoring catches on a Purdue. *Women in Higher Education, 6*(10), 1-2.

Direct reprint requests to:

Mara H. Wasburn, Ph.D.
Dept. of Organizational Leadership and Supervision
School of Technology
Young Hall
Purdue University
West Lafayette, IN 47906
e-mail: mwasburn@tech.purdue.edu