Plan versus Actual: Surprises in Project Design and Management

- If circumstances prevent you from following the project design exactly, brainstorm and improvise to find alternative ways to follow the intent of the grant, if not the letter.
- Recognize that staff changes at every level are inevitable and that a project cannot be dependent on any one individual. Build in focused communication activities to provide continuity across staff changes, whether administrators, project staff, or partner staff.
  Suggestions:
  - Write a clear and complete memorandum of understanding outlining the nature of the partnership and the specific conditions of the agreement, such as a payment timeline.
  - Each year, write a letter to the partners with a project progress report; include a copy of the memorandum of understanding.
  - Meet with partners and advisory council once a month so it is easier to "pass the baton" when staff changes occur.
  - Plan for administration "from afar," by building in costs for part-time salary, trips back to the project site, e-mail costs, and weekly conference calls.
- Keep everyone "on track" through interaction and communication, such as newsletters, nonstaff meetings, staff outings, and opportunities to learn more about the individual collaborators.
- Be aware that, sometimes, with success comes jealousy; some people may be inclined to replace subordinates and acquire for themselves some of the credit for those individuals' successes.
- When faced with the challenges of surprises, focus on the positive. Example: At the end of one girls' summer program, two project notebooks were found in the trash. Rather than focusing on those two, the program team focused on the 68 out of 70 participants who did not throw away the notebooks or the experience.
- Encourage faculty participation in diversity issues. One program put together a faculty institute on the subject; department heads selected faculty and required that they participate. The next year, under a new administrative leader, faculty members were encouraged to volunteer. The result was a smaller group with better dynamics and none of the negativity experienced the year before.
- Make participation in institutes a requirement for other desirable outcomes, such as eligibility for mini-grants and opportunities for student assistants. Enlist the dean to support the institute and faculty participation.
- Faculty can be hard to recruit without carefully crafted incentives to secure their involvement and to keep them engaged in the project.
- Recruitment strategies need to be shifted and refocused as project staff and partners develop a better understanding of the wider audience needs.
- Partnerships and collaborations are often more difficult to sustain over time than participants anticipated.
- Some have more difficulty than others in encouraging the involvement of parents. The distinction seems to relate to the characteristics of the specific program, and whether or not it was both attractive to parents and accepting of them.
- Rapid technological change is an ever-present challenge. Schools and teachers are often unprepared to use the technology planned for in the project. Some project plans fail to address the lack of skills and equipment available, such as the high level of skills required to create effective web pages.
- It is often necessary to redesign parts of a project "on the fly" to correct aspects that are not working and that must be fixed before the project can continue.

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- Institutional and individual difficulties arise when greater and/or broader expertise is called on for managing large grants and multifaceted projects.
- When scientists are used as role models, it is important to consider their presentation skills in particular when speaking to students. In some cases, the students themselves may be more effective role models because other students can relate to them more easily.
- The life complexities of the participants need to be addressed by building in support for handling the wide variety of needs and skills that participants will have.
- Curriculum materials must be customized to suit the specific needs of the project and the participants. Otherwise, they are less effective in supporting the learning process.
- A good strong contract or subcontract, outlining what is needed and when, can be an effective tool in managing a project according to its intended design.
- Having a good evaluator—and listening to what this person says—can make the difference between success and failure.
- Pilot test materials and improve them based on the test results and feedback.
- Attend to the care and feeding of volunteers; they are an invaluable resource that needs to be managed effectively.
- The enormity of the grantee's workload can come as a surprise. This is a particularly difficult challenge when the project grant is in addition to a full-time job.
- The field is moving from a deficit model—based on changing the girls—to a model that calls for changes in pedagogy and in science. These changes need to address not only professional jobs in the field, but technical ones as well.
- Take a wider view of the issues: Rather than centering on the gender issue, broaden the effort to one of transforming the curriculum, while keeping to the core goals of gender equity. Some have found it effective to address equity issues up front; for others, success has begun with a focus on specific teaching strategies. In all cases, establishing a common vocabulary early on is key.
- Serious gender-related issues continue to create challenges, even in the classrooms and venues of successful programs for girls.
- When a successful and independently funded program is ready to be institutionalized, new sets of challenges and issues arise, often to the detriment of the gender equity aspects of the program.
- It is surprisingly difficult to make co-ed settings girl-friendly, especially at the middle-school level. The classroom setting, even when predominantly female, often perpetuates long-learned stereotypes and behaviors. There is hope that this will change as the younger generations of university women become the teacher trainers. It must be acknowledged that we so often teach "how we were taught."
- When presenting exciting new ideas to the traditional educational community, many people are surprised at how little interest they are able to generate.

Facilitators:

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Strategies for Funding, Partnerships, Collaborations: Lessons Learned

- A project funded by multiple sources is likely to require an approach to accounting that accommodates not only the needs of the project itself, but also the needs of the various funding agencies. Project-based software systems, such as Costpoint, offer some technical solutions. Nevertheless, problems can also arise related to attitudes within universities, where funding for human resource development is not valued as highly as funding for research projects.
- Many sources exist for funding and partnership opportunities. Examples:
  - The American Association of University Women at the state level.
  - National sources such as PBS, industry groups and businesses with a vested interest in attracting and retaining women.
  - School districts looking for professional development.
  - Women's organizations and other groups with similar agendas and missions.
  - Women in corporations, university public affairs and development offices.
  - Women in local political office
- In-kind funding must not be overlooked. Examples:
  - The U.S. Department of Agriculture will provide meals if 50 percent of the children in the program come from low-income families. This can be arranged through the school.
  - The Children's Defense Fund has a low-cost guidebook for establishing summer food programs, available by calling 202-628-8787.
  - Similar programs exist for after-school snacks.
- To secure funding opportunities in community-based organizations, city and county governments, and from the private sector, you must identify organizations with similar interests, determine how they might best contribute, and show them what is in it for them. For example, national businesses might be particularly interested in supporting a program in an area where they have local offices. Keep in mind that the private sector typically expects results in a shorter time frame than is typical in academia and the government.
- Programs that provide aid for children with disabilities can benefit all participants in a qualifying program.
- While often essential for funding, partnerships can be a mixed blessing. Personalities of individuals are as important as compatibility of missions and agendas. Partnerships should build on joint success, strive for visibility in the right professional and local communities, and invite the "right people" to participate. Partnerships with the best chances for success are those where the people really want to work together and are committed to building solid and sustained relationships. NSF funding is seen as an important leverage point in beginning and developing partnerships.
- Working in collaboration with partners requires developing an equitable, long-term relationship. While the interpersonal interactions may be informal, the partnership arrangement, or agreement, should be formalized so that all parties know what is expected of them.
- Document the progress of a collaboration by collecting notes and project artifacts along the way. To help this process, set clear deadlines and make it easy for others to provide input to the collaborative record.
- Ways to keep a partnership working smoothly include defining responsibilities, helping all partners to feel fully vested in the program's success, letting others co-lead, and keeping everyone informed. These approaches can help resolve the typical challenges of time, follow-through, varying organizational

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structures and cultures, and systems of support.

- Learning how to collaborate is a common challenge. Suggestions:
  - Define roles up front.
  - Recognize and respect cultural differences—ethnic, professional, and organizational, as well as gender-based.
  - Resist the temptation to rely heavily on any one individual.
  - Establish an effective organizational structure—consortium vs. prime and sub-contractor arrangement.
  - Clarify the actual financial "buy-in" of each partner.
- It is important to recognize that there are different levels and degrees of collaboration. Some partners may well have larger and longer roles than those held by other partners. As long as the roles, responsibilities, and expectations are clarified, there isn't any reason why such a collaboration can't succeed.
- In every collaboration, there must be support from "the top." Each partner must market the program within his or her organization so that this type of fundamental support continues throughout the life of the partnership.
- Two key watchwords for success are communications and flexibility. Frequent, multi-mode (e-mail, telephone, face-to-face) communications are critical for success throughout the project. Flexibility is called for when actual events do not follow the plans, no matter how well thought out they were.

Facilitators:

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Research Frontiers for Women & Girls in SMET: Middle School

- First-generation college students lack role models, mentors, knowledge of how the system works, and an understanding of the consequences of the decisions they made when selecting courses at the middle level. Girls that lack these advantages are often the most economically challenged and educationally underserved, as well. They need many different types of support, including assistance in developing reading, writing and speaking skills, and in increasing social capital. School experiences fail to prepare them sufficiently for planning long-term goals and taking the initiative to get what they need to succeed. Many colleges resist the idea that math and science programs should also address these skills.
- In many communities, sports and other activities—not academics—are viewed as the important paths to gaining recognition. Girls are often socialized to achieve through supporting the sports activities of the boys in their schools.

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- Girls often face life factors such as poverty, neglect, and abuse—factors that have powerful impact on their academic and personal lives. Even advantaged girls may lack self-confidence and specific skills. Highly motivated girls often have different interests than their peers and as such may face the social challenges of not fitting in. Programs for girls must address these life experiences.
- Girls are still being subtly discouraged in schools, or, at best, simply not encouraged to pursue their interests in science and math.
- We still don't know what things motivate adolescent girls to academic success.
- Teachers are often already demoralized by the circumstances of their profession; addressing equity is often seen as just one more thing to do. Because of this, teachers are often not able to make the substantive changes that need to be made, either in their own practice or in their efforts to encourage their colleagues. They need to have opportunities to see girls excel at science and math, both as motivation and as models of success.
- Girls often fail to take seriously the decisions they make in middle school, not realizing how these decisions will impact their futures. At this age, they are not fully aware of either their potential or the range of options available to them in terms of education and career choices. Too many parents at the middle-school level turn such decision-making over to counselors, or to the girls themselves, without realizing the consequences of these decisions. Parents need to know that they must be advocates for their daughters as they move into adulthood. Our programs need to work with parents and counselors, who are often the gatekeepers, to help girls keep their options open. We need to help demystify middle-school students so the adults can truly help them.
- Girls face sexism, racism, and adultism. They believe adults don't take them seriously or see them as real people. Our work with partners, schools and others needs to help them hear girls' voices and look at what they have to offer.
- We need to focus on implementing gender-equitable strategies in regular classrooms, not just in programs for girls. In doing this, we need assistance on how we can measure changes in teachers' attitudes and behaviors in the classroom.
- We need longitudinal studies—and funding for them. Intervention at the middle-school level is important, but middle-school girls are a long way away from making career choices.
- We need to study the special factors that make calculus and physics so resistant to change.
- Grades often don't reflect achievement. Whether too high or too low, they can set girls up for failure, either leading them to believe that their skills are better than they actually are or by convincing them that they aren't smart enough. Girls' grades may reflect expectations, behavior, neatness, etc., rather than their level of understanding. This can be very harmful, particularly when young people are making transitions, such as from middle school to high school.
- Videotaping classroom activities can be a powerful tool for girls, boys, and teachers, by helping them observe classroom dynamics and the effect they have on the students.
- Scaling up and the need to diversify a program's funding base are two difficult issues for many programs.
- NSF needs continuity in PWG.

Facilitators:

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Mary Crowe, Coastal Carolina University

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Research Frontiers for Women & Girls in SMET: High School

- Research shows that girls have more success in theoretical or academic science than in applied science, but the research is as yet inconclusive on explaining why this is the case. Boys are more often exposed in informal ways and there are not formal introductions to science in school that would capture girls' attention. Girls' achievement in the subject matter tends to be greater during school, with their frontier stopping at graduation. Formal education needs to address the problem of nonexposure of girls to the value and benefits of careers in science and engineering. Students tend to be unaware of salaries for various professions, and don't realize that applied technologies are a part of science as well.

- The definition of science and technology must be expanded to include applied science; otherwise, the field will be just for middle and upper-middle class women.
- Recent emphasis on "all students" circumvents strategies that would improve equity for girls, or for other specific populations. The only effective way to address this is to think of people—including all students—as individuals rather than as members of groups.
- Where programs are single-sex and not co-ed, questions of legality are typically resolved as long as participation is voluntary.
- Single-sex education is not without challenges. The girls-only physics class was established in one school district and differences in learning began to be noticed. However, the program became a problem for the district because it is not legal to exclude anyone from participation. Another school district ran a program for girls, and there were no boys who even tried to join in.
- More research is needed in understanding what drives girls' decisions: What are their key experiences? How do they weigh those? How do ethnicity and culture affect their decisions? What are basic differences between how girls and boys make decisions? What effect does parental influence have? How do we ensure that teachers continue strategies they learn in workshops and how do we assess outcomes?
- The field needs a database of successful projects with documentation of the interventions that produced the success. Longitudinal data would also be helpful, and NSF's PWG might do well to provide this.
- Changing people's minds takes awareness, concern, and action. To overcome resistance, you must spend a minimum amount of time on awareness and concern and most of the time on the course of action for change. It may be that repeated contacts over time are necessary. But what are the characteristics of teachers who actually carry out strategies for change?

Facilitators:

Jo Sanders, Washington Research Foundation
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RESEARCH FRONTIERS FOR WOMEN & GIRLS IN SMET: UNDERGRADUATE

- Involving women in undergraduate research requires strategies for both recruitment and retention. Focusing on the content of what is being taught is one strategy. Another is identifying what is cutting-edge in research in the field.
- Many successful activities are currently being used to carry out these strategies. Some focus on teaching the value of lifelong learning. Others develop specific products—such as CD-ROMs and seminars—to engage undergraduate women in research and to teach them how to understand and evaluate choices.
- Participating on NSF review panels provides a unique perspective on research frontiers for women.
- Both quantitative and qualitative analyses are important in measuring results, as is independent evaluation. Quotes and comments from student surveys and pre- and post-program focus groups are effective in advertising the program.
- Activities in the dorm, organized programs, specific-subject study halls, and career nights are other ways to generate interest and allow students to explore options. Some schools organize freshman science and engineering dorms and have theme-houses on or off campus to create interest groups. Programs and activities initiated and run by students are among the best attended.
- There exists concern that girls do not receive enough support early in their freshman year. It is incumbent on us to "bullet proof" girls to the challenges of this time in their academic career, and to teach them to be effective self-advocates. Establishing mentor relationships is valuable, and can be done by involving older students. Creating social settings for networking adds personal interaction and develops effective career-related social skills.
- Senior professors often claim that "there is nothing a freshman can do" as part of their research programs. A program at Penn State shows results that refute this claim. The Women in Science and Engineering Program (WISE) uses research as part of the recruitment and retention program for women. The program takes students who are primarily rural and brings them into the global economy by having them work with international women and learn about the gender issues they face. This prepares these students for multinational research settings and programs. Faculty members who participate receive additional supplies budgets for bringing freshmen students into the laboratory. As a result of this program, there was a 50 percent increase in students retained in the program and about one-third of the participants built on their participation by staying on to do further research in the same lab. The program also produced significant experience and exposure for the freshmen students, including:
  - Connections and interactions with science graduate students.
  - A sense of self that says, "Yes, I am a scientist!"
  - Academic credit and wage income.
  - Laboratory experience to help build a good resume.
- Space Grant, a national NASA program, promotes undergraduate research across math, science and engineering disciplines. Through this program, each state can offer undergraduate research scholarships.
- Encouraging students with potential to stay involved over the summer has been shown to strengthen interest and improve grades. Summer fellows can be invited to conduct

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colloquia for undergraduate students. Inviting faculty members can help generate interest in serving as faculty advisors. Formal research presentations engage both undergraduate and graduate students and, by demonstrating actual research missions (balloon research, sounding rockets, aviation design), can allow students to become involved in real-world applications. Graduate students can mentor undergraduates in student-managed research projects. The relationship benefits both the undergraduates and the graduates, who then have the opportunity to see how far they have come.

- Colloquia and other venues provide valuable practice in public presentation of research. It is important to provide as many public speaking opportunities as possible throughout the students' training. Harbor Branch Ocean Institute has students conduct poster sessions and presentations. At other locations, faculty is encouraged to engage students in their work and to take them to professional conferences.

Facilitators:

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Lessons Learned in Evaluation

- An effective evaluation requires an appropriate control group. For longitudinal evaluations in particular, self-control does not guarantee good results. It is important to also control the environmental conditions. For example, wait list control may not be equivalent if you are selecting participants for maximum impact.
- Data from Educational Testing Service (ETS) can be used for comparisons.
- It is wise to pre- and post-test on the attitudes and knowledge of children and on approaches to handling gender equity issues. One evaluation revealed that group leaders had a need for training in gender equity; this finding led to the development of three-day training sessions and follow-up activities.
- Concern is increasing for the need to conduct longer-term evaluations of programs, especially when it comes to compliance with behavioral objectives for projects within a school setting. One project withheld the planned $200 stipend until the project was completed and the survey was returned.
- When evaluating web sites, you can count hits to measure exposure and use Internet communication to conduct follow-up interviews. Online surveys are consistently completed.
- E-mail is an effective device for conducting process evaluations.
- For local or regional projects, on-site visits and ongoing development of personal relationships enhance the use of material. Thinking of the sites as entities that need to be nurtured and involving administrators at the sites are also ways to improve results.
- Any mail surveys should be accompanied by stamped or postage-paid envelopes to maximize the return. Follow-up telephone calls can also keep people on track.
- Having teacher leaders assist colleagues enhances the presence of the program within the school setting. A modest honorarium is a small price to pay for this added support.
- Teacher training is an important and ubiquitous activity of most projects.
- A typical evaluation plan includes three components:
  - Pre-test and post-test with girls.
  - Conduct interviews with participants and parents. Program graduates can serve as interviewers.
  - Use valid and reliable methods (instruments, questions) to assess impact. Use pictures rather than words, use longer Likert-type response formats, and make sure

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"stems" are clean and match the program.

- Qualitative methods can reveal meaningful information. Suggestions:
  - Conduct focus groups (weakness: one negative participant can influence the results).
  - Review participant journals.
  - Develop case studies with a small number of participants (can be videotaped).
  - Have "draw a scientist" or "write a poem" sessions where you can access attitudes that might not otherwise be revealed.
  - Use comment cards at the end of each day or throughout the day and use them to begin the next day's session.
  - Distribute, collect, and review daily evaluation check sheets.
  - Lay out butcher paper or post "sticky pads" for anonymous comments in a private location where participants will feel comfortable.
- Qualitative evaluations pose specific challenges, such as establishing a control group and dealing with absences and lateness. To encourage individuals to participate, offer them the option of being in the experimental group the next time. Even with these concerns, focus group research continues to be considered a strong and effective tool.
- Several strategies have proven useful as standards for evaluation. Suggestions:
  - Have a second evaluation.
  - Conduct an evaluation class, making it a class project.
  - Conduct a research design class.
  - Collect questions from teachers as part of the evaluation.
  - Check changes in participant journals.
  - Videotape activities and sessions.
- Specific challenges:
  - Do you keep using a "bad" initial instrument?
  - How does self-selection affect differences in the control and experimental groups?
  - How do you do a longitudinal study within the life of the grant?
  - How do you avoid contamination in longitudinal studies?
  - What do you do if the evaluators are not good at what they do?
  - How do you write up failures?
  - Scientists often are not accustomed to interviewing people.
  - How do you encourage others to become and stay involved?
- NSF could assist in evaluation by putting out realistic project results.

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Facilitators:

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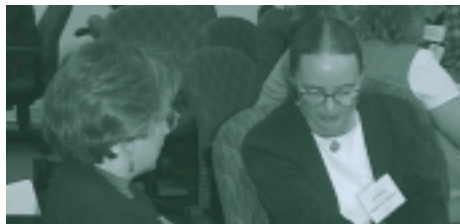

Lessons Learned in Dissemination

- Include dissemination activities in the project design and establish a relationship between dissemination and evaluation. Design aspects of self-perpetuation into the project or program, capitalizing on the enthusiasm of people who not only become involved but who establish a commitment to the project on an ongoing basis.
- On the one hand, it is important always to have a product that results from the project; on the other, you must be realistic about your capacity to conduct the project and produce this legacy.
- The financial costs of dissemination must be addressed rationally, although emotional costs should be anticipated as well. For example, while it is great to end up with a successfully commercialized product, it can be very difficult to let go of your personal involvement.
- You must address both internal and external audiences, considering factors such as educational level, when tailoring both message and medium. For example, a grade school administrator and a university administrator will respond quite differently and these differences can affect the success of your dissemination program.
- Partnering with 4H clubs can increase the effectiveness of a program and generate community support for it. This kind of partnering makes science more fun.
- Taking students to conferences, using student interns, and getting parents involved are ways to generate more enthusiasm, support and commitment.
- Several specific strategies are used frequently:
  - Hire a professional marketing consultant.
  - Find or develop expertise in packaging.
  - Within your own institution, rely on communications and public affairs departments, students in communications and telecommunications classes, and leaders at the highest level possible.
  - Use the "outside" audience to help develop messages and get the word out about your program or product. Use quotes or testimonials in promotional materials, conduct train-the-trainer sessions, and ask people how they found out about the program.
- Use the Internet to your advantage. Listservs can be more effective than web sites because you are sending the message out to the audience rather than waiting for them to come to you. If you choose this approach, learn about and be sensitive to the listserv culture, and be sure to include appropriate subject lines to attract the attention you need.
- Mailings are an established standard, but direct mail is costly, both in production and in postage.
- Review relevant newsletters and send clips to a selected list, asking them to send the clips along to their colleagues.
- Use clearinghouses such as Women's Education Equity Act Resource Center, part of Educational Development Center, Inc. Also consider attendance at conferences as a kind of in-person clearinghouse opportunity.
- If you develop a product for sale, establish discount structures for bulk orders. Establish credit card purchasing to record information about purchasers.
- Many agree that they would rather impact the girls' lives, even if that means that valid research data would be lost.

Facilitators:

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Recent Findings in Gender Equity/SMET

- There is a need to increase the willingness of engineering departments to accept women and minority faculty. Suggestions:
  - Encourage local industry leaders to become involved in supporting the diversity aspects of your program. Industry has already learned to value a diverse work force.
  - Identify faculty who have daughters and encourage both daughters and parents to become involved.
  - Establish incentives for faculty to take diversity workshops.
- Single-sex vs. co-educational settings present both challenges and opportunities.
- Restrictions for single-sex programs limit the opportunities in public school settings. To work around these limitations, consider using museums and community centers for after-school programs.
- Pre- and post-tests have indicated the need to incorporate exercises and activities related to stereotyping in each day of a five-day faculty training program. The tests also demonstrated the effectiveness of this approach in increasing awareness.
- It can be helpful to develop UWIBs—unconscious, well-intentioned behaviors—by modeling desirable behaviors seen in others.

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- One middle-school program demonstrated that a ratio of 70 percent girls to 30 percent boys was still not enough to break down stereotypes for girls vs. boys in the use of tools. When the program was repeated, with a 50-50 ratio, the boys again took over.
- Another program that crosses middle-school, high-school and community college levels, includes thirty girls and five boys in gender equity activities. The boys are learning more about girls' abilities and how girls think. They are realizing that girls "can do it" too.
- All-girls programs (such as scouting) allow girls to assume leadership roles. These programs create opportunities to talk about careers, what it is like for women in the field, and what these women liked doing when they were at a similar age.
- There is a need for good research on the relationships between socio-economic class, ethnicity, and gender equity issues. Some research of this type has shown that families of girls of color are not as stereotypical, in terms of occupation, as might be expected.
- Research has shown that, in the last five years, some of the gender equity programs are paying off in areas such as trends in course selection. For example, girls are now taking calculus in the same numbers as boys.
- Advance placement physics and chemistry remain boy-dominated. The National Center for Educational Statistics addresses this and related issues in their publication, *Men and Women on the Engineering Tract*. More work must also be done in engineering to develop a better curriculum and to place more emphasis on girls at an earlier age.
- Increasingly, people are asking the question: As the status of and opportunities for girls are improving, should we be looking at the boys? Many feel that while conditions for girls certainly are improving, there remains a good deal of work to be done before equity can be achieved.
- The notion of "working with the boys" is an emerging recurrent theme.
- Role models are important elements in a girl's development, and there are ways to make the most of their impact. Interviewing role models ahead of time, before inviting them to participate, can help you keep them on target and at the right level for the girls in the program. It is particularly helpful to find stories of perseverance, and personal stories that focus not

just on the science and engineering, but on the people who have been involved in the lives of the role models from girls to adults. Role models who are nearer in age to the girls in the program can have a particularly strong impact and can lead to close personal and perhaps professional relationships.

- Research has identified some of what today's college students think about gender equity issues:
  - There is an emerging backlash among men in the freshmen age group of eighteen to twenty; they are more concerned than their counterparts just five years ago about who would stay home with the children.
  - Women are increasingly intimidated in competitive situations: They are less likely to stand up for themselves than their counterparts were a decade ago.
  - Girls still hide their abilities from the boys.
  - Both men and women tend to deny that there is any equity problem.
  - In some ways, stereotypes of women have worsened over the last few years due to influences such as MTV and similar programming.
  - Some see that America remains a white-male society, that something must be done to help girls step out of the constraints, and that we need to begin working with the boys to change attitudes that will affect future generations. Research shows that boys can change their ideas if they are exposed to role models.

Facilitators:

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