

## Meeting the Challenges of Cross-Institution Initiatives: An Inside View of a Successful Multi-Institution Collaboration

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Cross-institutional initiatives offer many challenges and rewards. Collaboration partners are typically chosen because of diverse institutional expertise, geographic diversity and, for social science and educational research, demographic diversity—an attribute that strengthens the research goals but adds additional organizational and functional challenges for the partners. Cross-institutional partnerships also offer significant challenges. With disparate institutions often operating at significant geographical distances and with differing levels of institutional support, successful coalitions take careful management and planning to succeed.

Even given the obstacles to success, such collaborations encouraged by funders like the National Science Foundation, offer substantial research advantages and can yield results far beyond what a single-institution effort could produce. The AWE (Assessing Women in Engineering) Project coalition was created in 2001 (NSF HRD 01 20642) to develop effective assessment tools and models for WIE and related programs (11, 12). AWE comprises seven very different institutions, programs in varying states of development, and a range of staffing and funding resources. AWE Partner Institutions are the University of Missouri (Rose Marra, Co-PI), Penn State (Barbara Bogue, Co-PI), Georgia Tech (Mimi Philobos), the University of Arizona (Marie Reyes), the University of Louisville (Brenda Hart), the University of Texas – Austin (Tricia Berry) and Rensselaer Polytechnic Institute (Barbara Ruel). The three year project required that each institution and WIE director or research associate participate fully in developing and testing assessment instruments with large numbers of students, documentation and career development tools.

AWE directors were an integral part of reaching the AWE research and end product goals. In this paper we, as a sub set of the directors, will look at the rewards and challenges of the AWE Project collaboration coalitions. Using our AWE experience as an example, we will point out ways that such collaborations can be a productive and mutually rewarding process; how full and productive participation of collaborators is achieved; and what organizational tools and processes help to achieve collaborator ownership of the overall project.

### **The AWE Directors**

The AWE directors are a well-qualified team with a variety of experiences and from a diverse group of institutions. Tricia Berry, Director of Women in Engineering at Texas A&M University, is an engineer with industry experience at Dow Chemical; Mimi Philobos, director and founder of WIE at the Georgia Institute of Technology, is a civil engineering faculty member; Barbara Ruel, director of the Women in Engineering Programs at RPI, has extensive experience in

marketing and students services; Brenda Hart, director of student affairs, J. B. Speed School of Engineering, University of Louisville, directs the Minority and Women in Engineering Programs; and Marie Elena Reyes, assistant research scientist and academic professional at the University of Arizona, is a social scientist who develops programs that increase participation of girls and women in STEM (K-16+) and teaches courses on gender. Rose Marra, assistant professor of learning technologies at the University of Missouri, Columbia, works in assessment and web-based instructional delivery and Barbara Bogue, immediate past director of Women in Engineering at Penn State, focuses on career development, retention/recruitment programming and development of web-delivery systems. Advisors are Jane Daniels, Program Director of the Clare Boothe Luce Program, and Cinda-Sue Davis, Director of the WISE Institute at the University of Michigan-Ann Arbor. Daniels founded the Purdue WIE Program, is a founding member of WEPAN, and is a leader in the movement to develop programming, tools and data collection to improve classroom climate, attract and retain women in non-traditional career areas, implement strategic planning and instigate organizational change. The late Barbara Lazarus, vice provost of Carnegie Mellon University, was a valued advisor who is greatly missed.

These institutions include two large producers of underrepresented engineers—Georgia Tech, which enrolls a relatively high number of African Americans and African American women (583 and 199 respectively and UT-Austin and the University of Arizona, which enroll a relatively high number of Hispanic students (725 total; 183 women and 435 total; 100 respectively)—are included. Penn State, which has a low enrollment of ethnic students (228 African Americans total; 29 African American women and 193 Hispanic Americans total; 43 women), is representative of many large engineering institutions for which diversity is an established value but that are located in states with low ethnic populations. The University of Louisville, a small institution, enrolled a relatively high percentage of African American students (99 total; 31 women). Rensselaer is a small private institution. Percentages of women enrolled in the institutions in Fall 2003 ranged from 17.8 % (Penn State) to 19.9% (Georgia Tech). Finally, the schools represented enroll a fairly large percentage of women engineering students in the United States. In 2003, 8 percent (987/12360) of the women enrolled in the United States with a baccalaureate degree in engineering was enrolled in one of these institutions (Engineering Workforce Commission, 2003). The diversity of these institutions provide access to larger and more diverse minority populations will help ensure that the AWE instruments are valid for programs nationwide.

### **Coalitions—Benefits and Drawbacks**

Coalitions became a familiar feature of engineering education in the late 80's when the NSF launched the Engineering Education Coalitions, an initiative that responded to the 1989 Belmont Conference on Imperatives in Undergraduate Engineering Education with identified the need to synthesize knowledge, push interdisciplinary, emphasize practice and the participation of underrepresented groups and so on, presaging the ABET 2000 criteria. (Coward, et al, 2000). Each coalition required the participation of a group of diverse engineering education institutions that would work together to re-design how engineering education was delivered, with an emphasis on developing a diverse student population. Six coalitions were funded. (The AWE PIs first collaborated through the ECSEL Coalition.) An underlying idea was that coalitions would solve the problem of effective initiatives being developed at one institution, but never going any

farther; the coalitions would have built in dissemination, as each institution in the coalition exported the ideas of the others.

The coalition initiative had many successes and provided a model for such efforts. As noted on the NSF Engineering directorate home page, “These efforts integrate new knowledge across disciplines, accelerate technology development, and improve the capabilities and diversity of engineering graduates entering the technical workforce.” (NSF Engineering Directorate Webpage)

While the concept of coalitions is well accepted, the actual practice remains challenging as identified in a mid-term evaluation of the NSF Engineering coalitions. (Coward, et al, 2000). Dissemination, one of the fundamental goals of developing coalitions, was singled out as a continuing problem.

Additional drawbacks to successful coalitions are expense, the additional time that it takes collaborators to actually collaborate when they already have demanding primary job responsibilities; the need to deal with varying administration policies and styles at disparate institutions (Horgan, 1998); and the time and effort needed to determine that everyone has the same understanding of the coalition goals and objectives and identify the skills and information needed to have all collaborators at the same operating and knowledge levels. (Katz et al, 1997)

A daunting list. But the benefits are also numerous and, in our experience, far outweigh the costs and challenges and can be detailed in three main categories devised by Hardy, Phillips and Lawrence, (2003) based on extensive, interdisciplinary reviews:

- Strategic (leveraging of resources and experience);
- Knowledge Sharing and Creation (exchange of existing and new knowledge, including tacit knowledge, plus the synergy gained from interaction among diverse individuals at diverse institutions);
- Political (increasing professional networking and visibility).

Other benefits are that effective inter-institutional collaborations “can serve a change management role by being more entrepreneurial and less conservative than the institutions they represent” (Horgan, 1998) Or, in a description of NSF Engineering Education, the principles of which can apply to such collaborations in general: “Coalition partners draw on their diverse strengths and mutual support to construct improved curricula and learning environments; to attract and retain a more demographically diverse student body, and to graduate a new generation of engineers who can more effectively solve the increasingly complex, rapidly changing societal problems.” (Friar et al, 1998)

### **Methodology for Assessing AWE Project Collaboration**

From the beginning of the project we built in several methods to track the progress of the collaboration:

1. Annual electronic survey of participant experience in the project
2. Electronic feedback webforms for all products under development
3. Assessment results from annual meetings and regularly scheduled telephone conference calls

4. Individual phone calls to gain feedback on specific topics and on experience in grant in general
5. Ethnographic notes based on feedback to developed processes and implementation of processes

While the thrust of the assessment plan above was to measure the efficacy of the collaboration the most valuable outcome, as so often happens, was to strengthen the commitment to the project and build an active community based on achievement of the project objectives. This speaks to an underlying precept of the overall AWE Project: that well planned assessment is integrated into an activity or larger program in a holistic way that provides the platform for a systems approach to program development. The regular and systematically sought director input meant that we were constantly asking “what’s possible?” “What’s missing?” and “how can we do this better?” The result was that the products developed are lean and based on what is possible for a busy director to achieve, highly usable and relevant.

A final example is collaborative projects such as this paper and presentations at national conferences about our experiences as AWE directors.

This paper is drawn from ethnographic notes, in this case provided by the directors in response to questions based on the Hardy, et. al. (2003) framework. More detailed analysis of all data will be provided in future papers.

### **Meeting the Challenges of Cross Institutional Collaboration**

Following are director questions to a set of questions based upon the most common challenges of creating successful collaborations:

- 1. What were the professional benefits of participation in AWE to you in strategic, political and personal results?*

Ruel: When news of the grant was publicized at Rensselaer, the President, Provost, and Dean of the School of Engineering offered their praise and congratulations. Assessing program success is important to the Rensselaer community, not only to gauge program impact and effectiveness but also to share data and to learn about and implement best practices. Students as well as the administration are interested in the results of the study particularly with respect to how Rensselaer compares to students and programs elsewhere.

Learning the importance of setting measurable program goals and designing assessment tools that effectively measure the success of my programs was very important to me. I now feel confident to develop new programs and assessment tools on my own. Working as a team was a wonderful experience. While we all struggle to address the same societal and institutional issues, the support and synergy of our group interactions allowed new ideas to germinate and evolve into practical applications.

Collaborative research is extremely important for innovative ideas to emerge. From that standpoint, the ability to engage in a collaborative effort with colleagues at well known national universities and to subsequently share the results of our collaborations was very satisfying.

Hart: First of all, my boss (the Associate Dean) and the Dean of the college were both very pleased that U of L was asked to participate on this grant; that's always beneficial. It was also a plus that we were collaborating with "key" engineering schools and that my partners were women who had extensive experience in WIE programs.

Just by letting administrators and faculty at my school know of our AWE collaboration helped leverage resources and gain increased collaboration.

Reyes: I have not yet made strategic gains through AWE as it has been difficult (at best) to convince my past Supervisor about the importance of the project. Since September 2004 I am working with a new supervisor and she is very anxious to promote the use of the instruments and reports for strategic gains with the Deans. So I expect to have more to report on this item in the future. For the first time in the five years that I have been at the UA the opportunity for hiring a program director and developing a substantial and focused program exist - as a direct result of my reporting on what I have learned from others in the AWE program.

I found it very helpful to learn what directors were doing at other universities. For instance learning that Penn State followed students from their earliest involvement in WIE programs and assigned student id numbers convinced UA WISE Board members that this task was doable. Access to the database being developed through the AWE project will make this possible for UA which has never had the resources (money or staff) available to develop the infrastructure or collect the data.

*What are some personal results?*

Ruel: I have the least experience as a Director of Women's Programs in Engineering compared to the other directors participating on the grant, yet the other directors made me feel welcomed and that my contributions were valuable. I've enjoyed learning from the other directors and have probably avoided a few pitfalls as a result of their stories and wisdom. The grant afforded me my first opportunity to participate in a grant; my first opportunity to submit a conference abstract, and my first opportunity to organize and lead a conference panel. The grant experience gave me the confidence to accept a position as conference program co-chair for a joint national conference.

Reyes: Participation in AWE has helped me to develop networks at other Universities that I know will continue to develop as I move forward in my own research and programmatic directions. AWE is one of several experiences over the last 2.5 years (including AWE) have propelled me towards returning to work on my doctorate degree and develop a non-profit organization to focus on educational access for women of color in higher education in the borderlands. The support of other participants in the AWE project (specifically the PIs) has motivated the submission of two other collaborative proposals (not funded yet) which would incorporate the instruments developed and the collaborative process modeled through this project. On a semester time period, it seems like I take baby steps towards my personal goals of running a non-profit devoted to research and leadership training that will increase numbers of Latinas, American Indian, and African- American women in STEM. But I continue to make small strides forward for example I just received notification from IRS that my non-profit, the Frida Kahlo Institute of the Borderlands is a reality.

*2. Are there outcomes of participation in AWE (as an inter-institutional collaboration) that you gained that you would otherwise not have achieved?*

Ruel: Yes. I realized that the structure of the Women at Rensselaer Mentor Program which draws students together as a community and creates critical mass amongst women works very well for our campus and for our students. The fact that our mentor program serves all women in all majors across campus celebrates their diversity while acknowledging their common interest in technology. This has made the recruitment of prospective students easier, because the high school students can see multiple opportunities to apply their skills and interests. The preliminary results of some of the data also suggest a high level of confidence amongst our female students. Although higher levels of self-confidence amongst Rensselaer women were also brought to light in another longitudinal study, it is great to know that the research from different studies points in the same direction.

Hart: Had I not participated in AWE I probably would not have changed my superficial, “post-activity only” “process of “assessment”.

Reyes: The best examples of this would be putting together two proposals for collaborative multi- institutional grants (even if unfunded) that could only have occurred as a result of participating in AWE. The participation allowed for the development of relationships with PIs and in the review of the instruments which allowed for an understanding of the full potential of such instruments and the collaborative process.

*3. What were the most effective methods of community building in AWE (if any)?*

Ruel: Presentations at regular meetings allowed us to share information about what we were doing at our institutions so that we could see the similarities and differences and gather information about best practices. Eating meals together, having down time to get to know and trust each other was very helpful. Everyone was encouraged to speak and share ideas. Encouraging different people to take lead roles at conferences or at meetings was also very effective. It gave the participants the opportunity to lead as well as to collaborate as part of a team.

Reyes: The most effective methods of community building in AWE were the face-to-face meetings and collaborating to put together presentations for the WEPAN meetings.

*4. What would improve the building and maintenance of the collaboration?*

Ruel: The value of the collaborative model needs to be demonstrated. If other directors see something in that model for themselves or their programs, then they are likely to sign-up. To maintain the collaboration, I think that people have to see an on-going relationship(s) of value that is sustainable over time. If the collaboration is seen more as giving something up (time or knowledge) and there doesn't appear to be any “value-add” or return for their participation, there won't be a continuing need to collaborate. The relationship would need to grow and continue to provide new information or an innovative approach.

Hart: Perhaps meeting three times a year vs. just two would help us enhance and maintain the collaboration. We're able to share a lot more that way – in spite of the difficulties of travel.

Reyes: The presentation preparation and additional paper writing process could be strengthened even further by allowing for a face-to-face workshop time in additional venues.

*5. Would you have participated in such an effort without funding?*

Ruel: Probably not. Time is money. I couldn't have afforded to put in the amount of time the grant required, particularly in the third year, without the additional support and I could not have afforded the travel money to go to meetings where much of our collaboration and sharing took place. As a new director, I was just beginning to ramp up my programs and without the grant and a student assistant, I couldn't have run my programs and participated in the grant.

Hart: I probably would not have participated in such an effort without funding. Although much of our interaction is via phone conferences and email I don't think I would have "bought into" the process or been able to keep "on task" without the face-to-face meetings. And without the funding I would not have been able to hire the student assistant or have the resources for student incentives, etc.

Reyes: I did, except for the funding that was provided by the project PIs for me to attend joint meetings. The lack of funding hampered my ability to gather data and motivate student and staff involvement. But all of that said it has been worth every minute of my participation because of the points I addressed above in growth areas and the sharing of knowledge and collegiality that is not possible within my own institution and state.

*6. A big barrier to effective collaboration is distance. Did AWE effectively address this barrier?*

Ruel: The times that the group came together face-to-face were very effective. There wasn't much interaction with the other directors outside of the face-to-face, so I think there's room for improvement there. Having missed one meeting and having had to teleconference in, I found it was very difficult to feel a part of the group and to take part in the exercises remotely.

Hart: Distance was certainly a barrier, but having regular conference calls, reminders of deadlines from Mieke Schuurman [AWE data analyst] and Dana Hosko [AWE staff], updates from Mieke (and ongoing assistance) as well as the two face-to-face meetings most years made the process work as well as it did.

Reyes: Again the face-to-face meetings were crucial for addressing this barrier.

*7. Do you believe that AWE moved beyond just exchanging information to true exchange and creation of ideas?*

Ruel: Yes. The [Year II AWE director] meetings in Albuquerque and Washington, DC, were good examples of moving beyond what we were already doing to suggest new ways of collaborating and getting others involved in what we're doing. There was lots of great exchange of ideas and expanding upon each other's suggestions.

Hart: I'd say we've mainly exchanged information about our programs and the processes we've used, but by reviewing the instruments and literature we have developed new tools and strategies of assessment.

Reyes: Ideas seemed to spin-out of every face-to-face meeting. One example is using the databases developed for following student participation in WISE programs at individual institutions to understand where students of color might be moving to other institutional programs

*8. Would there have been another way to achieve the goals of the grant?*

Ruel: I think that it might have been interesting to see what folks are using as assessment instruments and to use some of these examples to show them how they can create questions to gather formative and summative evaluations. In other words, start with some examples of what they already know and build on that to show them how they can make it better. As a new director, it would have been useful for me to have worked more with the data findings and had examples of how to use the data to demonstrate the impact of my programs on recruitment and retention.

Hart: I don't know of a better way...

Ruel: I cannot think of other ways other than to include the idea of workshops for collaborating in person but maybe this is an outgrowth of the current grant.

*9. Have you participated in other inter-institutional coalitions? If yes, please compare that experience to AWE.*

Ruel: Yes. I'm participating now in an interesting coalition that is examining the educational impact of big hi-tech firms deciding to build cutting-edge manufacturing plants in our region. The diversity of the coalition is broader than AWE but the collaboration stimulates innovative thinking and new paradigms are emerging for teaching and learning.

Hart: No, I have not

Reyes: I have been involved in a number of other inter-institutional coalitions (including community agencies) but the AWE project has far excelled in the quality of experience and leadership necessary to accomplish program goals.

*10. Do you have anything else to add about your experience in AWE?*

Ruel: It was a privilege to work with two experienced Principle Investigators and a team of consummate professionals!

Hart: I have enjoyed it a great deal, have learned a lot and made new friends. I look forward to the continuation.

Reyes: I look forward to continued involvement in the AWE program as it moves to the next phase of disseminating information and delivering workshops to other WIE programs.



## Conclusion

AWE directors came from a variety of institutions and yet each found similar benefits from the collaboration. All reported that funding and regular face-to-face meetings were essential components of the collaboration and resulted in advances in their own understanding as well as the development of new ideas and approaches. Developing and improving means of communication remained a challenge throughout and will be a focus of continuing collaboration. In summary, the partner institutions all gained strategically (by using shared knowledge and experience to create universally usable assessment and support instruments); in knowledge sharing and creation (bringing together a diverse set of experiences and expertise created usable and relevant assessment instruments and uncovered the need for career development tools); and politically, gaining greater visibility in home institutions and beyond and creating functional and extended professional networks.

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