Managing Research Collaborations

Strategies for conducting interdisciplinary, international research collaborations

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This report provides tips on both the intellectual and technical aspects of organizing successful interdisciplinary collaborations involving international work.

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We are a team of five researchers, in three universities, spanning four academic disciplines, and four different physical locations. For our project, we have teamed up with researchers and their research teams in universities in four countries: Jordan University of Science and Technology (Jordan), Universiti Teknologi Malaysia (Malaysia), Princess Nora Bint Abdulrahman University (PNU) (Saudi Arabia), and National School of Engineering of Tunis (ENIT) (Tunisia).

The U.S.-based team includes:

- PI-Dr. Jennifer DeBoer, Purdue University, Department of Engineering Education, West Lafayette, IN
- PI-Dr. Julie A. Kmec, Washington State University, Department of Sociology, Pullman, WA
- Dr. Nehal Abu-Lail, Washington State University, Gene and Linda Voiland School of Chemical Engineering and Bioengineering, Pullman, WA
- Dr. Ashley Ater Kranov, Washington State University, School of Electrical Engineering and Computer Science, located part-time in Baltimore, MD and Saudi Arabia
- Dr. Karen Bradley, Western Washington University, Department of Sociology, Bellingham, WA

Our project involves conducting research in four countries (Jordan, Malaysia, Saudi Arabia, and Tunisia) to assess the contextual factors that encourage women's participation in engineering in tertiary education and as a career. We seek to understand the links between cultural context and women's successful engineering participation by studying the economic, educational, socio-cultural, legal, and political drivers of women's participation in these contexts.

We apply case study methods to collect data using focus group interviews with female engineering undergraduate students, faculty members, and practicing engineers in our four sites. With its cross-national, in-depth exploration of women's curricular and career choices and its attention to mechanisms producing gender-differentiated curricular and career decisions, this project promises to shed light more generally on how context shapes women's successful participation in engineering in ways that inform efforts to broaden participation in the US.

In the first few months of our project, members of the research team and a graduate student assistant travelled to Jordan, Malaysia, and Tunisia for roughly two-week time periods to collect data with a team of international scholars. Prior to the travel, many months of conversations, writing, and collaboration both with the US-based team, but also with our international collaborators, took place. We learned a lot in the process that we want to share with others.

Research Related: Communication

Pursing this project involved interdisciplinary challenges of communicating in a common language. As sociologists, engineers, and engineering educators, we had to first understand each other's disciplinary norms. We learned that we needed to be explicit about disciplinary language. For example, "institutional theory" is a theory widely taught and applied to explain a variety of social phenomenon (e.g., why work organizations all tend to adopt the same human resource policies or why some business organizations fail) in the discipline of sociology. Early on in our collaboration, the sociologists could not take for granted that engineers understood "institutional theory" and the language associated with it.

Even before conversations about specific theories, the group had to identify what made sense for the purpose of the project: to test one theoretical explanation of a social phenomenon against another theoretical explanation? Single testing a single theory's explanation of a phenomenon? Applying a theoretical lens to make sense of what we observe.

At the same, the group had to communicate very clearly about research methodology; each of us uses a different set of research techniques (e.g., qualitative interviews, internet surveys, factorial surveys, focus groups) and some of us use different terms to refer to data tools (e.g., focus group interview guides are equivalent to focus group protocols). In general, as soon as we encounter a different term, we would ask team members to clarify its meaning.

We also had to communicate clearly about disciplinary publishing and conference norms. The major annual conference in sociology, the American Sociological Association, requires presenters submit complete (roughly 20-page) papers in January for an August conference. Not all conferences require that long of a lead time for submission; some disciplinary conferences only require a paper abstract.

Communication also involved the calibration of protocols across countries. Specifically, the team had to modify language on the focus group protocols to reflect the language of the country. For example, our translator of the protocols to French was Quebecois Canadian and certain terms and phrases were either unfamiliar or unusual to the Tunisian French speakers. We modified the language of the protocols with our Tunisian collaborators to ensure maximum comprehensibility by those being interviewed and those participating in focus groups.

Technical Side: Communication

Key to any good collaboration is timely, consistent, and organized communication among the research team, but also with advisory board members and international research collaborators.

To facilitate research team communications, the project PIs (Dr. Jennifer DeBoer and Dr. Julie Kmec) set up a **weekly hour-long Skype call** to discuss upcoming deadlines, weekly plans, and provide project updates. These weekly meetings happened at the same time each week so became routine; they served to keep the tasks on deadline.

Following these weekly meetings, the PIs would generally share information (via email) with the research team. As needed, the PIs held skype calls with team members.

The U.S.-based research team communicated almost entirely by email. It was helpful to have a **project listserv** (including all members of the research team and graduate students affiliated with the project) to make it easier to send group emails.

As needed the team set up group skype calls. To schedule these, we relied on **doodle poll/whenisgood.net.**

Finally, we maintain a project website (http://womeninengineeringpmcs.org/) to inform the public what we do, but also to serve as a place for interested researchers, policymakers, and other interested individuals to find project resources, including focus group protocols, collaborator training materials, and consent forms developed for the study.

Research Related: Information Sharing & Organizing

To facilitate the sharing of information and keep the team organized, we developed several strategies. The first of which was to delegate responsibility/determine roles of team members. Each time we had a group phone call, someone crafted an agenda and served as the leader of the phone call; that person would walk us through the agenda and also typed notes regarding the conversation. She would also circulate the notes, asking for accuracy and clarity in her summary of the group conversation.

Shortly after receiving funding, we circulated announcement of our funded grant to our university communications offices, many of these offices created press releases announcing the grant. From these press releases, we received interest from the media, both in the U.S. and abroad. The US based team prepared a "media talking points" document that included a summary of the project, biographical information about the team, and grant specifics so that we could all draw on the same material when contacted by the media.

Technical Side: Information Sharing & Organizing

Central to the efficient working of our research team was access to a reliable, simple information sharing and organizing tool.

The project PIs and graduate students used the **project management software, Basecamp**, as a tool to manage, share, and communicate. Basecamp is a software system that lets team members store files, make "to do" lists, and serve as a communication platform (i.e., the system allows users to send reminders, allow commentary on documents). We set up the system to request that each user post her "deliverables" (i.e., what she accomplished each week). Not only did that keep us accountable for work, but we will use these weekly reports to write the project annual report for the NSF.

Because Basecamp is a place to store data, we also keep all protocol files, international collaboration materials, and grant paperwork there. Basecamp also sends research team members weekly reminders about what's on their "to do" list and allows for team members to post comments about documents so it archives the back-and-forth communication that sometimes gets lost using email alone.

The team also maintains a **Dropbox** folder for the project, with subfolders that include grant proposal material, literature relevant to the project, IRB materials, templates for recruitment letters, and materials related to data collection. To facilitate the sending of documents to international collaborators, the team established a Dropbox folder for each international research team collaborator.

We also had to agree upon a common way to name files in Dropbox and Basecamp, opting for a system of file naming that included date and manuscript title (e.g., 2017423_Focus group protocol by country.doc)

To share transcribed data, the team also created access to a secure data sharing site.

Once a year (at minimum), the U.S.-based research team will met face-to-face. We scheduled meetings (what we call team retreats) to coincide with academic conferences we attend.

Since these meetings tend to happen in places we are not living, they required some work to identify appropriate (affordable) meeting spaces. For example, our first team meeting was held in a study room in the Seattle Public Library. A second meeting will be held in an Air b-n-b site that will also serve as the lodging accommodation for some team members.

Unexpected Research and Technical Challenges

As with any large-scale project, we encountered some challenges. Here we summarize a few of the obstacles we faced leading up to and during data collection.

As noted above, our US-based research team hails from three US universities and within these universities, two colleges. Splitting budgets across colleges within university proved to be necessary in order to give due credit (for overhead, grant expenditures), but challenging to organize. It was important that research team members from each university managed their own budgets, ensuring that budget expenses came from the appropriate budget. To facilitate this, it was important that each research team member monitor her budget statements and the budget justification statement submitted with the grant proposal.

Any amount of group work requires navigating different work styles. For example, not everyone interacts with technology the same way; some prefer email, others phone. Some are comfortable always talking in skype, some do not. We had to learn that being flexible about communication modes (while also aware of the cost of long-distance, international communication) was important. We almost always relied on Skype audio (or video, if we were lucky to get a good connection) calls between the US and international locations and Skype when communicating within the US. Setting up Microsoft Outlook reminders about calls helped keep track of call times, too.

On top of communicating differently, team members had different work styles; some on the team need long lead times to prepare requested documents and files, others

felt comfortable working up until deadline. Out of respect for work style differences, we tried to post requests for material, preparation, etc. well in advance (i.e., at least one week).

Finally, we encountered some challenges working with international collaborators with whom we had not had previous long-term research and work relationships in advance of starting the project. We learned that it is critical, prior to starting the project, to establish a common understanding of interest and engagement in the study topic, as well as the attending responsibilities of research collaborations. In addition, we learned that it is necessary to include specific guidelines for budget expenditures and their documentation.