Roundtable Discussion, A Follow Up Activity to the Workshop:
Best Practices in International Research Experiences for Graduate Students
10 October 2019 - National Science Foundation, Alexandria, VA

1.0   Workshop Summary and Roundtable Overview

A group of ten university and professional society representatives met with ten representatives of the National Science Foundation on October 10, 2019 for a roundtable discussion ("Roundtable") on findings of the January 10-11, 2019 NSF-funded workshop (OISE1840364, "Workshop") entitled "Best Practices in International Research Experiences for Graduate Students." The 2019 Workshop was organized and led by Brian S. Mitchell, Professor of Chemical and Biomolecular Engineering at Tulane University. It was the third in a series on international research experiences for graduate students; the previous two occurred in 2011 and 2016.

The Roundtable began with a brief overview of the Workshop findings and recommendations as described in the final report. Kirsten Davis, a PhD candidate in Engineering Education at Virginia Tech, then presented an analysis of the pre-workshop survey responses in the context of the three Workshop topic areas: timing and duration of research stays; the role of the research advisor in structuring the international activity; and tracking of graduate students who participate in these international research activities. A key finding of the survey analysis was a preference by survey respondents for research experiences lasting 1-4 months that occur after the PhD qualifying exams are completed and general support by advisors for international research experiences as part of a student's professional growth.

Roundtable discussion on the first topic - timing and duration of international research experiences - reiterated the need for clear goals of the activity and intentionality in designing not only the length of the activity but in determining the appropriate pre-departure training. Second, the role of the research advisor was discussed with an emphasis on providing training to the advisor and promoting the importance of international activities to their own professional development. Finally, the third topic on data collection provided a rich environment for participants to share how their institutions collect and use information on international research activities. This information proved to be the focal point for a proposed pilot study on how these activities can be tracked and evaluated beyond the institutional level.

Recommended steps from this Roundtable Discussion include:

1. Continue to report Workshop results through publications and presentations at annual meetings such as those from the Association of International Education Administrators (AIEA) and the American Educational Research Association (AERA) as well as relevant professional societies.
2. Develop and administer surveys on international research experiences to current and former graduate students, faculty, and university administrators.
3. Propose a pilot study to collect and analyze existing aggregated institutional data on international research activities at the graduate level to determine common data elements and provide preliminary results on participation rates and outcomes.
4. Partner with organizations performing similar studies such as the Graduate Learning Overseas (GLO) research study from the Institute of International Education (IIE).
5. The term "international research experience" should be replaced with "global research experience" to be more inclusive and better reflect the development of global competencies in participants regardless of country of origin.

2.0   Pre-Workshop Survey Analysis

To prepare for the Workshop, a survey was designed by Brent Jesiek of Purdue University and distributed to a limited number of faculty at selected participating institutions and to members of the American Physical Society. Kirsten Davis, a PhD candidate in Engineering Education at Virginia Tech performed statistical analyses on the 147 responses and was able to draw broad conclusions despite the limited response and their correspondingly limited statistical significance. In addition to a preference for research stays of less than six months and general support for such activities by faculty advisors, there were some findings that can be used to inform subsequent surveys. For example, views on the importance of international research experiences differed based on the NSF funding area of respondents. This difference was especially distinct between those identifying Mathematical and Physical Sciences as their NSF funding area and those from Computer and Information Science and Engineering. These two groups of respondents also differed on their views of the optimal timing for such visits. *Is this difference of opinion related to demographic differences within the group, especially with respect to the advisor's country of origin, or is it some other reason?* There was some correlation between support for graduate student international research experiences and the prior international research experiences and ongoing international research collaborations of the faculty respondents. A journal publication is planned to describe the pre-workshop survey results in more detail. Suggestions were made to not only improve the structure and distribution of the survey to account for selection bias and forced choice effects, but to administer surveys to student participants in order to gain their perspectives on international research experiences.

3.0   Roundtable Discussion

Rather than focus further on the findings of the Workshop, the Roundtable discussions considered unanswered questions and next steps in better understanding the benefits of international research activities.

3.1   Topic 1: Timing and Duration

The recommendations from the Workshop on timing and duration of research visits focused on the related concepts of evaluating intended outcomes and using a decision-tree approach to assist with identification of an appropriate international activity (see the Workshop Final Report for a full description of the decision tree). The Roundtable discussants returned to the fundamental question at hand: *what are the goals of this activity*? One discussant noted that goals and outcomes should dictate duration. The topic question should be really the corollary: "*have we appropriately designed this experience for the proposed duration*?" Another noted that intentionality is important in shaping the experience. The required pre-departure work and preparation should be appropriate to the goals and duration rather than a one-size-fits-all approach. Goals (or outcomes) could include exploring a general research topic or addressing a specific research need such as the use of specialized equipment or facilities. There could be other tactical reasons such as establishing formal collaborations with a specific person or institute. Goals and outcomes also depend on where a student is in their research project. These factors can be incorporated into a decision tree, but other considerations such as corresponding barriers to the activity and the necessary pre-departure training must be conveyed to the participant and their advisor(s).

The decision tree approach and survey questions regarding the importance and purpose of international research experiences presuppose that there is already an interest in an international activity on the part of the student. The Roundtable discussants were equally interested in determining how this interest is established in the first place and how programs and institutions can promote this activity as important to

professional development. There was also discussion regarding how the international experience can and should continue upon completion. Follow-on activities at the home institution not only support internationalization at home but serve as opportunities for publicity and program promotion. Examples of how institutions have done this are described in Topic 3 below.

3.2   Topic 2: Role of the Research Advisor

The two Workshop recommendations regarding the role of the research advisor in designing and promoting international research experiences for the graduate student advisees were briefly discussed. The first recommendation regarding the research advisor serving as a student advocate recapitulated the need for clearly stated goals and outcomes on the part of the student. Much of the discussion on the second recommendation that training be provided for research advisors centered around the NSF International Research Experiences for Students (IRES) program. There are three tracks in the current iteration of this program related to IRES Sites (IS), Advanced Studies Institutes (ASI), and New Concepts in International Graduate Experiences (IGE). Although graduate-level international research experiences can occur within any of these tracks, Track III (IGE) is the most relevant to the conversation on the role of the research advisor. An NSF Program Manager commented that it is still difficult to get IRES applicants to propose innovative models; most request funds to support specific research projects. There are some exceptions, however. The IREE 2010 China program at Purdue allowed for student self-placement and the IRES grant at Virginia Tech is housed at the college level rather than within a specific department.

Consistent with the recommendation for research advisor training, one Roundtable participant noted that there are a lot of faculty who are interested in supporting international experiences for their graduate students but they don't know what to do. This institution (UMBC) has started hosting faculty panels to tell their stories of how they got started. It was also noted that advisors require clarity from their advisees on the perceived benefits of the international activity. The role of individual development plans (IDPs) and faculty/program annual review processes can facilitate these conversations. It was mentioned that promotion guidelines – especially to the rank of full professor – often include some international component, either through collaboration, publication, or recognition. One software tool for cataloging international activities for recognition is Rescognito.   NSF does have supplements available for international travel on CAREER grants to junior faculty. Professional societies can also be a source of support for faculty interested in international research activities. IEEE, for example, is very multinational in its membership and has sufficient resources to support international activities.

The institutional perspective was brought into the discussion on the role of the research advisor. Institutions are increasingly interested in how international collaborations benefit the institution as measured by return on investment, contributions to local/regional economy, and faculty development. At the same time, language from institutional international offices is often targeted to undergraduates; e.g., study abroad or junior year abroad. Simple language changes can be made to broaden the scope of available international activities to include research experiences and graduate student participants.

3.3   Topic 3: Data Collection, Tracking and Dissemination

University representatives gave reports on how graduate student international experiences are tracked at their institution. The were prompted prior to the Roundtable with the following questions:

1. Who (if anyone) tracks international travel (for any academic purpose but not necessarily personal) by your graduate students and postdocs?

2. Does your university require that all university-sponsored travel be booked through a specific agent or website (Concur is a common portal) as opposed to allowing reimbursement for personal purchases on university business?
3. Does your university subscribe to International SOS or a similar international insurance or assistance program?
4. Are there any statistics available on the numbers of graduate students from your institution who travel internationally, for what purpose, and how they are funded?

3.3.1 Michigan State University

Mary Anne Walker, Office of the VP for Research at MSU reported that their International Studies & Programs Office is responsible for collecting international travel information and that all travel is recorded in a home-grown database as well as Concur. They have information on how many students participate in international activities but they are not currently differentiating between undergraduates and graduate students. Canada is the top international destination, followed by Germany. They use information from their database to assess programs and inform the process. MSU convenes an international data working group. An international faculty database is maintained for mentoring activities but is limited to access for this purpose only. Mary Anne provided samples of quarterly reports on faculty and student travel that are shared with MSU leadership.

3.3.2 Lehigh University

Cheryl Matherly, Vice President and Vice Provost for International Affairs reported that Lehigh now tracks travel for graduate students and postdoctoral scholars as of 2018. Expansion of travel insurance through ISOS was the key driver in the decision to track these groups of affiliates and risk management is the primary unit in charge of collecting this information. Lehigh recently implemented a policy requiring a university travel agent for booking international travel.

3.3.3 University of Maryland-Baltimore County

Marc Zupan, Associate Professor of Mechanical Engineering and Janet Rutledge, Dean of the Graduate School at UMBC conferred with the director of their International Office and reported that no one is required to track international travel for the university, but that if university funds are used there should be information available. There is no institutional required travel agency for booking international travel and International SOS is used only for those students involved in study abroad. As a result, there are no readily available statistics, but some information could be gleaned if necessary and with some effort.

3.3.4 Georgia Institute of Technology

Julia Melkers, Associate Professor in the School of Public Policy at Georgia Tech reported that the Vice President of International Programs is charged with overseeing all international activities. They track international travel and run periodic reports from their travel database. They can differentiate the purpose of some travel but not all. University affiliates are not required to book travel through Concur excepting for travel related to Department of Defense (DoD) funded projects.

3.3.5 Purdue University

Brent Jesiek, Associate Professor in the Schools of Engineering Education and Electrical and Computer Engineering reported that Purdue University requires that travel be approved through Concur although travel arrangements can be made external to Concur. As a result, they are able to extract international travel approval information from Concur including the unit of affiliation, destination, and dates of travel.

He provided the following sample data extraction from Concur (graduate students only in all fields of study):

Academic Year	Number of Student Participants	Average Duration of Stay
2016	509	21 days
2017	604	25 days
2018	665	20 days

3.3.6 Tulane University

Brian Mitchell, Professor of Chemical and Biomolecular Engineering reported that Tulane collects little data on international travel activities. Faculty international travel must be booked through Concur and ISOS is used for faculty and students on international travel, but no other data are collected on the nature of the activity and no reports are issued.

There were commonalities in the data collection efforts as described by the institutions as summarized in Table 1. Enterprise software such as Concur and ISOS are common databases for the collection and archiving of relevant information. Most institutions also currently contribute information to IIE's Open Doors report as well as risk management data through the National Association of College and University Business Officers (NACUBO) and University Risk Management and Insurance Association (URMIA). In fact, risk management considerations are a key driver in the collection of information on at least the travel portion of international research activities. Nevertheless, barriers exist to collecting this information. For some institutions, there is no reason to collect this international activity information on graduate students. For others, definition is part of the problem.

Table 1 Summary of International Travel Data Collection Efforts at Selected Institutions.

	MSU	Lehigh	UMBC	Ga Tech	Purdue	Tulane
Who tracks international travel?	International Studies Office	Risk Management	No one	VP for International Programs	Business Office	No one
Booking agent required for international travel?	Yes (Concur)	Yes	No	No, excepting DoD projects	No	Yes (Concur)
ISOS or equivalent?	Yes (ISOS)	Yes (ISOS)	ISOS, Limited to study abroad only	Yes (ISOS)	Yes (Gallagher)	Yes (ISOS)
Data on graduate student international activities?	Yes	Yes	No	Yes	Yes	No

4.0   Recommendations

The Roundtable concluded with brainstorming ideas on how to promote international research experiences for graduate students and for next steps in evaluating the benefits of these activities.

4.1   <u>Terminology</u>

In the context of promoting and evaluating global competencies for all graduate students, there was a recommendation that the term "global research experiences" be more used instead of "international research experiences" to better reflect the development of global competencies that are developed in participants regardless of country of origin.

4.2   <u>Improved Surveys</u>

There were several suggestions on how to build upon the results of the pre-Workshop survey. The first was to stratify the surveys and perform sampling rather than trying to survey everyone. These sampling surveys should be administered to current and former graduate students, faculty, and university administrators involved in international research activities. Something as simple as a checkbox on an exit survey indicating whether the project involved an international component could provide valuable information. For example, Georgia Tech asks graduates whether they made a presentation away from campus and how that activity was funded. Sampling can be performed as both entrance and exit surveys to various activities (admission, candidacy, graduation) at the graduate school or program level. There was also a suggestion that respondents be asked to rank responses rather than pick only the "best" response. The Survey of Doctoral Recipients (SDR) from NCSES has occasionally included a question on international experiences. Smaller, more focused surveys were also recommended, such as specific aspects of international research projects rather than evaluating the entire experience. There was also a suggestion that a Mosaic approach to cataloging research experience be used in addition to surveys.

4.3   <u>Institutional Data Collection</u>

As occurred at the Workshop, there was Roundtable discussion on who should collect information and what should be collected. Even such institutional approval forms as "research in absentia" or "change in duty" forms can be a source of information. Still, there is a need for clear data definition, what is knowable and reportable, what qualifies as an international research experience, the format of the data, how and how often it is collected, and whether or not the institution partners with common data collection programs such as UMETRICS or the Census Research Data Center.

Institutional representatives agreed on the following sets of questions to pursue with their home institutions:

- *Are data available on graduate students (MS and PhD) participating in international experiences including research as defined by conferences, co-ops, internships, research trips, service learning, other work experiences; and credit-based experiences? Response: yes/no; corresponding data fields if "yes."*
- *At what administrative level is this available (program, department, school, university)? At what level can reports be run?*
- *Are there any pre/post activity surveys? What items relevant to international experiences are in travel authorization and which are required? Are there existing surveys or reports into which questions could be inserted?*
- *Where did you find these data?*

- *What are the linking mechanisms across databases, e.g., student ID?*

4.4   Dissemination of Results

Workshop recommendation and results will be presented at the 22nd Annual Colloquium on International Engineering Education in Cincinnati, Ohio in November 2019. A list of potential venues for further presentations was compiled.   In alphabetical order with key Roundtable participant contacts in parentheses, they include:

- AAAS
- AACU (Julia Mathers)
- AAU
- AAWS
- ACS Symposium on Graduate Education (Joerg Schlatterer)
- AEIA (Cheryl Matherly)
- AIR
- APLU
- Global Engineering Deans Conference (Janet Rutledge)

4.5   Useful Resources

A key source of additional information and collaboration identified by several participants was the recent Graduate Learning Overseas (GLO) project from IIE. The Open Doors report from this same organization provides annual information on student mobility at all degree levels. There are criteria for duration to be reportable and different categories of duration. Only recently were non-credit activities such as research experiences counted in this report.   The Roundtable organizers will reach out to IIE for further conversations on these reports.

Additional sources of information for future discussions includes:

- NASEM Report on The Science of Effective Mentorship in STEMM
- NASEM Report on Graduate STEM Education for the 21st Century. Many of the key recommendations related to PhD core competencies (Recommendation 5.1) and career preparation (Recommendation 5.2) require much of the same type of data collection and validation as discussed at the Workshop and Roundtable.
- NASEM Report on The Next Generation of Biomedical and Behavioral Sciences Researchers: Breaking Through
- International Global Diplomacy Program
- Bureau of Educational and Cultural Affairs at U.S. Department of State
- Vitae Researcher Development Framework (United Kingdom)

Roundtable Attendees

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Sandra Cruz-Pol	Program Director, EEC	National Science Foundation
Kirsten Davis	Doctoral Candidate	Virginia Tech
Jong-on Hahm	Program Director, DGE	National Science Foundation
Claire Hemingway	Program Manager, OISE	National Science Foundation
Christopher Hill	Program Director, DGE	National Science Foundation
Brent Jesiek	Associate Professor	Purdue University
Libby Lyons	Program Manager, OISE	National Science Foundation
Nimmi Kanankutty	Interim Division Director, DGE	National Science Foundation
Cheryl Matherly	Vice President and Vice Provost for International Affairs	Lehigh University
Julia Melkers	Associate Professor	Georgia Institute of Technology
William Miller	Science Advisor, CISE.OAC	National Science Foundation
Brian S. Mitchell	Professor	Tulane University
Hiro Okahana	Associate Vice President, Research & Policy Analysis	Council of Graduate Schools
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