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## Principal Investigator Perspectives on the Effects of COVID-19 on their NSF-Funded International Research Projects with Students in 2020

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## Principal Investigator Perspectives on the Effects of COVID-19 on their NSF-Funded International Research Projects with Students in 2020

### Cover Page Footnote

This material is based upon work supported by the National Science Foundation under Grant No. 1840364. The participation of principal investigators in the survey and interview portions of this work is gratefully acknowledged.

***PERSPECTIVE***

**Principal Investigator Perspectives on the Effects of COVID-19 on their NSF-Funded International Research Projects with Students in 2020**

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**Introduction**

The global pandemic has highlighted the importance of global scientific research collaborations, yet it has stifled the very type of training necessary for future collaborations to be successful. The full impact of the COVID-19 pandemic on an important part of global scientific research collaborations – academic mobility – may not be known for decades, but reports are emerging that pandemic-related travel restrictions are having negative impacts on participation rates in activities such as student study abroad (Martel & Baer, 2021), researcher fieldwork (Howlett, 2021), and scientific travel in general (Woolston, 2021). In this perspective piece, we examine the early effects of the COVID-19 pandemic on a small but important aspect of global scientific research collaborations: federally funded international research training programs. To understand how student-centered global research is being impacted by a disruption of global scale is to understand how the academic community can better prepare for the next such event. It also provides an opportunity for us to re-examine what international research training options are available to students absent the ability to travel.

The Office of International Science and Engineering (OISE) at the National Science Foundation (NSF) is the key funder of student-centered international research experiences in the disciplines it supports, but additional opportunities exist in other NSF directorates, such as international research centers and dissertation fellowships. Related federal funding agencies have similar global research training programs and a large number of independent organizations offer fellowships for international experiences at all post-secondary levels of training. The OISE programs selected for this study follow a similar format where there is a host institution (or institutions) in a foreign country at which a cohort of students from U.S. institutions spend a dedicated period of time (typically 4-12 weeks) conducting research and engaging in cultural activities. Activities can vary before and after the international research experiences, but may include

language preparation, campus presentations, and ongoing research. These activities in some way impact the development of global competence in the participants (Vande Berg, Paige, & Lou, 2012; Dwyer, 2004; Varela, 2017), including exposure to research methodologies, expertise, and laboratory facilities that may be different from their home institutions. These projects can also assist the faculty participants with advancing their own global competence and research agendas. To shed some light on how the pandemic is impacting students and faculty involved in these international research training programs, we developed a short survey and conducted follow-up interviews with the principal investigators of current NSF-funded international research projects that involve students.

## Methodology

A total of 249 principal investigators (PIs) of international research projects involving student training were identified through a publicly available search of active NSF awards as of July 7, 2020. The programs involved in the search included International Research Experiences for Students (IRES), Partnerships for International Research Experiences (PIRE), and AccelNet. The survey link (Qualtrics) was sent to all PIs in December 2020; a total of 103 responses were received by January 25, 2021, representing a 41% response rate. Not all questions were answered by all respondents and in some cases the questions were not applicable. Of those who responded to the survey, 26 agreed to be contacted for detailed follow-up interviews. Approximately half (12) of those who provided contact information were contacted for follow-up interviews. These twelve interviews were conducted via Zoom during January 15-29, 2021 and lasted approximately 30 minutes each.

These questions apply specifically to the impact of the COVID-19 pandemic on student participants in your NSF-funded international research project.

1. What is the primary NSF program for your international research project?
2. Have you requested a no-cost extension for your NSF grant?
3. Have you requested a re-budget of participant support costs?
4. Approximately how many undergraduate students were impacted?  
Grad Students?
5. Describe those aspects of your international research project that have been able to continue during the COVID-19 pandemic.
6. Give one or two examples of research or training activities you have had to implement as a substitute to activities at the international partner institution due to the COVID-19 pandemic.

*Figure 1. Survey questions*

The survey was approved by Tulane University's Institutional Review Board (IRB) and consisted of six questions (Figure 1) comprising administrative information (questions 1-3), the impact of the global pandemic on the number of program participants (question 4), and program activities (questions 5 and 6). The survey was administered such that respondents' names were not connected to their responses. Contact information for those agreeing to participate in follow-on interviews was collected separately from survey responses to protect anonymity of the survey respondents. The follow-up interviews used the same set of questions as the survey but requested additional detail and examples, especially for questions 5 and 6.

## Results and Discussion

### *Survey Results*

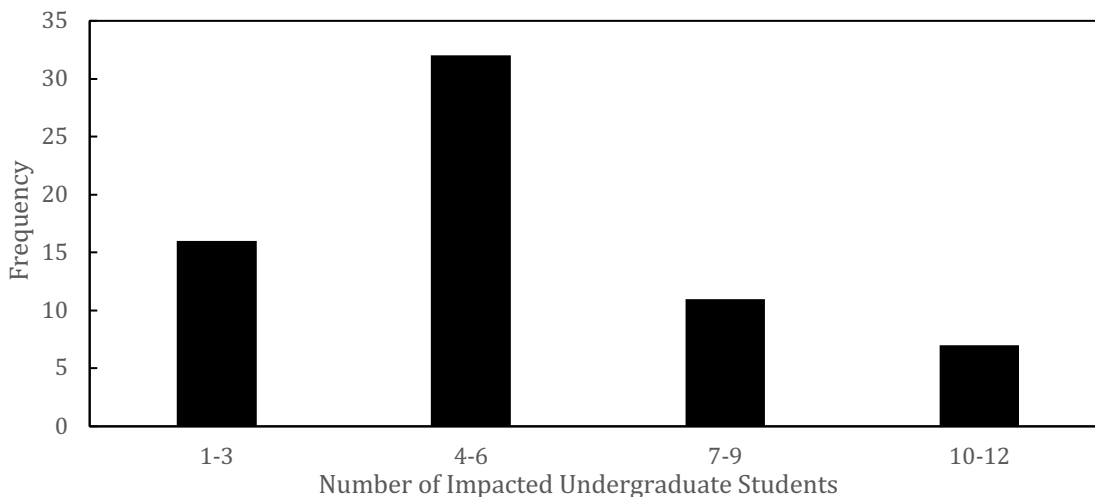
The majority of respondents (80%) were leading IRES projects (Table 1). Only 43% of respondents in all programs had requested a no-cost extension at the time the survey was administered (December 2020), and only 11% had requested a re-budget of participant support funds by that time. No-cost extensions are common so not all re-budgeting activity may be pandemic related; it will be interesting to see if the percentage of no-cost extensions increases as the pandemic continues to impact international travel beyond 2020. We infer from these results that PIs are taking a "wait and see" attitude from a budgetary standpoint. They have sufficient student support funds for when travel resumes, but they are not yet ready to take those travel-related funds (air travel, local travel, housing abroad, in-country personnel support) and rededicate them to activities at their home institution. This shows the importance that PIs place on the in-country experience, as will be reflected in the interpretation of interviews.

*Table 1. Survey responses by NSF program and number of students impacted*

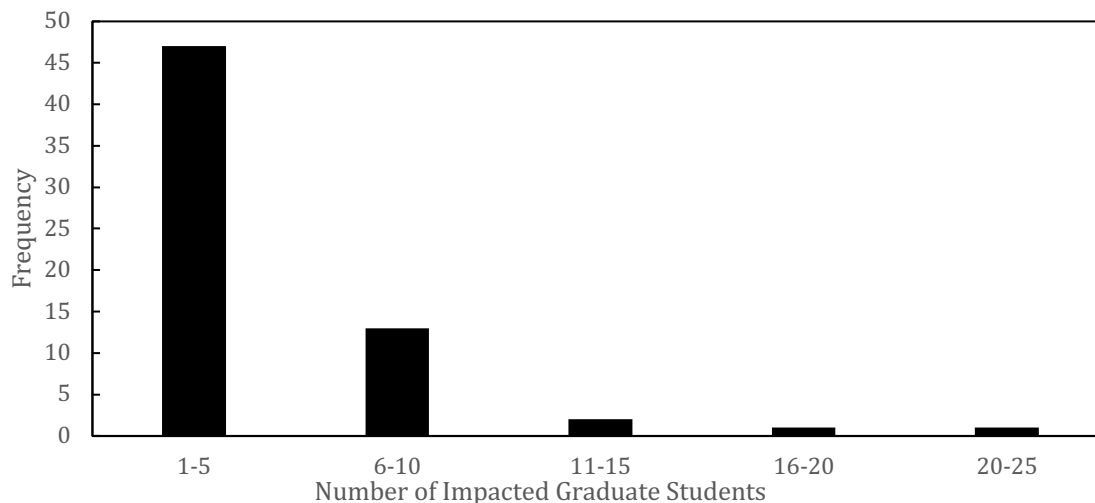
<b>NSF Program</b>	<b>% Responses (of 94 total)</b>	<b>UG Students Impacted (max)</b>	<b>Grad Students Impacted (max)</b>
IRES	80%	270	214
PIRE	15%	81	66
AccelNet	3%	0	1
Other	2%	17	1

About two-thirds of the respondents indicated that student participants were denied the opportunity to travel abroad because of the pandemic. This translated to approximately 360 student researchers at the undergraduate level (66 responses with some giving a range) and 280 graduate student researchers (64 responses also with ranges). The distribution of students denied travel is shown for each NSF program in Table 1

(maximum value of ranges used) and plotted by reported cohort size for undergraduate and graduate students in Figures 2 and 3, respectively. For example, 32 survey respondents reported that cohorts of 4-6 undergraduate students were impacted. This was the most common undergraduate cohort size unable to travel. We did not specifically inquire about participant numbers in programs that were able to send student researchers abroad, although some PIs volunteered that they were able to conduct travel later than originally scheduled or with a reduced number of students. There were also some respondents who were in the first year of their grant during which no travel was originally scheduled.



*Figure 2. Undergraduate student cohorts unable to participate in international research projects in 2020*



*Figure 3. Graduate student cohorts unable to participate in international research projects in 2020*

In terms of research and cultural activities, survey respondents indicated that some program activities continued in the absence of international travel. These continuing research activities included laboratory work, computational work, data analysis, literature reviews, and work on publications. Cultural activities included virtual introductions to host countries and language training. In some cases, planning for the resumption of travel continued, as well. Some of these same activities were implemented as replacements to travel, such as data analysis, laboratory work, and publication preparation, but the majority of new activities fell in the category of virtual training. These virtual activities included workshops, webinars, mentoring, didactic training, and networking events. Most of the PI respondents viewed all of these activities as ways to keep students engaged in the program until travel could resume. We did not distinguish between activity type by degree level (undergraduate vs. graduate) but anecdotal differences and additional details were provided by the follow-up interviews.

### ***Interview Results***

We were fortunate to interview PIs who had projects on all continents excluding Antarctica, in a variety of scientific and engineering disciplines, and involving different types of research (e.g., fieldwork or laboratory work). The impact of pandemic-related travel restrictions on student participation were similar in all instances. None of the interviewed PIs were able to send students abroad for their projects in 2020, although in one instance travel was not scheduled to commence until 2021. PIs were skeptical that travel could resume in 2021 (as of early in 2021, when these interviews were conducted). A plurality (42%) indicated that students would not be able to travel in 2021 and 33% were unsure at the time of the interviews. The inability of students to travel in 2020 was not entirely due to international travel restrictions to the host countries. It was also due to university restrictions on university-sponsored travel, the potential for difficulties with connecting flights in stopover countries, and restrictions on local travel in host countries due to the pandemic (e.g., related to local guides and participants for fieldwork). Despite the prospect of pandemic-related travel restrictions, a majority (58%) of interviewees did not suspend applications for their 2020 cohorts. In some cases, those applications had been initiated pre-pandemic (i.e., in the fall or winter months of 2019 and early 2020). Only 17% of interviewees indicated that they suspended acceptance of applications in 2020 due to the pandemic. Most interviewees (67%) planned to accept applications for the 2021 cohort.

Despite the inability to travel to host institutions abroad, most of these research projects continued in some form. As reflected in the broader survey, these ongoing activities included language training, lab work, computational work, data analysis, reading relevant papers, and preparing publications from previous studies. In one instance, PhD candidates were brought back into the project to analyze data from previous years in which travel took place. In this case, it is possible that there will be more productive

research output than if travel had taken place. Furthermore, this PI felt that this pivot to data analysis and publication of previous results served as an example of how to better design international research activities from the perspective of the foreign partner. Without research output (publications), the foreign partners may not benefit as fully since the NSF funding supports only the domestic side of the research.

PIs indicated that they continued with project planning for when they can resume travel to the host countries. PIs were also asked to elaborate upon new activities that were developed as a result of the pandemic. Unsurprisingly, these activities were primarily virtual in nature, comprising workshops, webinars, mentoring, didactic training, and networking events held through now common virtual networking platforms such as Zoom, Microsoft Teams, WebEx, or Skype. Workshops included introductions to the host institutions and countries, videos from past participants, journal clubs, and designing experiments. In limited cases, asynchronous research was possible with the host institution, but as previously mentioned this ability is highly dependent on the type of research being conducted. In most cases, however, the primary purpose of these virtual activities was to keep students engaged in the program during the pandemic. Some PIs commented that this additional training and engagement could make this cohort of students better prepared for the international experience compared to previous cohorts when they are able to travel again. This observation suggests that future projects should build in sufficient pre-departure training to ensure that students are not only prepared for the international experience but are also able to optimize their research and cultural development while abroad.

There are many relevant questions our short study was not able to answer. For example, it is unclear how student researchers from underrepresented or socially marginalized groups may have been impacted disproportionately by the global pandemic. Demographic information on student participants was not collected, and because surveys were anonymous the information that was provided on impacted students could not be correlated with participating institutions. Several theories exist on the impact of the pandemic on underrepresented or socially marginalized student participation in research activities and global competence development. On one hand, substitute virtual activities could allow students to participate who could not during a non-pandemic year due to financial or familial barriers to international travel. On the other hand, there is evidence from all levels of education that students from marginalized backgrounds also have a disadvantage in connectivity access that is necessary for participation in virtual activities (García & Weiss, 2020; Wilcha, 2020). There are also differences in participation likelihood according to project type. Our interview results suggest that those projects based on field work (e.g., biological and geosciences) were more adversely impacted than those involving primarily computational research or simulations. Because the number of survey responses is relatively small (approximately 100), a breakdown of student



participants by minority status of any kind could be skewed by, for example, one large computational science project involving many such participants. A study specifically designed to elucidate the disproportionate impact of the global pandemic on student researchers from underrepresented or socially marginalized groups that also considers the inherent differences in project type (fieldwork vs. lab work vs. computation) is highly recommended.

## **Conclusions**

A survey of 103 principal investigators of NSF-funded international research training programs administered in late 2020 revealed that over 640 undergraduate and graduate student researchers were unable to participate in international research projects as a result of the COVID-19 pandemic during 2020. Virtual activities including webinars, workshops, and networking events were implemented as a substitute for research and cultural experiences abroad with the goal of keeping students engaged until travel can resume. Unforeseen benefits of travel restrictions included enhanced research output with more time dedicated to data analysis and publication and improved pre-departure cultural training. Faculty who are considering applying to one of the NSF's international research programs should explore how virtual activities can be included in their proposals regardless of travel restrictions and how data and information collected during the research programs can be better analyzed to optimize publication and provide enhanced benefits to the international research partner. As the educational research community begins to identify those skills that constitute global competence development in student and faculty international research participants, we can explore the relationship between virtual activities, pre-departure intercultural training, and post-return data analysis on long-term research skills development.

## **Acknowledgments**

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