Best Practices in Proposing and Coordinating NSF IRES and PIRE Projects (and Beyond!)

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INTERNATIONAL RESEARCH EXPERIENCES FOR STUDENTS (IRES)

- Supports international research and research-related activities for U.S. science and engineering students
- **Purpose:** to enhance U.S. leadership in research and education and to strengthen economic competitiveness through **training the next generation of research leaders**

Track 1: IRES Sites

- Undergrad and/or grad students
- 6-10 weeks abroad

Track 2: Advanced Studies Institute

- Grad students only
- 10-21 days

TWO STUDIES INFORM THIS WORKSHOP

1. NSF IRES supplement: “Assessing the Impact of IRES on Researchers and Research Outcomes: A Case Study Approach” (Grant Number: OISE-1658604)

2. NSF EAGER grant: “Faculty Perspectives on how to Reimagine International Research for Students in a Virtual World” (Grant Number: OISE-2106093)

1. Assessing the Impact of IRES on Researchers and Research Outcomes: A Case Study Approach

RESEARCH QUESTIONS

How does the structure of an IRES program influence **faculty researchers** (in U.S. and abroad)?

How does the structure of an IRES program influence the **institutions** involved?

How does the structure of an IRES program influence the **participating students**?

STUDY DESIGN

Multiple Case Study: Nine IRES Programs

Australia | UK | Germany (1) | Germany (2) | South Africa | Japan | Portugal | China | Ghana

Cases were selected to diversify:

- US location
- Location abroad
- Research topic
- Institutional type

Interviews were conducted with:

- Principal Investigators
- Collaborating researchers abroad
- Student alumni

2. Faculty Perspectives on how to Reimagine International Research for Students in a Virtual World

RESEARCH QUESTIONS

How can program components be translated into a **virtual environment**?

What **creative program structures** allow for better access and research outcomes?

How are the **international research collaborations** that support IRES programs formed?

STUDY DESIGN

Participants - PIs of IRES and PIRE Grants Initiated between 2010-2019

Focus Groups:
- 42 Participants
- 8 Focus Groups

Topics Discussed:
- Approaches used when integrating virtual components into IRES programs
- Benefits of virtual components
- Challenges with virtual components
- Support needed for virtual IRES programs

Interviews:
- 25 Participants
- 1 hour in length

Topics Discussed:
- Creative approaches to designing IRES programs
- Unique structures that enabled access or improved research outcomes
- Origin of international research partnerships

PROGRAM STRUCTURE

STRUCTURES OF IRES PROGRAMS

Faculty PI Leads the Research	Faculty (PI) leads research in collaboration with international partners
PI Runs Lab in Both Countries	A single PI runs research laboratories domestically and internationally
Faculty "Broker" in 2nd Dept.	Faculty PI serves as a "broker" between different domestic departments and international partners
College Level "Broker"	College-level PI serves as a "broker" between multiple domestic departments and international partners
Network Wide Program	Existing professional network structures the collaboration

STRUCTURES OF IRES PROGRAMS

U.S. Collaborators

- Individual Faculty
- Multiple Faculty in One Department
- Multiple Faculty Across Departments
- One Department

- One College
- Research Center
- Professional Network
- Research Collaboration Across Universities/Orgs

International Collaborators

- No one – U.S. team
- Individual Faculty
- Multiple Faculty in One Department
- Multiple Faculty Across Departments
- One Department

- Government Org.
- Research Center
- Professional Network
- Research Collaboration Across Universities/Orgs
- Not for profit (NGO, museum, etc.)

STRUCTURE INFLUENCES OUTCOMES

Faculty PI Leads the Research	→	Greater impact on **faculty researchers** and individual benefits
PI Runs Lab in Both Countries	→	Greater impact on **individual faculty member's research**
Faculty "Broker" in 2nd Dept.	→	Improves **internal relationships** between departments
College Level "Broker"	→	Greater **institutional impact** at college and university levels
Network Wide Program	→	Better for **graduate students** to find research match abroad

BUILDING IN VIRTUAL STRUCTURES

IRES SOLICITATION:

"For all IRES proposals, PIs are strongly encouraged to outline **virtual, hybrid or other alternative approaches** to strengthen and maintain international collaboration in the event travel is not undertaken, and/or in addition to travel."

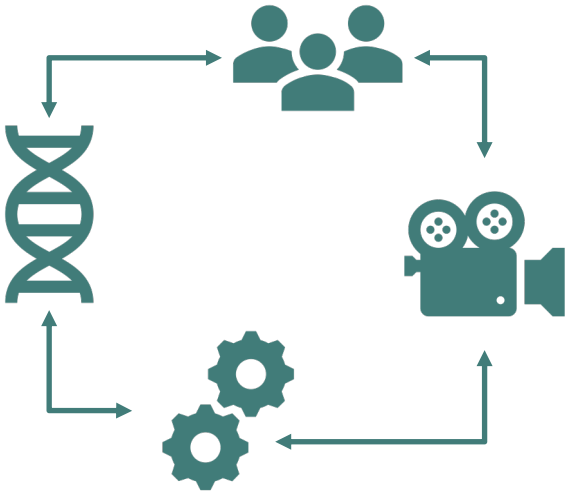
Benefits

1. Opportunities for new and enhanced collaboration opportunities
2. Improved accessibility compared to traditional programs
3. Opportunities for new ways to learn about collaborator's culture

Challenges

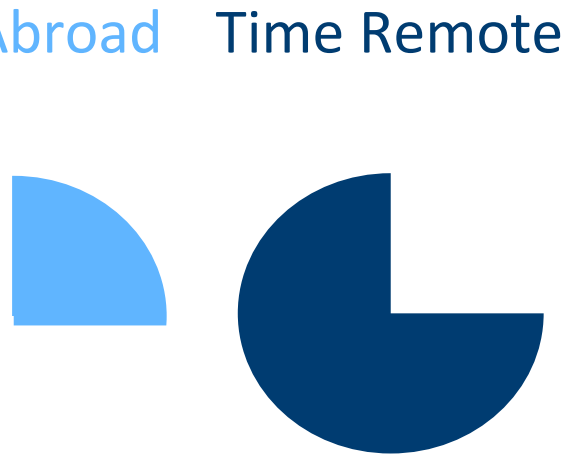
1. Cannot replicate the cultural and social experience of going abroad
2. Can place additional strain on international collaborators
3. Challenging or impossible for certain types of research (e.g., field work)

CREATIVE STRUCTURES



Interdisciplinary Teams

Different Schedules



Hybrid Programs

LESSONS LEARNED

PRINCIPAL INVESTIGATORS

Need **research outputs** – especially if working **individually**

COLLABORATORS ABROAD

Receive **no funding**, so **research outputs** are main benefit

STUDENT PARTICIPANTS

Undergrads – Recruit for grad school
Grads – more research done

Different **tradeoffs** are involved in deciding the **structure** of an international research experience program for students.

PROGRAM ELEMENTS & LEARNING OUTCOMES

PROGRAM DESIGN DECISIONS

PROGRAM LOGISTICS

- Student Selection
- Pre-Travel Prep
- Student Housing
- PI Travel
- Planned Activities
- Social Activities

RESEARCH PROJECTS

- Program Schedule
- Project Structure
- Research Tasks
- Collaboration
- Deliverables
- Mentoring & Support
- Post-Travel Activities

Context Matters – culture of host country, culture of host research group, student characteristics

EXAMPLE: MENTORING & SUPPORT

Place Students in Research Group

Same Group = support each other, but form "IRES bubble"
Different Group = less support, may develop more responsibility

Assign Students Mentors

Same mentor = less individual attention
Different mentors = more focus
Grad mentors = attention + social

Enroll Students at Local University

Pros = logistical support, access to student groups, connect with locals
Cons = costs more money

VIRTUAL ELEMENTS TO CONSIDER

- Movies
- Concerts
- Restaurants
- Cooking meals
- Religious sites
- Cultural festivals
- Local groups

Use Local Resources

Connect with Leaders Abroad

Pre-Travel Preparation

LEARNING OUTCOMES

RESEARCH OUTCOMES
Technical Skills
Research Skills
Nature of Research

Differences by students' stage in program
Field-work versus lab-work differences
Important to be working toward a product

CROSS-CULTURAL OUTCOMES
Professional Skills
Cross-cultural skills
Cross-cultural awareness

Collaborative projects
Differences based on location of the program
Differences in work-life balance, values, mentor styles

PERSPECTIVE SHIFTS
Perspective Change
Global Engineering
Personal Growth

Most prominent in novice travelers
Strongest with local friendships/strong mentors
Ownership of open-ended project
Travel on own + site matters
Navigating foreign language

CAREER AND FUTURE OUTCOMES

GRADUATE SCHOOL & ACADEMIA

INDUSTRY

INTERNATIONAL WORK & TRAVEL

PROFESSIONAL NETWORK

KEY IDEAS – PROGRAM ELEMENTS

Programmatic decisions in IRES programs can influence students' **experiences** and **learning outcomes**, but different formats and structures can be effective, depending on **context factors**.

Every student participant said they would recommend similar experiences to others. Several students asked us to "**make sure the NSF keeps funding programs like this**."

By far the most common type of outcomes that were discussed across all of the programs related to **students' careers or future lives**.

THINKING OF APPLYING FOR IRES?

TO CONSIDER BEFORE APPLYING

If you are pre-tenure: will this help your tenure case?

→ Consider institutional expectations, get mentorship

Look for existing resources or relationships on your campus

→ University level agreements, department collaborations, research centers

Be real about administrative responsibilities – who will handle this?

→ Identify campus resources, connect to existing programs

→ Talk to other IRES PIs about creative approaches

BUILDING A PARTNERSHIP

IRES can help build a partnership, but may not be a good place to start.

Get to know each other, do a small project, build institutional support

Apply for IRES

Build on IRES work to apply for other research funding

Thank you for joining us today!

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http://global.eng.vt.edu/Resources/IRES