Designing Effective International Research Experiences for Students

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PURDUE UNIVERSITY

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WHAT WE WILL COVER:

1. **Background and Program Structures**

2. **Program Elements and Learning Outcomes**

3. **Virtual Components**
   - Benefits and Challenges
   - Suggestions from PI’s

BACKGROUND

PROJECT TEAM

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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)

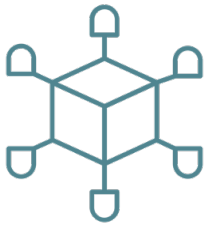
2. NSF EAGER grant: “Faculty Perspectives on how to Reimagine International Research for Students in a Virtual World” (Grant Number: OISE-2106093)

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

MOTIVATIONS FOR THIS STUDY

Study abroad is often difficult for engineering students

Research abroad fits well with engineering programs



Little research on such research programs

GOALS OF THE STUDY

- Impact on Student Researchers
- Impact on Faculty Collaborators
- Impact on Participating Institutions
- Impact on Research Outcomes

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

PROGRAM STRUCTURES

WHAT THIS SECTION COVERS

1. Different types of program structures

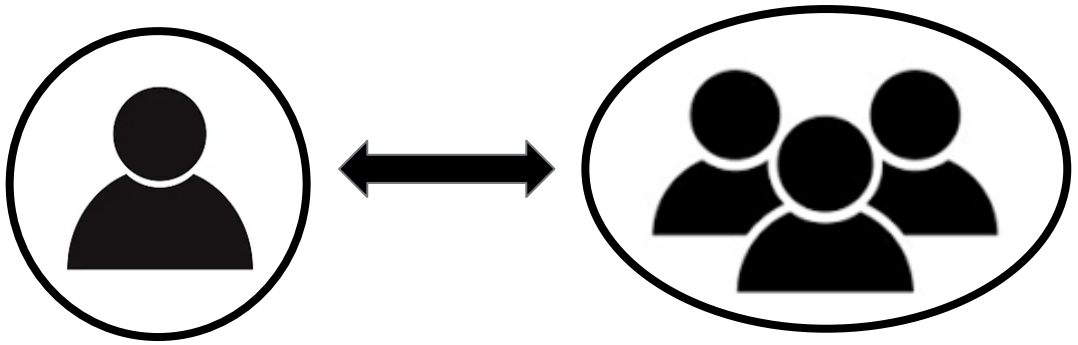
2. How the program structure you choose affects:
   - **faculty researchers** at the US institution and international university
   - **institutions** involved
   - **research area**

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

1. FACULTY PI LEADS RESEARCH

Faculty (PI) leads research in collaboration with international partners

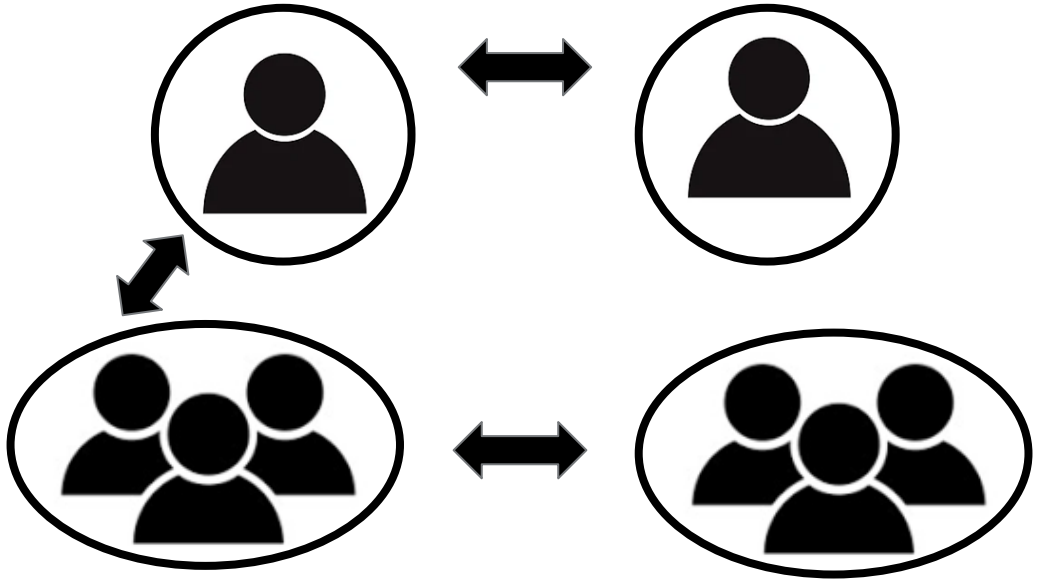


2. FACULTY PI RUNS LAB IN BOTH COUNTRIES

A single PI runs research laboratories domestically and at overseas partner institution

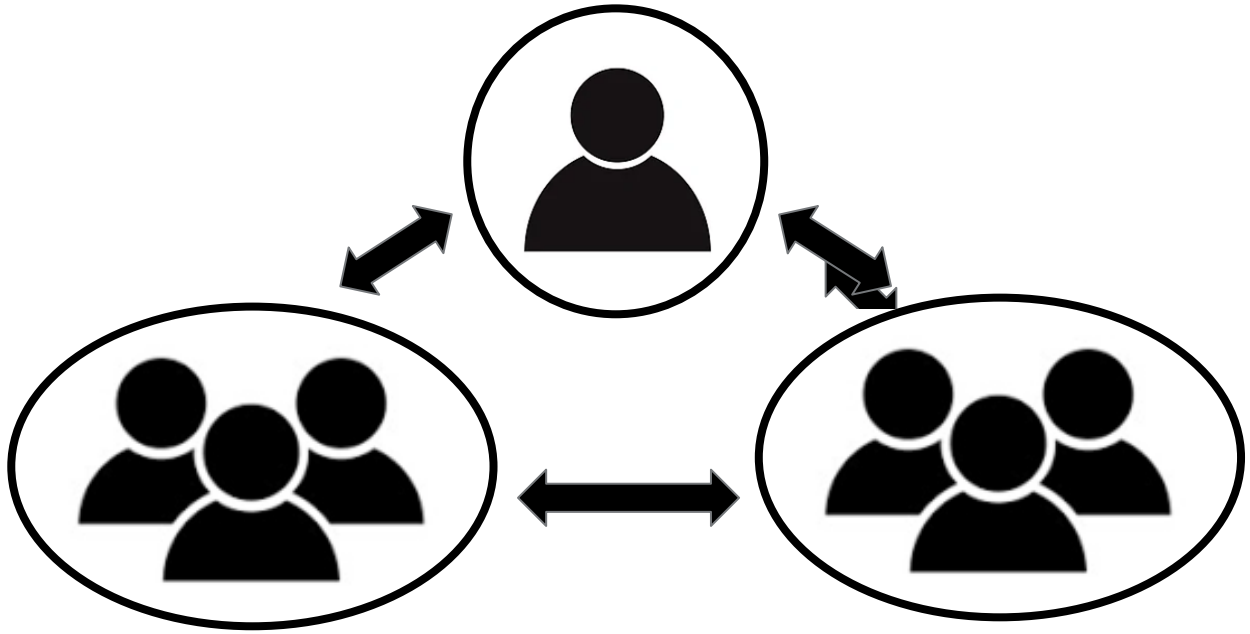
3. FACULTY "BROKER" IN SECOND DEPARTMENT

Faculty PI serves as a "broker" between different domestic departments and international partners



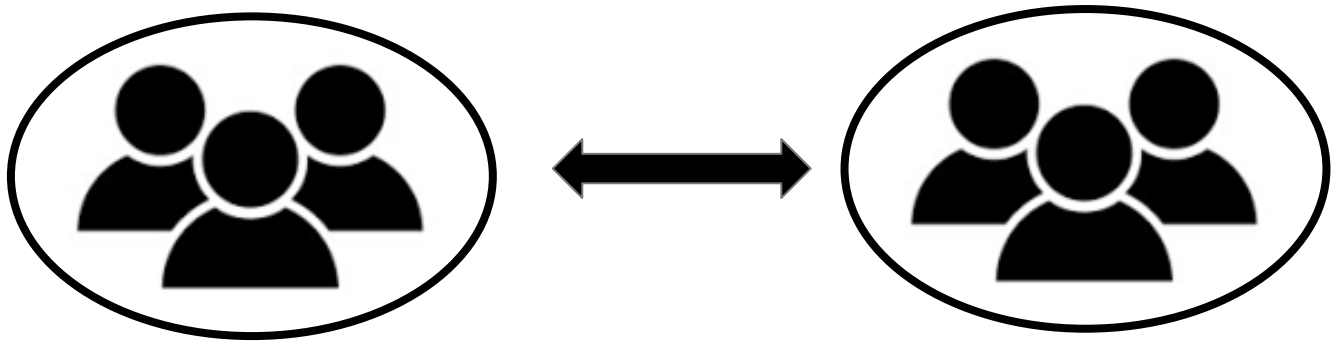
4. COLLEGE-LEVEL "BROKER" IN SECOND DEPARTMENT

College-level PI serves as a "broker" between multiple domestic departments and international partners

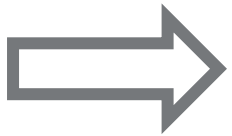
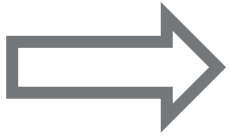
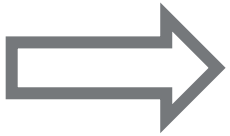
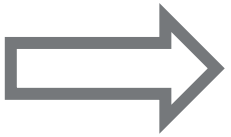
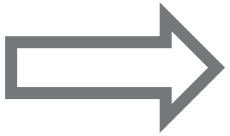


5. NETWORK-WIDE PROGRAM

Existing professional network structures the collaboration



STRUCTURE INFLUENCES OUTCOME

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

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.

NOW IT'S YOUR TURN!

Work with the people around you to brainstorm ideas for how you might structure an IRES program in your context.

Questions to consider:

1. What outcomes are most valuable from an IRES program?
    - For you?
    - For your institution?
2. Who could you work with to create a structure that will support those outcomes?
    - Collaborators abroad?
    - Collaborators at your institution?
    - Collaborators in your field?

Part 2

Program Elements & Learning Outcomes

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PROGRAM ELEMENTS

PROGRAM DESIGN DECISIONS

PROGRAM LOGISTICS

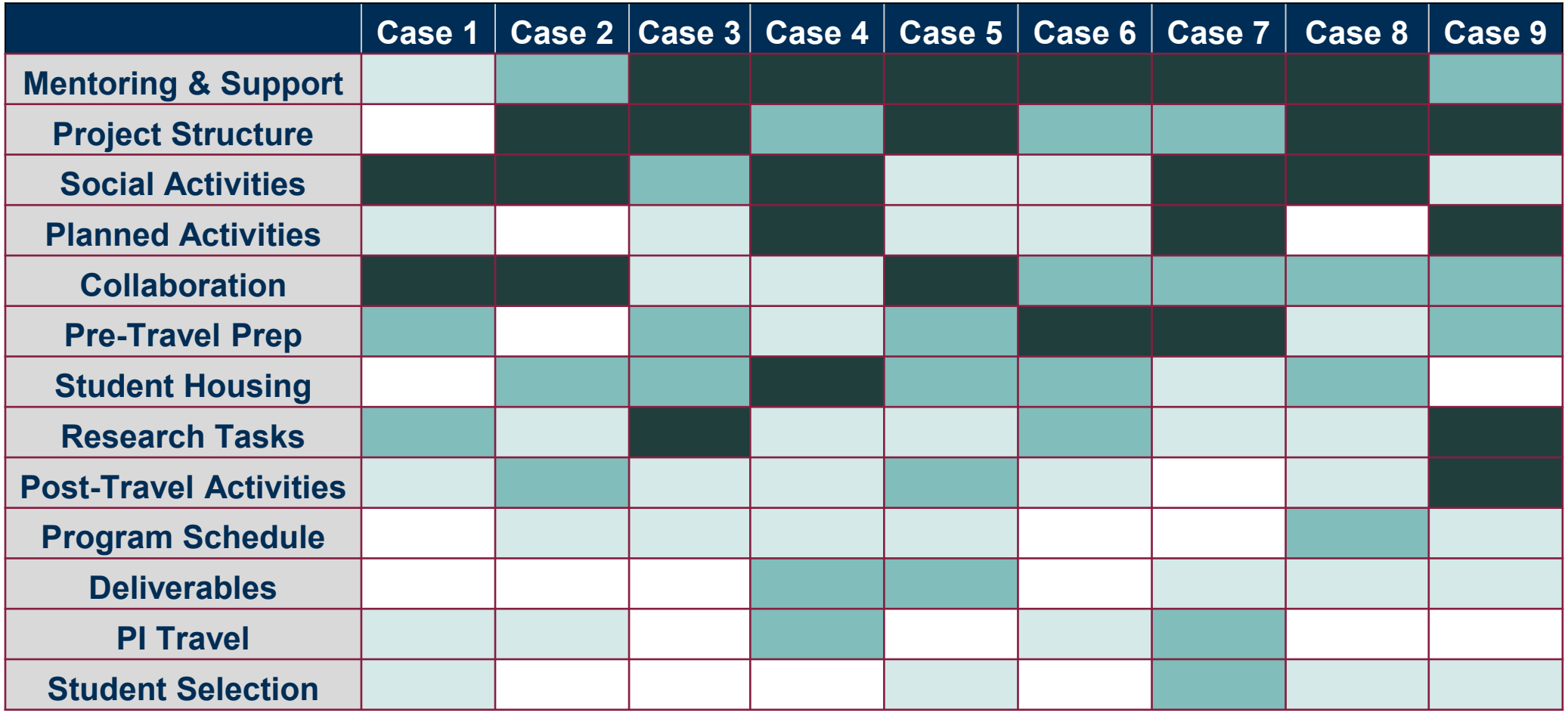
- Student Selection
- Pre-Travel Prep
- Student Housing
- PI Travel
- Planned Activities
- Social Activities

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

DIFFERENT STRUCTURES



EXAMPLE: STUDENT HOUSING

Students Together vs. Separate

Together = support each other, but may form “IRES bubble”
Separate = meet more locals

Type of Housing

Campus housing = easier to meet locals and make friends
Apartments = harder to interact

Location of Housing

Close to lab = convenient, may form “IRES bubble”
Close to town = engage with culture, meet more locals

“We lived at the **student residence building** […] there were a lot of South African students there. So then that afforded the opportunity to **really get to know South Africans** and then also what they were studying, because some of them were doing internships. […] So I'd say that gave more of an opportunity to get to know what they were working on.”

- Student from Case 4

“One thing that I think hindered [making friends] a little bit was **living with the other people who were doing the research with me**. So other people from the same state and all of that. It meant that a lot of times it was just kind of, you go in and like you'll interact with the people in the lab **a little bit**, but that was mostly the extent of it.”

- Student from Case 5

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

“A lot of it I had to sort of figure out by myself. I **didn't really have anyone there to supervise me** the whole time. There was one person there who was really open to having me come ask questions whenever I wanted, but I had to **push myself independently** to get the work done and actually learn what I needed to know for the project.”

- Student from Case 4

“Being part of a group where we had weekly meetings, and **we worked together every day**. We all had vested interest in it, and it really brought me out of my bubble. We all had diverse backgrounds. […] It was just such an, I don't know, **welcoming, friendly environment** to be part of that I had not experienced before.”

- Student from Case 5

CONCLUSION: 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**.

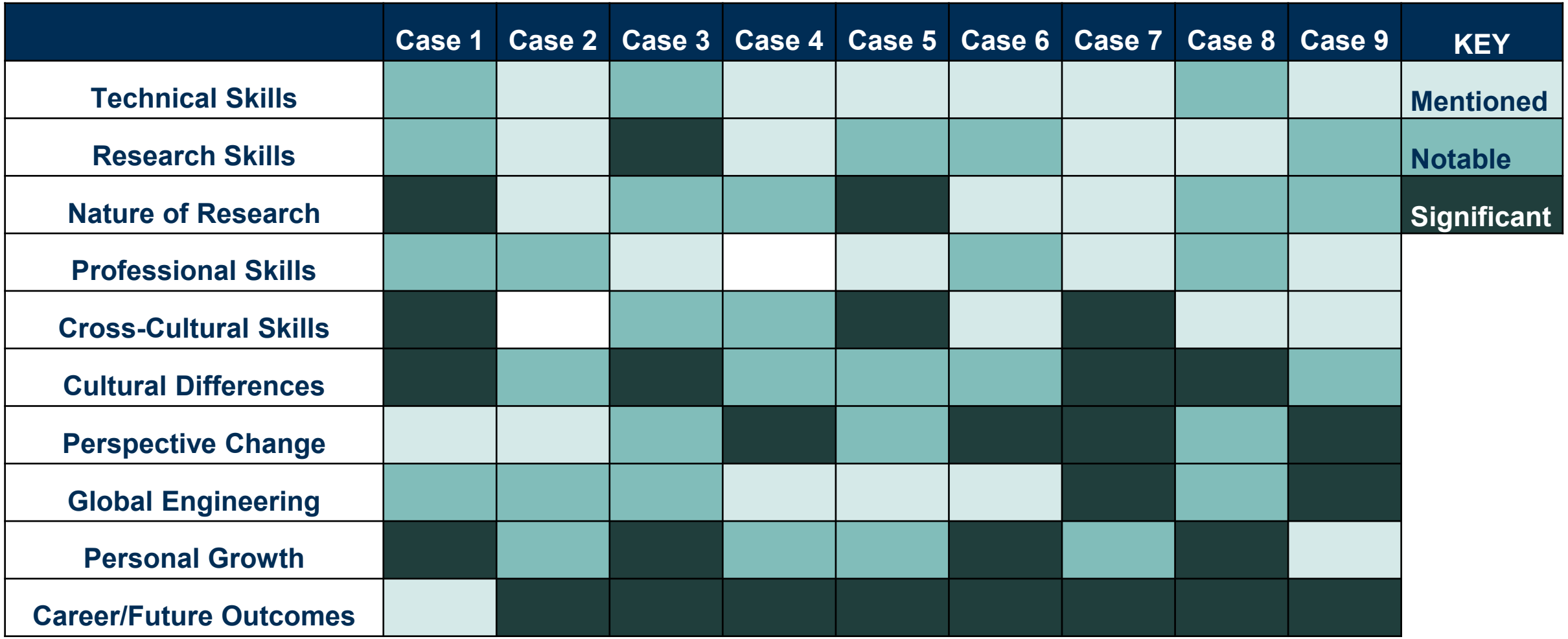
LEARNING OUTCOMES

WAYS WE COLLECTED DATA

1. Asked students for their biggest take-aways from the program
   - Follow-ups on **research learning**
   - Follow-ups on **cultural learning**

2. Asked students to describe two significant events from their program and what they learned from those experiences

LEARNING OUTCOMES



OUTCOMES PERTAINING TO RESEARCH

TECHNICAL SKILLS → Noted by early-program students

RESEARCH SKILLS →
Noted by students with less prior research
Importance of field-work/lab work
Importance of writing a paper/conference
Interdisciplinary projects

NATURE OF RESEARCH →
Noted by students with less prior research
Experiments or mathematical modeling: iterative processes

OUTCOMES PERTAINING TO OTHER SKILLS

PROFESSIONAL SKILLS	Collaborative projects = teamwork and communication
CROSS-CULTURAL SKILLS	Noted in more culturally distant locations and/or with a non-English language
CROSS-CULTURAL AWARENESS	Low cultural distance: Work-life balance High cultural distance: Cultural values and practices Mentor connection: communication styles or workplace behaviors

OUTCOMES PERTAINING TO WORLDVIEWS

PERSPECTIVE CHANGE

Most prominent in novice travelers
Strongest where students formed local friendships/strong mentors

GLOBAL ENGINEERING

More prior research
Cross-cultural research groups
Local university students
Programs in developing countries

PERSONAL GROWTH

Ownership of open-ended project
Travel on own
Navigating foreign language

CAREER AND FUTURE OUTCOMES

GRADUATE SCHOOL & ACADEMIA

INDUSTRY

INTERNATIONAL WORK & TRAVEL

PROFESSIONAL NETWORK

CONCLUSION

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

Students pointed to **a variety of different learning outcomes** achieved during IRES, including **technical and research skill development** and **cross-cultural and global engineering skills and awareness**.

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

NOW IT'S YOUR TURN!

Work with the people around you to brainstorm ideas for how you might structure an IRES program in your context.

Questions to consider:

- What is your **context** (culture of host country, culture of host research group, student characteristics), and how might this inform program design decisions?
- How might you structure the **program logistics** for your program?
- How might you structure the **research projects** for your program?

Part 3

Virtual Components for IRES Programs

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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."

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 program structures allow for virtual research experiences?

What support do program leaders need to implement virtual programs?

STUDY DESIGN

8 Focus Groups with PI's of IRES and PIRE Grants

PI's selected to diversify:

- Location abroad
- Institutional type
- Discipline
- Research methods (i.e. field work, lab work, etc.)

IRES and PIRE Grants:

- Initiated between 2010-2019

Focus Groups:

- 42 Participants
- 1 hour in length

BENEFITS AND CHALLENGES

BENEFITS OF VIRTUAL PROGRAMS

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

CHALLENGES OF VIRTUAL PROGRAMS

1. Cannot replicate the cultural and social experience of going abroad
2. Can place additional strain on international collaborators
3. Make it challenging or impossible to conduct certain types of research (i.e. field work)

SUGGESTIONS FROM PI’S

1. PRE- AND POST- TRAVEL RESEARCH ACTIVITIES

Examples:

- Plan virtual meetings with collaborators with the goal of finalizing research plans before their time abroad
- Utilize synchronous communication methods (Discord, Slack)
- Have faculty who have traveled there come talk to students

Benefits:

- Students are better prepared to successfully complete their research goals
- Students are better prepared for intercultural aspects of international research

2. INCLUDE PRE-DEPATURE TRAININGS

Examples:

- Create online modules that can be completed pre-travel. Recommended topics include:
  - Leadership
  - Intercultural communication
  - Language
  - Research protocols and ethics
  - Data privacy laws

Benefits:

- Students are better prepared for intercultural aspects of international research

3. CREATE INTERCULTURAL EXPERIENCES AT HOME

Examples:

- Go to local cultural festivals
- Include interaction with local international associations or language groups
- Connect with students at partner institution via Zoom for social events (i.e. cooking, football game watching)

Benefits:

- Students are better prepared for interactions in the host culture

4. RESEARCH EXPERIENCES AT HOME

Examples:

- Use unanalyzed data/get mailed data collected by in-country partners
- Travel to a field site in the U.S. if possible
- Have local materials sent by in-country partners to be studied/analyzed in the U.S.

Benefits:

- For some disciplines, these methods can augment research done overseas

5. FLEXIBILITY IN RESEARCH EXPERIENCES

Example:

- Adjust timeline for travel (2 weeks abroad, then rest virtual; or two shorter-term travel stints)

Benefits:

- Can make international research more accessible for students who have commitments during the summer months

NOW IT'S YOUR TURN!

Work with the people around you to brainstorm ideas for how you might structure an IRES program in your context.

Questions to consider:

- How could you use virtual elements to help students prepare for their time abroad?
- How could you use virtual elements to improve research outcomes for both students and collaborators abroad?
- How could you use virtual elements to improve access to the IRES experience for students who many not be able to travel for the entire summer?

Thank you

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