

November 9, 2022

STEM Abroad

2022 CIEE ANNUAL CONFERENCE

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STEM Study Abroad: Preparing Students to Face Global Challenges

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Pathways to Peace



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Session Agenda

STEM Study Abroad

10 minutes

- Intro, Defining STEM, and STEM Study Abroad Trends
-

STEM and Intercultural Development

20 minutes

- IDI data, How STEM Students Compare
-

Metacognition and Intercultural Development

20 minutes

- Defining Metacognition and Its Use in Study Abroad
-

Proposals/Suggestions

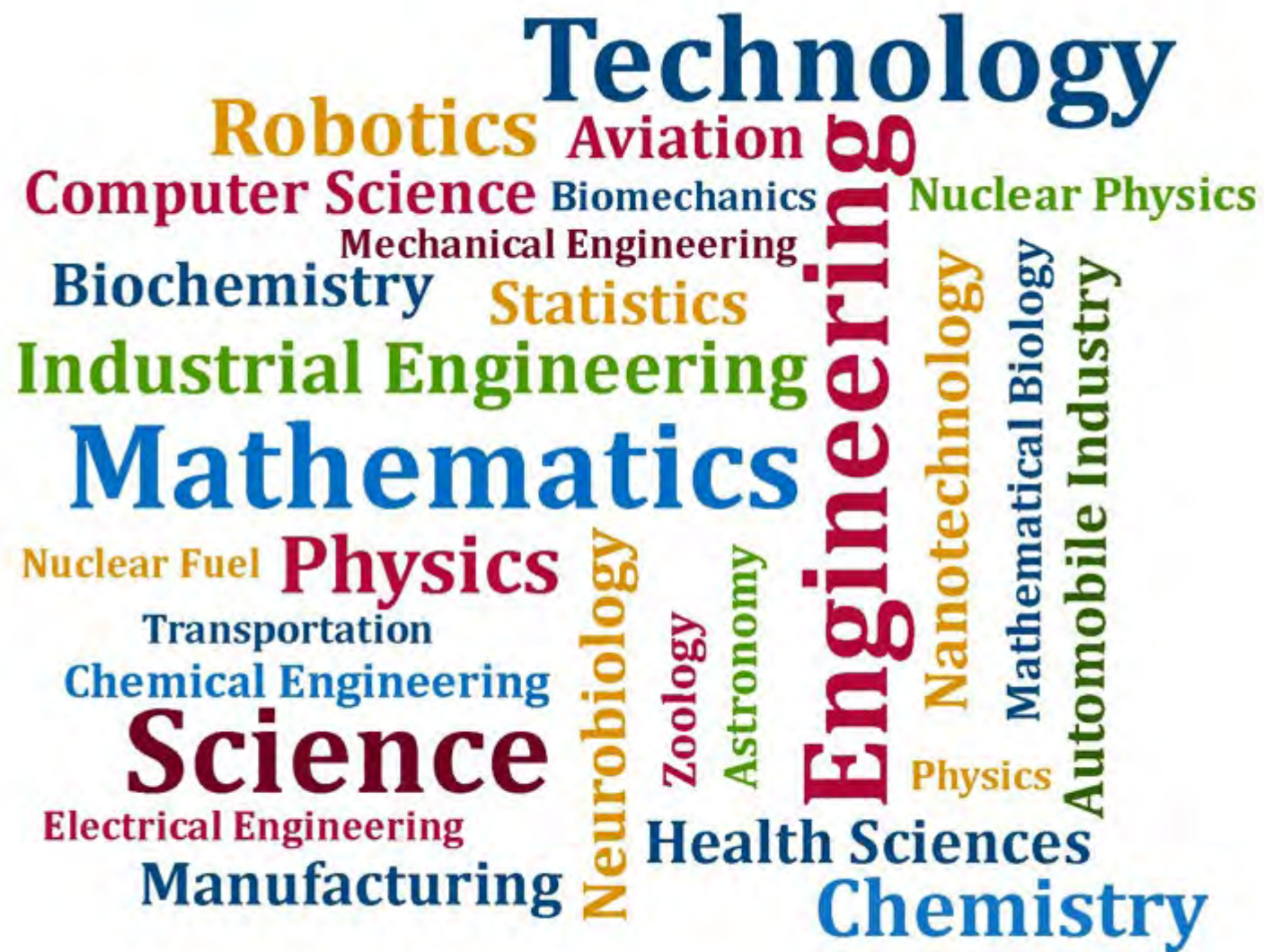
20 minutes

- Using Metacognition to Promote Intercultural Development for STEM Study Abroad

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STEM

SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS



STEM and Study Abroad

- STEM students are increasingly studying abroad
- Excellent means to develop Global Competency
- STEM students may have unique interest/needs studying abroad

TOP FIVE MAJOR FIELDS OF STUDY OF U.S. STUDY ABROAD STUDENTS



STEM Fields
26%



Business
21%



Social Sciences
17%



Foreign Language &
International Studies
7%



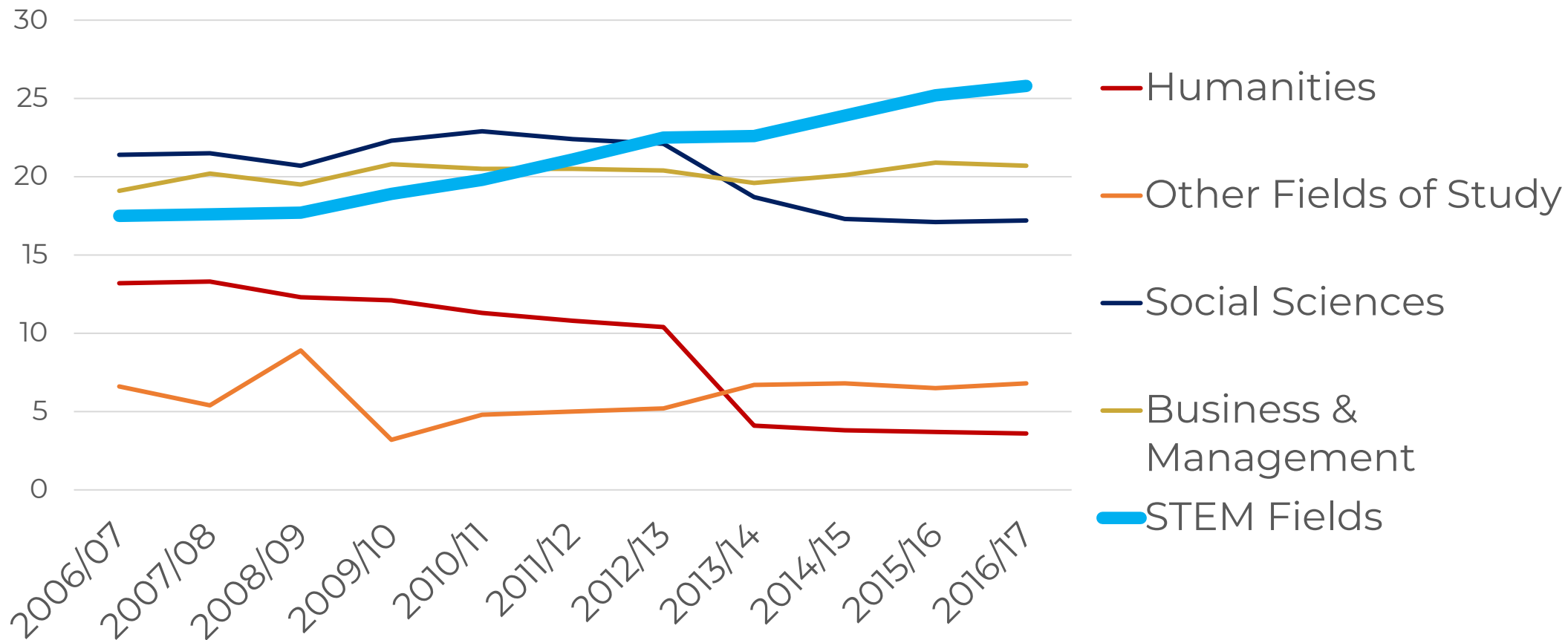
Fine &
Applied Arts
6%

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STEM Study Abroad is Growing

Study Abroad Participation by Field of Study 2007-2017



WHY STEM and Study Abroad?

10 GREAT Reasons to Study Abroad

1 Expand your worldview 	2 Enhance your career opportunities 
3 Learn another language 	4 Experience another culture first-hand 
5 Make new friends from around the world 	6 Strengthen communication team-building & adaptability skills 
7 Gain invaluable experience 	8 Discover new things about your own culture 
9 Boost your confidence & independence 	10 Travel 



 Connect: #generationsstudyabroad
generationstudyabroad.org


STEM Student Perspectives

- The same reasons other students want to study abroad
- Explore connections between STEM, society and culture
- Increase Cultural Competency
 - STEM is international
 - Diversity and Innovation



SUSTAINABLE DEVELOPMENT GOALS



How Do We Help STEM Students develop Intercultural Skills Abroad?



Maximizing Intercultural Gains for STEM Students Studying Abroad

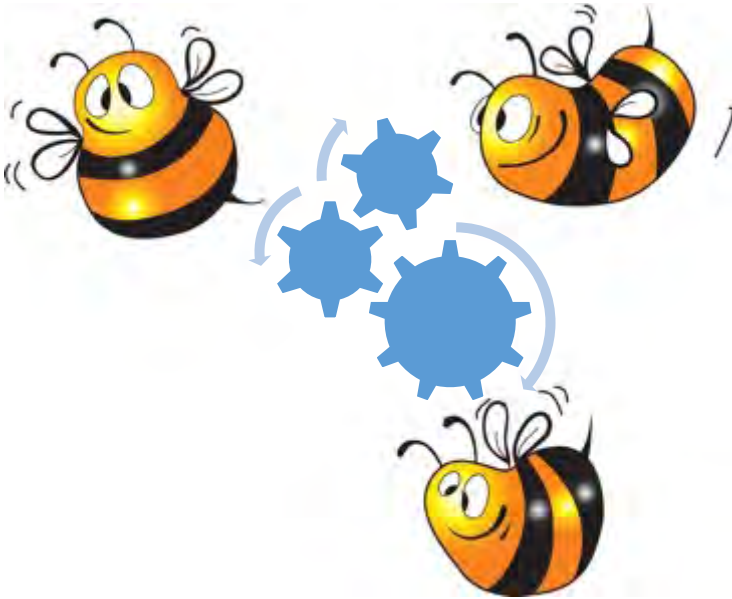
- Are STEM students studying abroad unique?
- If so, how best can we help them develop their global competence?



Your STEM Students and Study Abroad

Buzz Session (15 min.)

- Each Table can be a group
- Draw from your own experience
 - What do your STEM students hope to gain from study abroad?
 - How unique are study abroad goals of STEM students vs. other students?
 - Are STEM students likely to differ from other students in ways that impact their intercultural experiences abroad?





Are STEM Students Different?

- More limited intercultural coursework in their curriculum
- Less likely to have language requirement
- More likely to choose study abroad in English
- More likely to choose shorter programs, with faculty
- More likely to choose island programs
- Perhaps more in need of intentional cultural interventions

May (Sue Kyung Hwang)

Sustainability and the Environment
Monteverde, Costa Rica (CIEE)

➤ I wanted to study abroad to:

- experience nature and talking to people working closely with the environment.
- take advantage of the proximity of the US and Latin America.
- to boost my Spanish speaking skills.
- to take "meaningful" elective courses.



May (Sue Kyung Hwang)

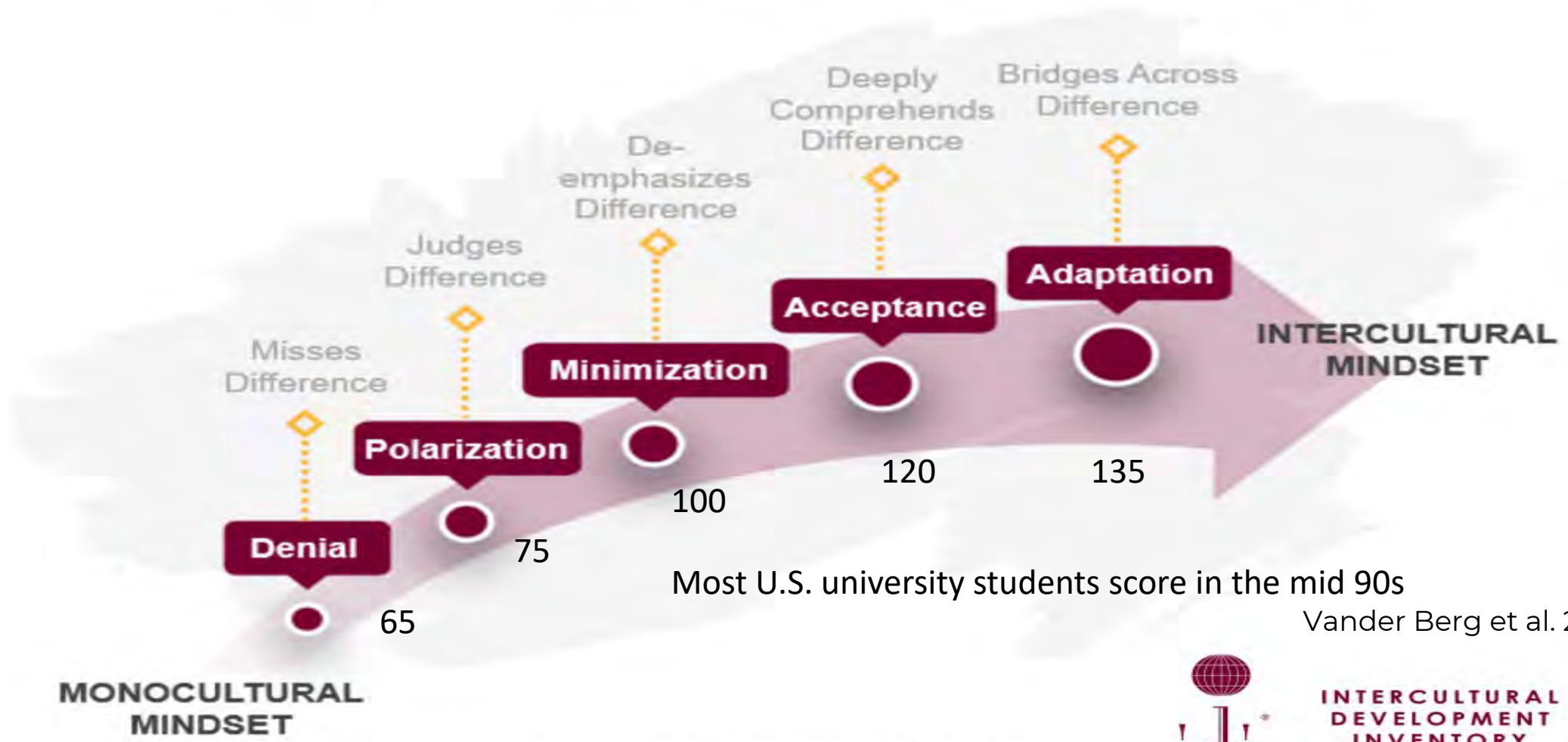
- I chose my program because:
 - Course syllabi and field trips complemented each other.
 - I thought field trips would provide opportunity to experience new environments and new people.
 - It involved an intensive Spanish course.
 - It offered an internship experience.
 - It was easy to transfer credits.



How well do STEM students studying abroad progress in their intercultural development?



Intercultural Development Continuum (IDC™)



Most U.S. university students score in the mid 90s

Vander Berg et al. 2009

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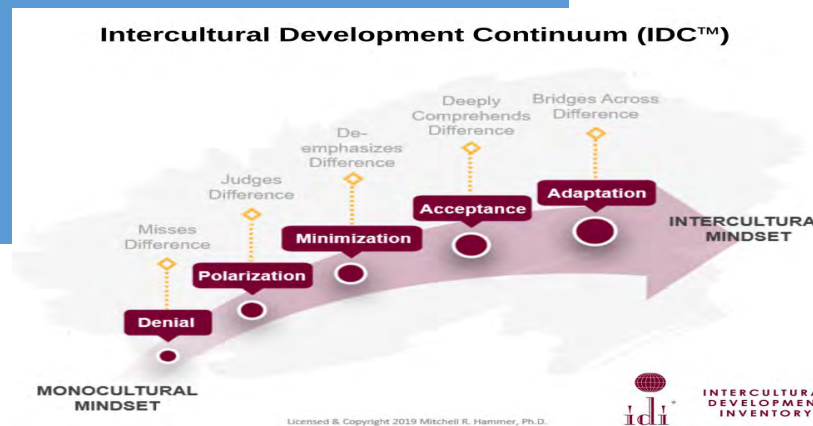


**INTERCULTURAL
DEVELOPMENT
INVENTORY**

Sample IDI: The 2-minute version

- Read all of these statements
- Choose the one that best represents your views

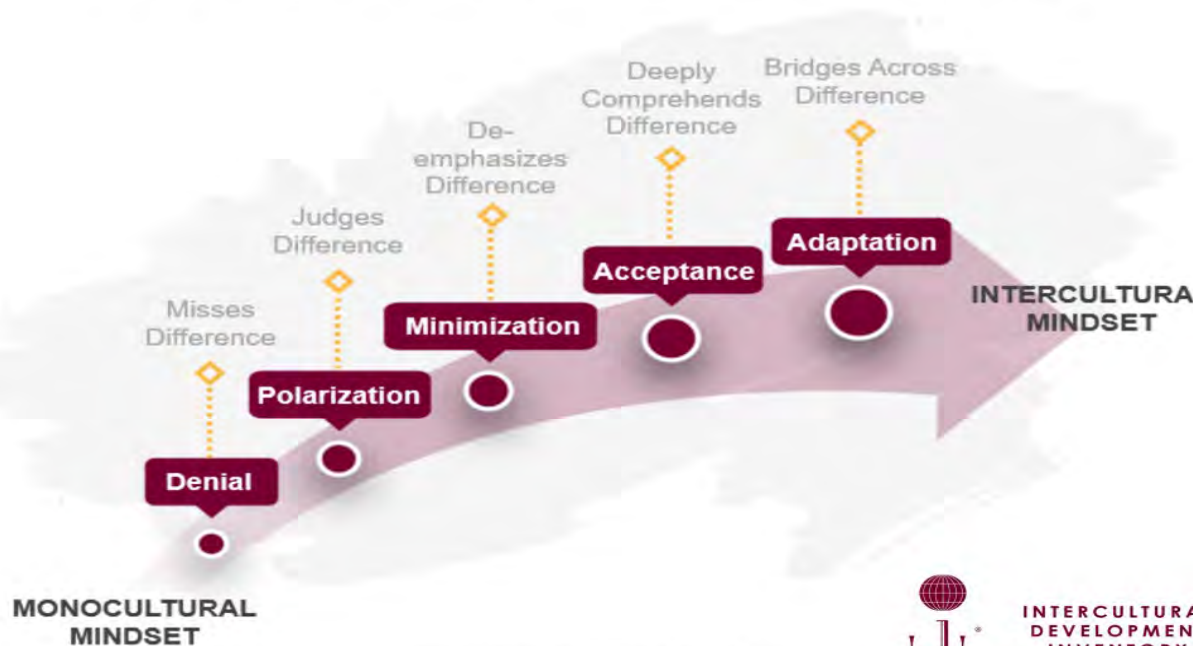
- It is best to form relationships with people of your own culture.
- If only our culture was more like other cultures, the world would be a better place.
- People are the same; we have the same needs, purposes and goals in life.
- I often act as a cultural bridge between people from different cultures.
- I do not identify with any culture, but with what I have inside.



Sample IDI Statements: The 2-minute version

- It is best to form relationships with people of your own culture = **Denial**
- If only our culture was more like other cultures, the world would be a better place = **Polarization**
- People are the same; we have the same needs, purposes and goals in life = **Minimization**
- I often act as a cultural bridge between people from different cultures = **Acceptance/Adaptation**
- I do not identify with any culture, but with what I have inside = **Cultural Disengagement**

Intercultural Development Continuum (IDC™)





- Georgetown University Consortium Project (GUCP, Vande Berg et al. 2009; 1,163 students studying abroad + 134 control, 51 programs)
- Pre and Post IDI
- Study abroad gains > control
- Females small gain
- Humanities, Social Sciences, Foreign Language disciplines showed modest gains
- Males regressed



- Program characteristics with modest IDI gains (GUCP)
 - Longer is better
 - Target-language courses are better
 - Host family is better
 - Mentoring is better

Note: Pre and Post IDI Averages in all studies remained in Minimization (in the 90s)

Immersion does not guarantee cultural development

- U.S. academic STEM culture is more and more collaborative, including in the classroom.
- Many other countries, including Korea, STEM courses are more hierarchical, with the instructor in charge.



There may be other important differences in academic culture for STEM students, as well.



If the development of intercultural competence is a primary goal of study abroad, then study-abroad educators must be prepared to guide the process through program design and on-going facilitation in order to meet the needs of students (Vande Berg, 2007).

Students who face too much challenge and not enough support will retreat, while students who are not challenged enough or receive too much support will get bored and not progress (Vande Berg et al., 2009).

Pedersen (2010)

- Full Year Study Abroad in England
- 32 students
- 16 with intercultural training course
- 16 without
- (13 students in U.S. preparing to study abroad)
- Only students with intercultural course showed IDI gains (11.56 pts)

Edward T. Hall's Cultural Iceberg

Visible Culture

**Food
Festivals
Flags
Fashion**

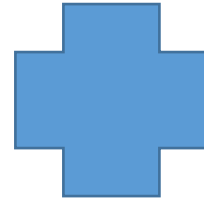
Deep Culture

**Dispositions
Values
Attitudes
Beliefs**

Best Strategy for Diving into Culture



Immersion



Instruction

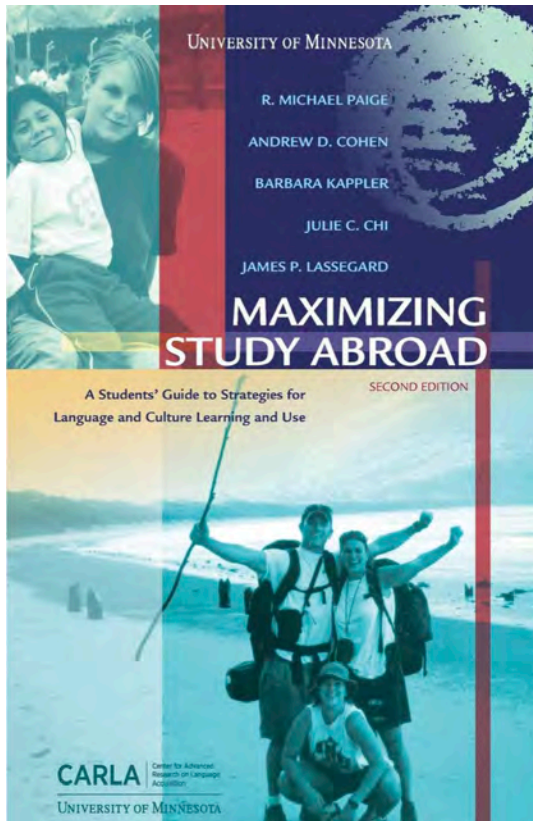
Metacognition and Intercultural Learning



Metacognition, put very simply, is our ability to know who we are, the ability to think about our thinking, the ability to self-reflect.

Can we teach students intercultural skills using metacognition?

Metacognition and Study Abroad



- Predeparture, On Site, Return
- Metacognitive Strategies:
 - Coping with culture shock
 - Dealing with difficult times
 - Making judgements
 - Dealing with different communication styles
 - Non-verbal communication
 - Interacting with others from host culture
 - Returning home

DAE –
Describe,
Analyze,
Evaluate
ICL
Activity

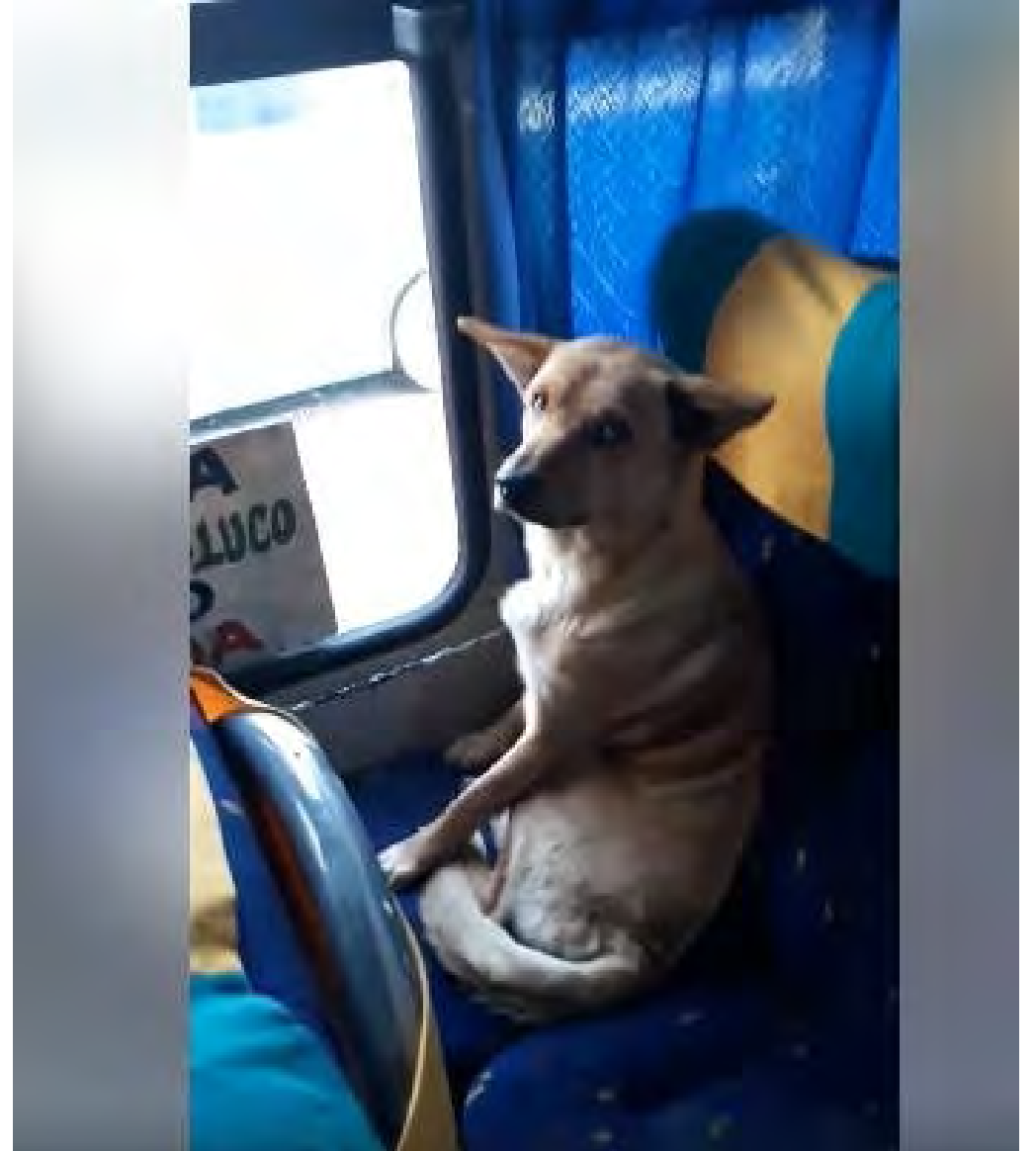
- From DIE (Describe, Interpret, Evaluate)
- Objective vs. Subjective cultural observations
- Korean **대** dae = counter to instinct
- Bennet et al. (1977), and Nam, Condon and Gandert (2008)
- Metacognition applied to intercultural understanding
- Take a few minutes to try it out

Group activity:

Let`s pretend we are all in Chile for a month for a study abroad internship. It is your first day, you are dressed up and you are getting onto the bus to get to your new laboratory.

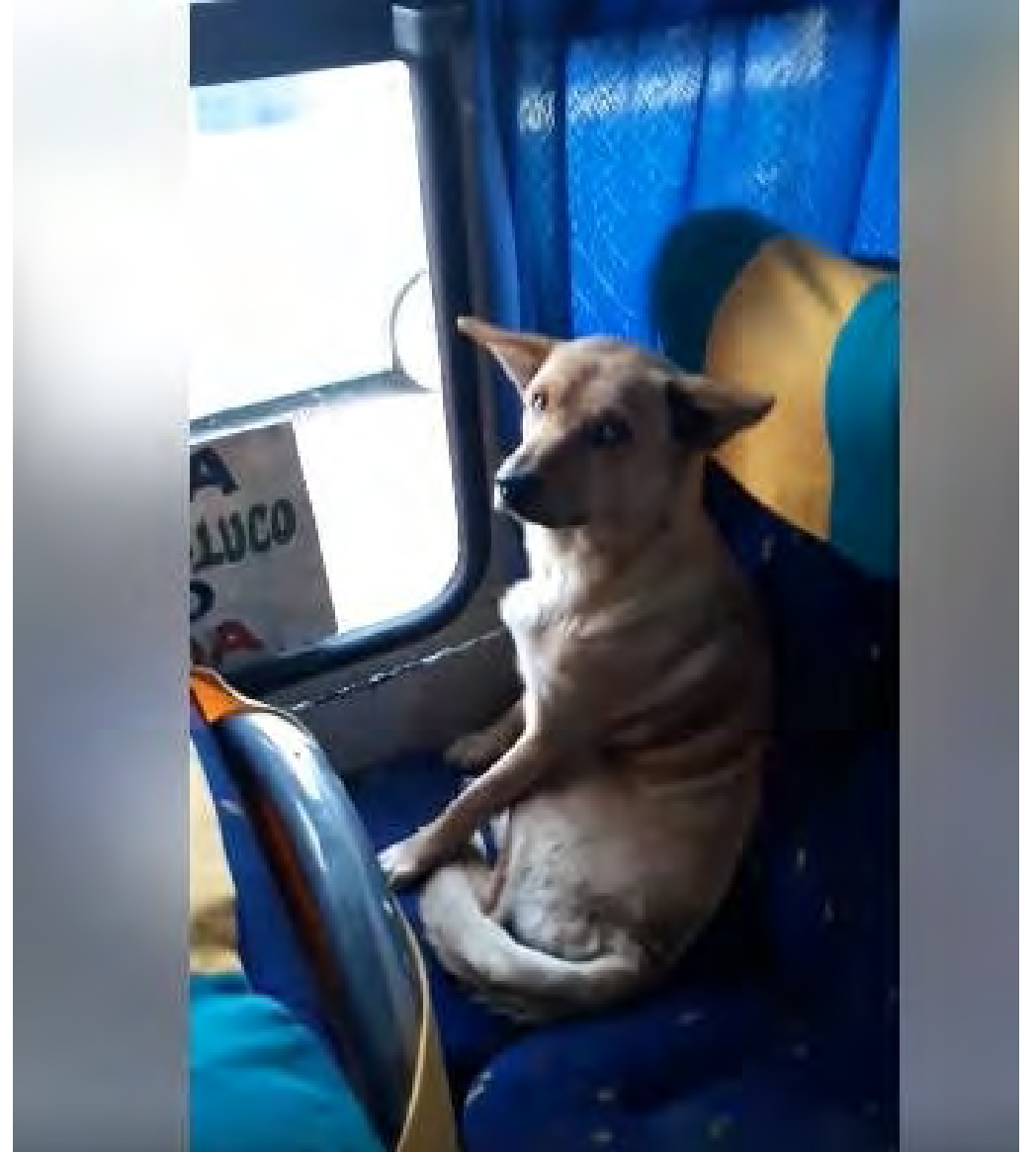


- How would you feel?
- What would you say to yourself?



Now write down or
tell the person next to
you ...

1. What you see in the
picture
2. How might the dog
have ended there?



Describe

There is a dog sitting a bus

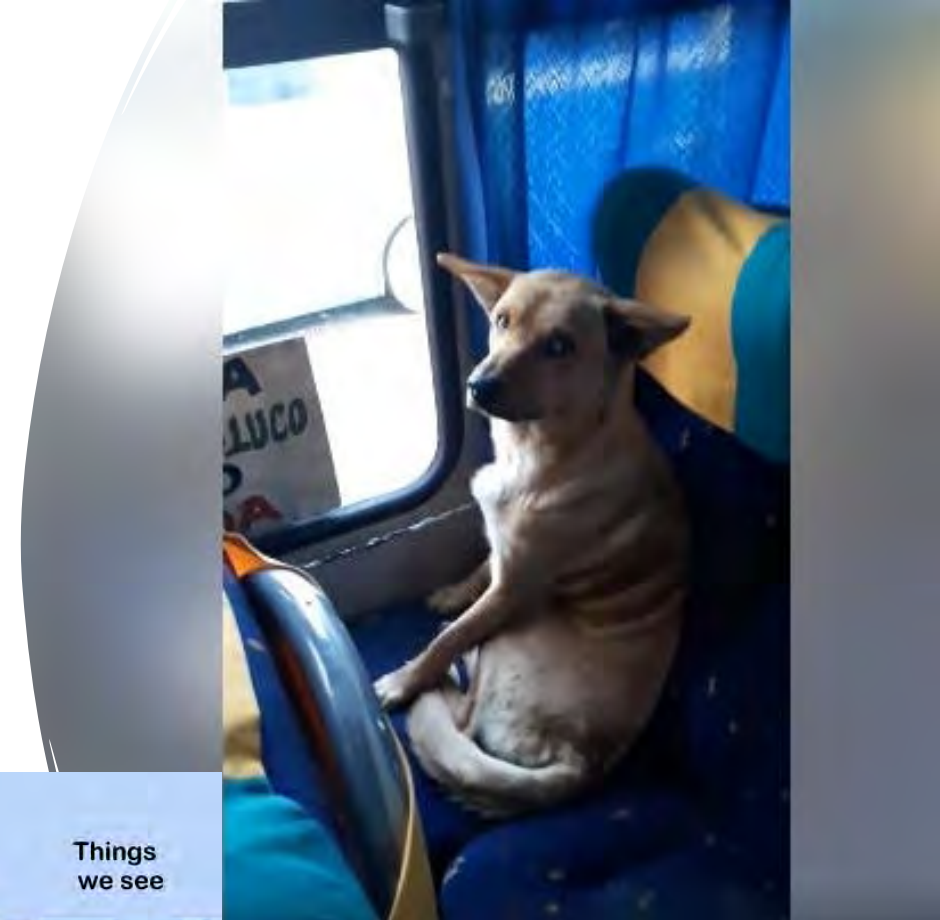
Interpret

The dog might be hurt

Evaluate

Chileans are not strict or organized with public transportation rules.

All Chileans are dog lovers.



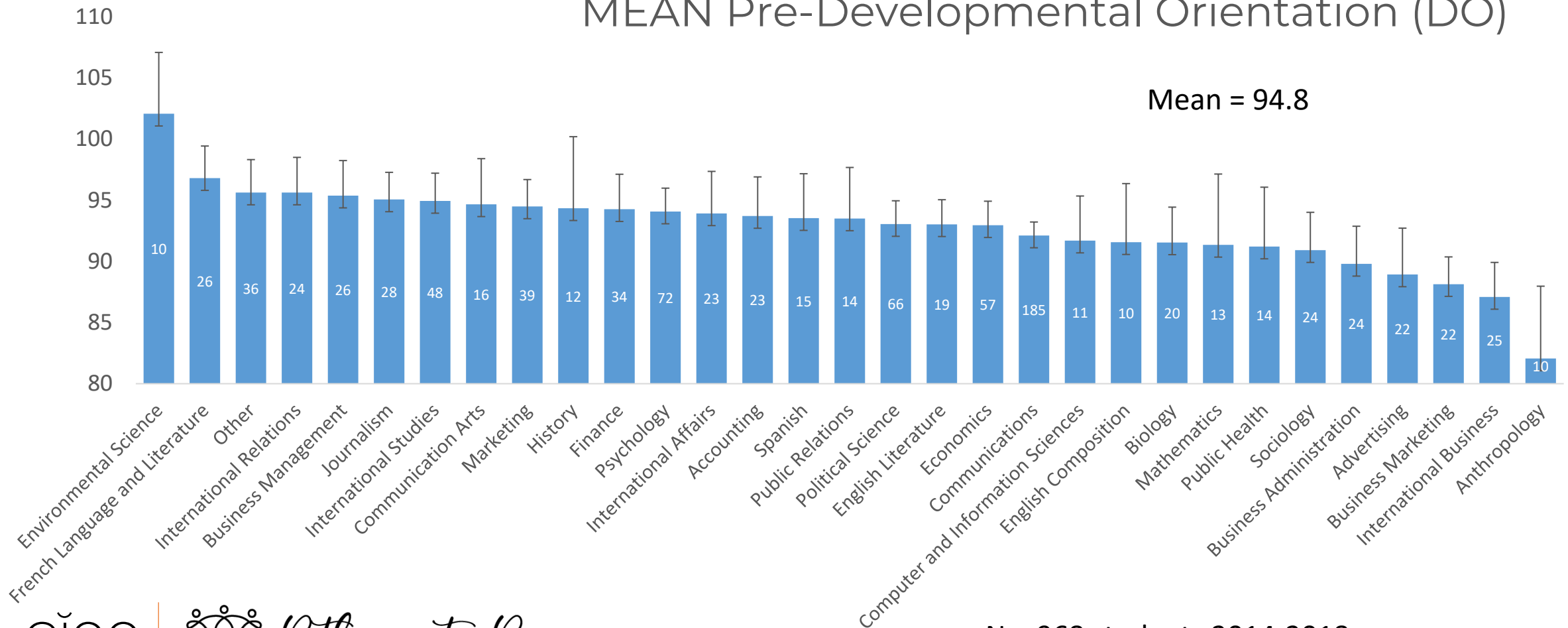
CIEE's Intercultural Communication and Leadership (ICL) Course

- Elective semester course
- Offered at all CIEE locations
- J-term, Summer, Traditional Semester, Open Campus Block
- CIEE's top enrolled class worldwide
- Metacognition applied to Study Abroad



CIEE IDI Data for ICL Students

MEAN Pre-Developmental Orientation (DO)

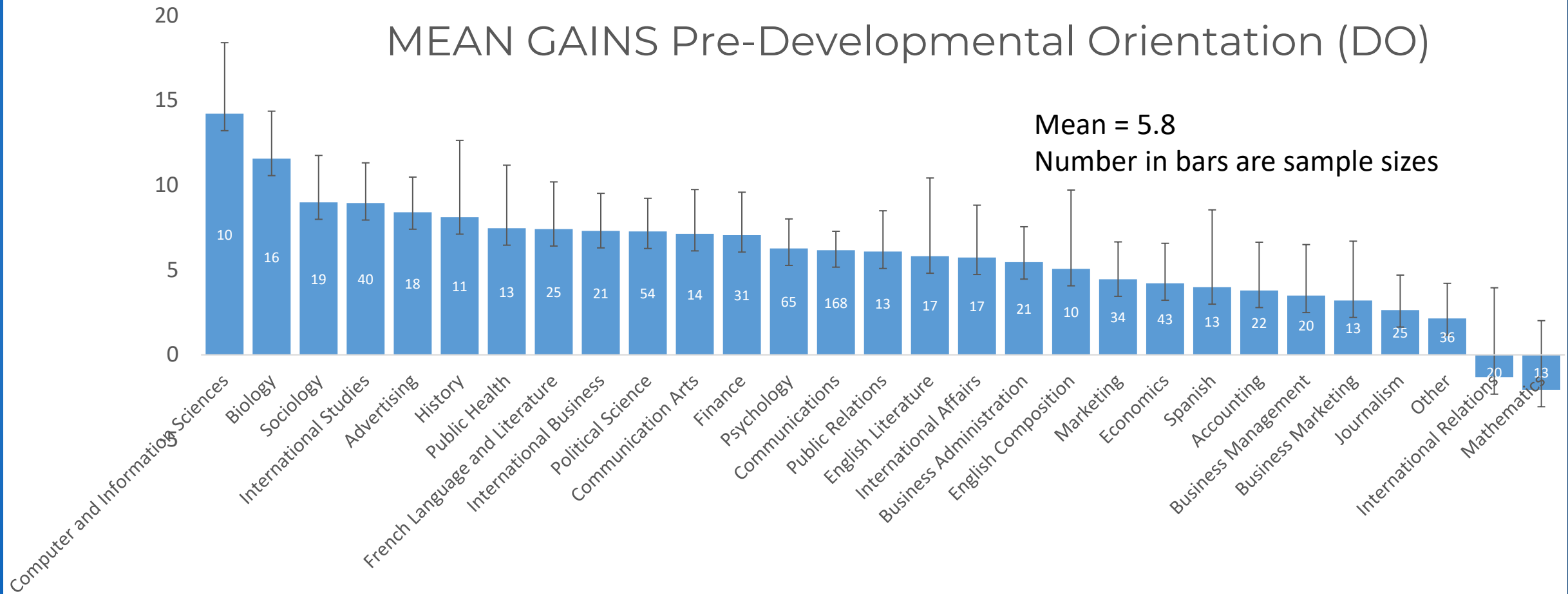


CIEE IDI Data for ICL Students

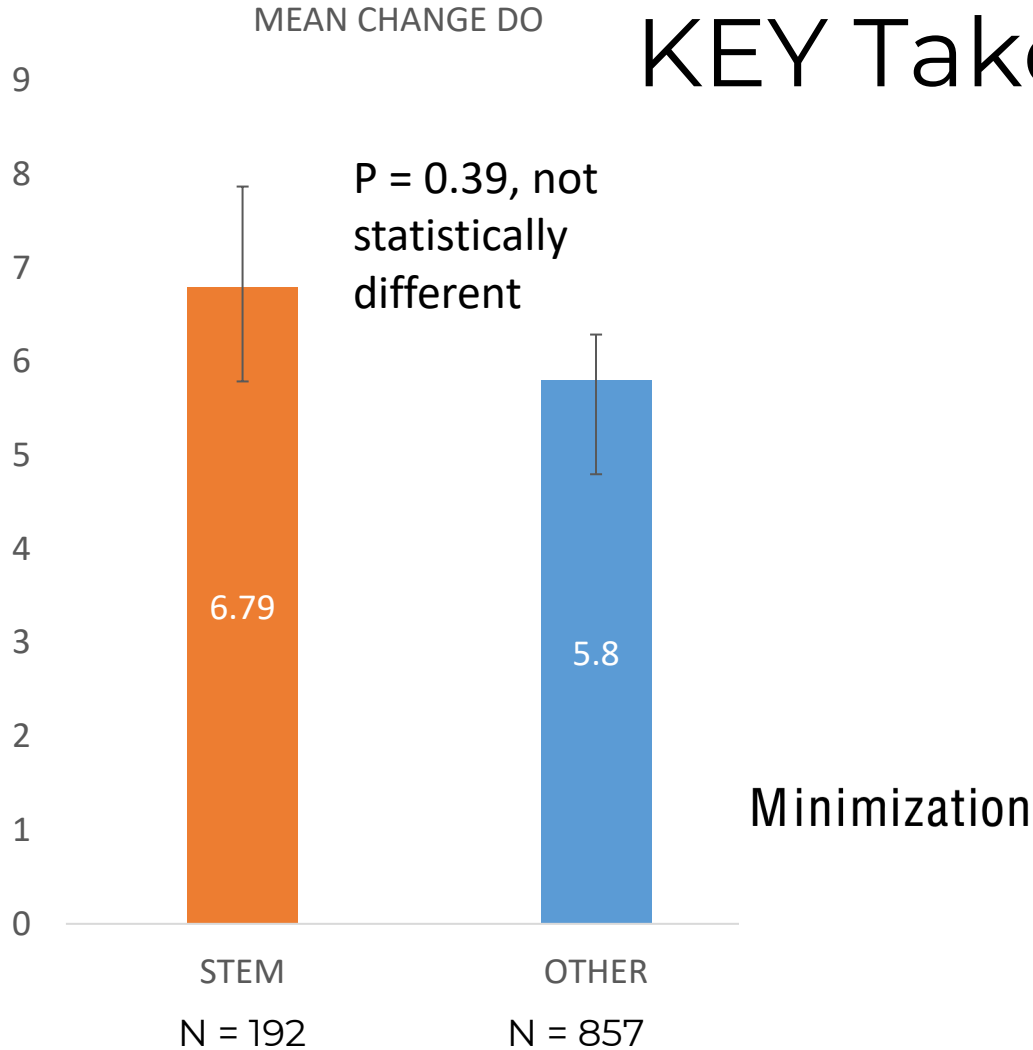
MEAN GAINS Pre-Developmental Orientation (DO)

Mean = 5.8

Number in bars are sample sizes

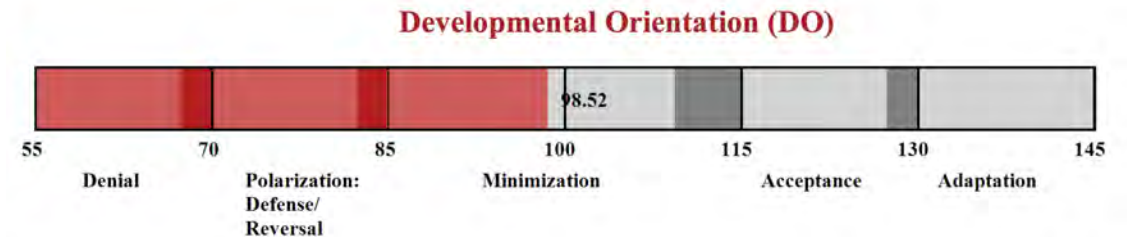


KEY Takeaways from CIEE IDI Study



- No control group (non-ICL, non study abroad)
- Only for STEM students taking ICL course
- Overall mean gain of 5.8, PRE = 93.4 vs. POST = 99.3, statistically significant at $p < 0.05$).
- STEM students generally respond as well (STEM Mean Post DO = 99.9, Non-STEM = 98.6).
- Still at Minimization in IDI scale

An orientation that highlights cultural commonality and universal values and principles that may also mask deeper recognition and appreciation of cultural differences.

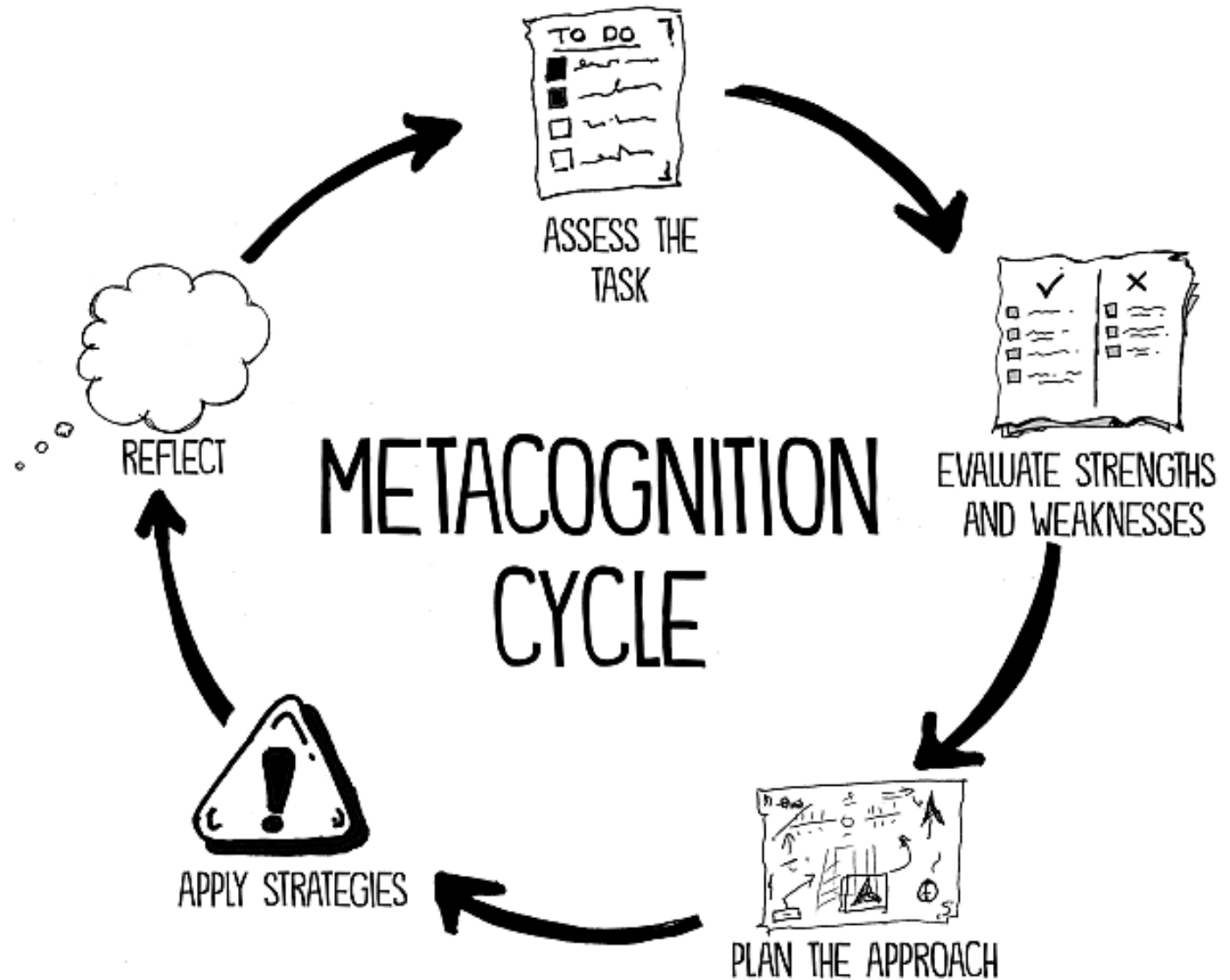


Applying Metacognition to Study Abroad

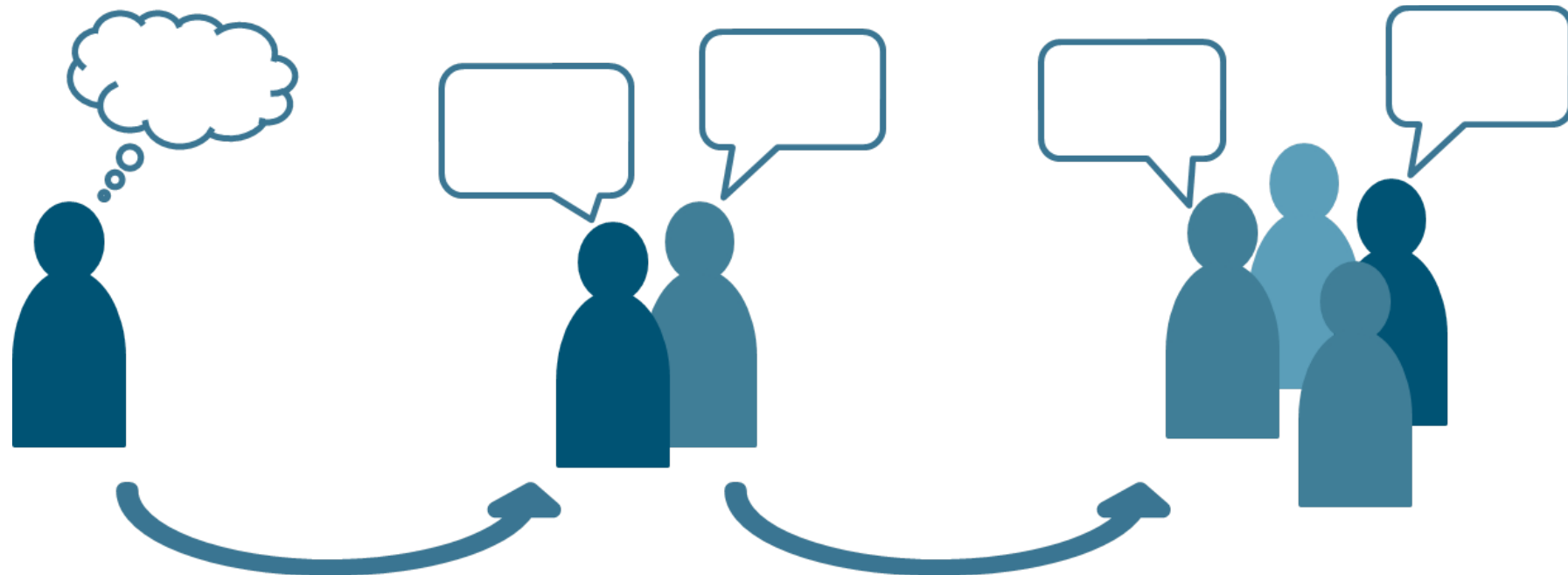
- Goal Setting
- Culture Shock Seminars
- Orientation – What to expect
- Intercultural Coursework – (eg CIEE's ICL)
- Journals, Reflection Essays
- Instructor/Student Training



- What metacognitive tools do you use to prepare and support your study abroad students?
- Which might be most important for STEM students?



Activity: Applying Metacognition to STEM Study Abroad



What More Can We Do?

- Prepare STEM students for possible differences in STEM culture
- Bring Culture to the Student
- Embedded Intercultural Experiences
- Metacognition to regularly engage and reflect on intercultural experiences



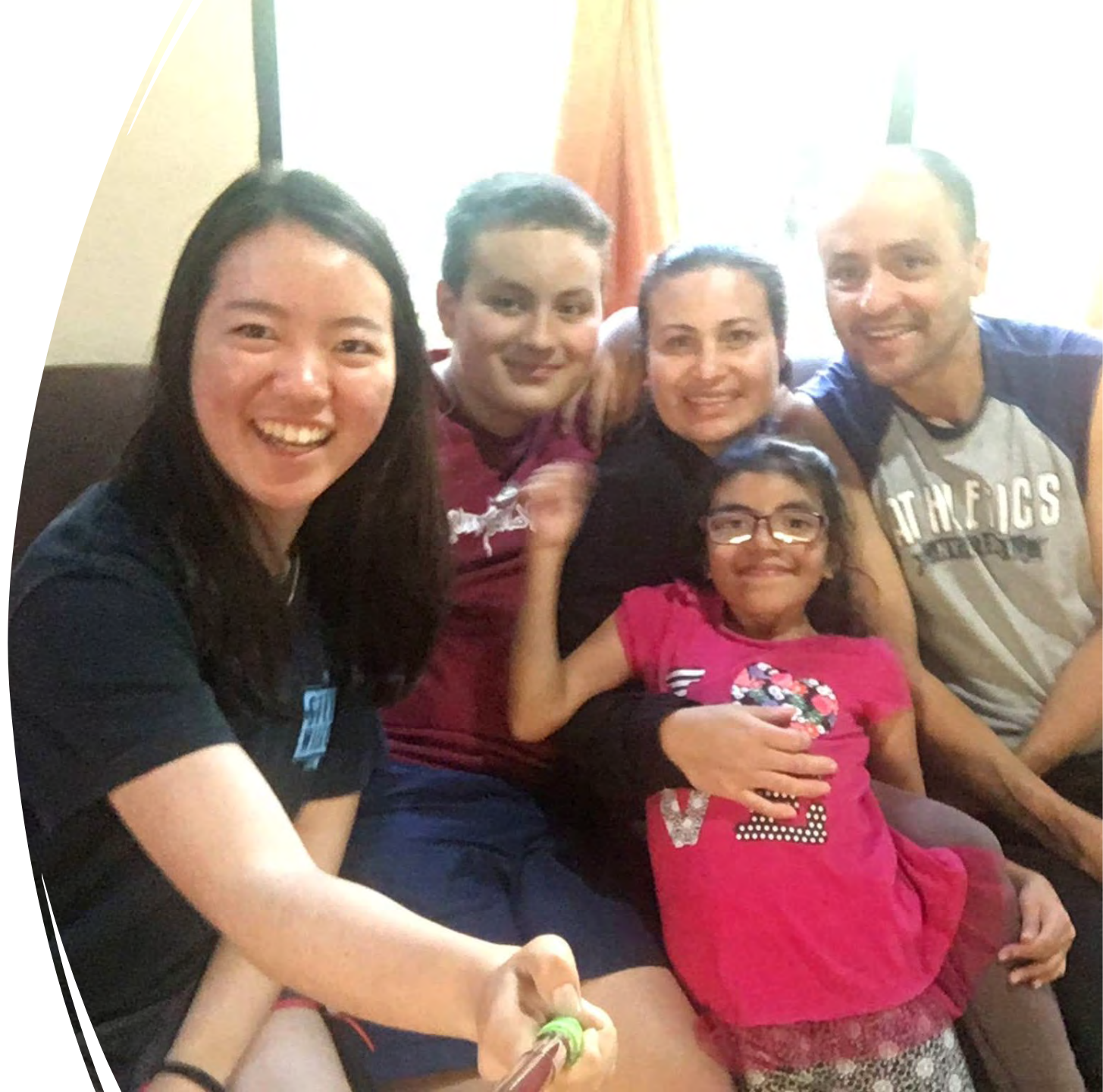
Reflections from the Field

- Embedded Intercultural Experiences
- CIEE's Sustainability & Environment program
- Monteverde, Costa Rica
- "Island Program"
- Home Stay



Embedded Intercultural Components

- Homestay
- Spanish Language Instruction
- Field trips
 - Indigenous villages
 - Sustainability projects
 - Womens cooperatives
 - National parks
- Life on the Monteverde campus



Using Metacognitive Techniques to Help STEM Students Studying Abroad Gain CQ

1. Connect STEM to society and culture (pre, during, and post)
2. Provide a list of metacognitive strategies most applicable to study abroad (and to STEM students studying abroad)
3. Choose programs/courses with embedded intercultural experiences (direct enroll may not always be best option)
4. Encourage ICL-type courses for STEM students (could be your own online version or CIEE's)
5. Encourage use of inquiry (scientific method) in approaching cultural moments (observe, hypothesize, etc.)
6. Provide opportunities for assessment and reflection

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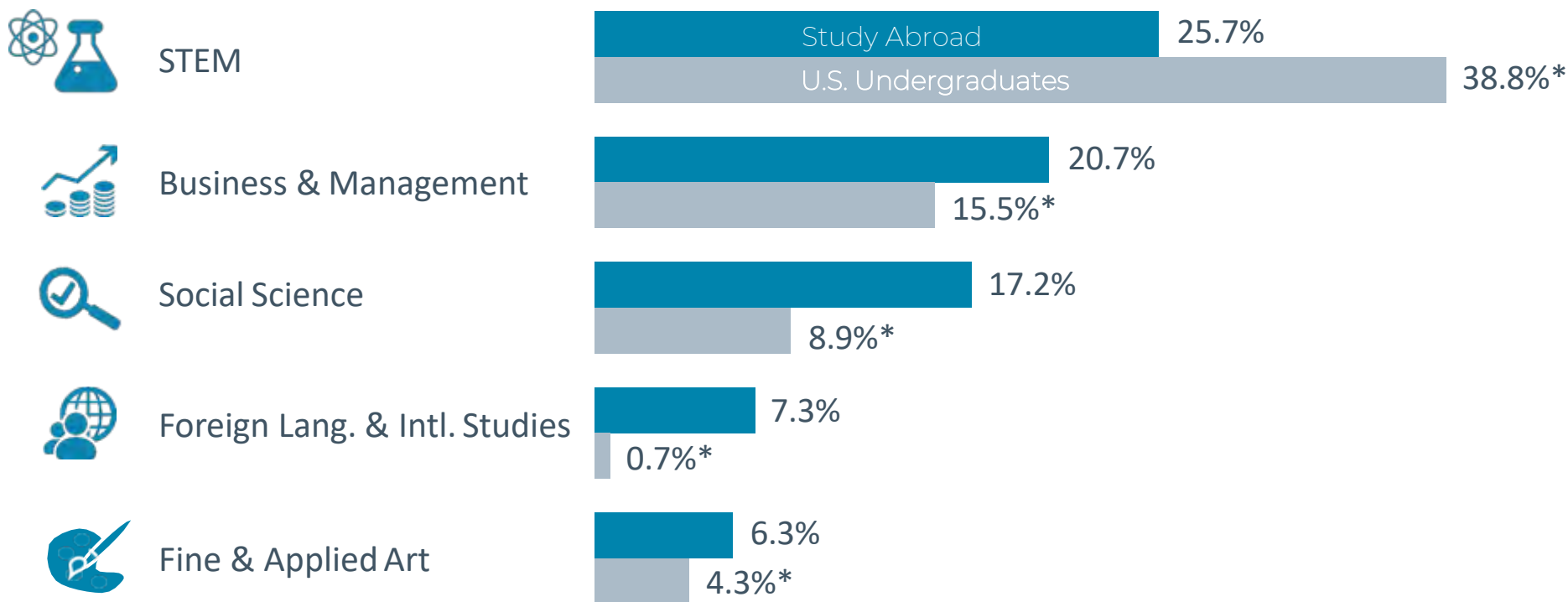
SEOUL

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Pathways to Peace

Yet, STEM continues to be underrepresented in study abroad



*U.S. Department of Education, *Digest of Education Statistics*, 2016

#IEW2018 #IIECelebratesIEW2018 #OpenDoorsReport

What We Hear

Lab credits will not transfer, but I need them.

Labs and instructors are better in the U.S.

My foreign language isn't good enough

\$\$\$\$

I don't know anyone in my major who has studied abroad

I will have to repeat a semester

What if the classes are more demanding?

My required courses may have different content.

My advisor says study abroad is a waste of time

Med Schools won't accept the credits

My semester ends after the program begins

I cannot find courses abroad my college will accept

How will I know if I am learning the right stuff?

It might lower my GPA

Are STEM Students
Likely Different in Ways
that Impact the Study
Abroad Experience?

- **Activity:** Share your experiences to help answer the question.
- If yes, then **HOW?**

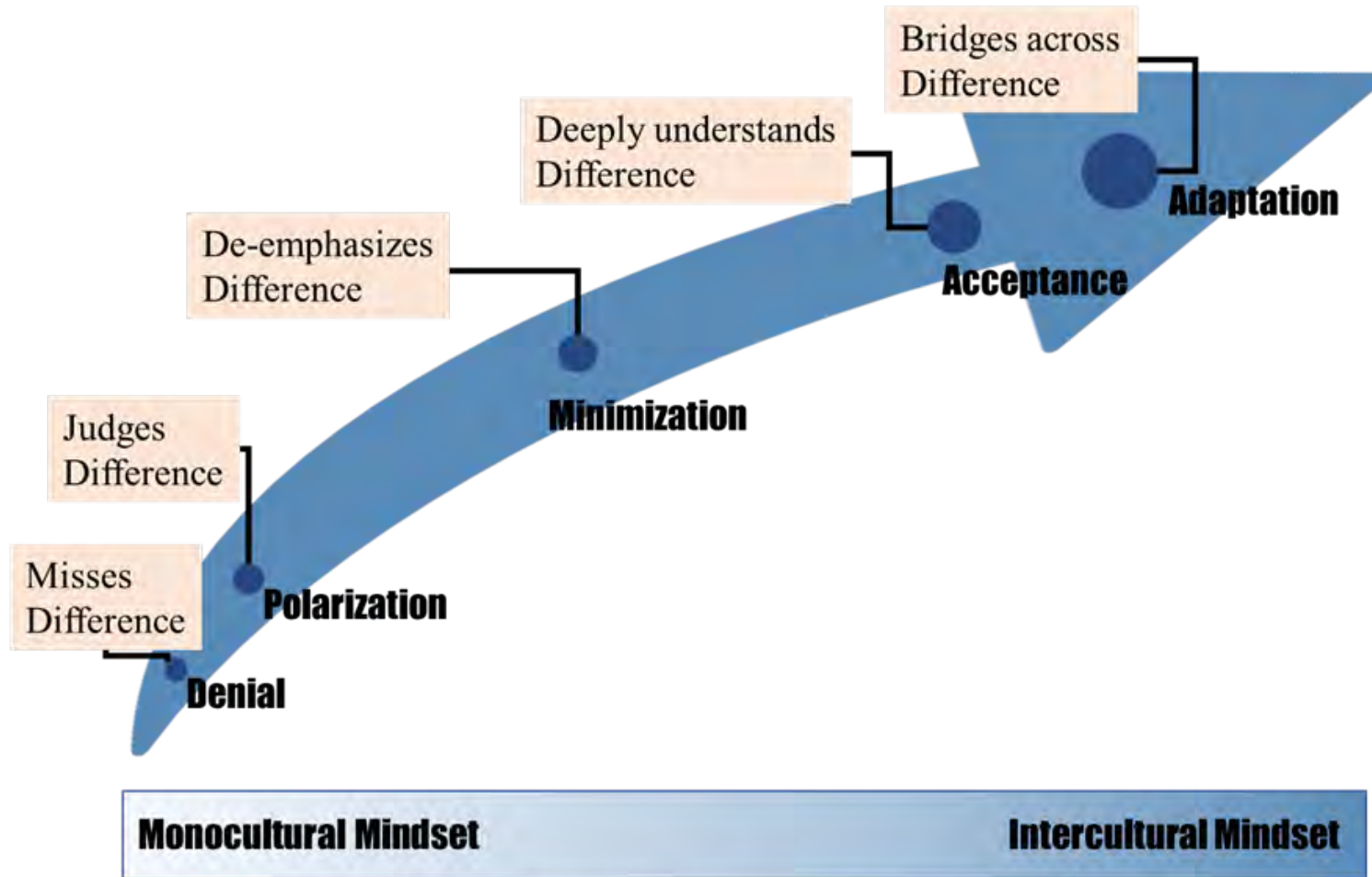


- **Cost**
- **Curriculum**
 - Calendar
 - Sequence
 - Content
 - Alignment
- **Culture**
 - Tradition
 - Bias
 - Language
 - Pedagogy

Barriers to STEM Study Abroad



IDI – Intercultural Development Inventory



Metacognitive processes can include thoughts that fall under two umbrellas:

Thoughts about **academics** and thoughts about **culture**.

Both categories of metacognitive processes are important for STEM learning abroad.

Do STEM classes abroad have the same STEM curriculum?

For example, do lab classes and recitations accompany the lectures?

Are there teaching assistants?

Are there opportunities to obtain lab experience as a research assistant?

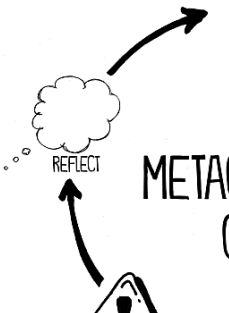
Is field work feasible?

For example, in Korea, there are fewer seminars and lab experiences available.

* might study abroad providers be able to make these "field experiences" available?

Culturally, the ideas of "brainstorming" might be very different.

* could study abroad programs offer information on cultural differences? For instance, the idea that Korea is a hierarchical culture – resulting in fewer "debate" than would occur in America – students should prepare for these differences in learning.



Daekwon Park and Lisa Son – Can you give a few concrete examples of how metacognition is applied to university students studying abroad?

What More Can We Do?

- Embedded Intercultural Experiences
 - CIEE programs are designed to regularly engage and reflect on intercultural experiences
 - Pre-departure, Orientations, excursions, language learning, core courses, CIEE global learning objective



Learning about my culture through other cultures



Living with the environment



Sharing experience with other open-minded students



Sharing daily life with the host family



Internship Experience



corclima

