

Diversity Beyond Content: Examining Physical and Life Science Fields

Allison BrckaLorenz
Associate Research Scientist, Indiana University Bloomington
Christen Priddie
Graduate Research Associate, Indiana University Bloomington
Heather Haeger
Assessment and Research Coordinator, CSU Monterey Bay



Slides & Handout!
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Problem

- Lack of diversity in STEM
- Narrow view of diversity (race, gender, class)
- Moving beyond representation
- Viewing diversity beyond content
- Questioning the "STEM" umbrella

Are diverse student populations experiencing each STEM field in the acronym in the same way?

Supportive Campus Environment

Institution emphasizes commitment to diversity and providing resources needed for success in a multicultural world

Ensuring that you are not stigmatized because of your identity

Creating an overall sense of community among students

Culturally Engaging Courses

Exploring your own and others' backgrounds, cultures, perspectives, norms and experiences

Developing skills to work with people from various backgrounds, and discuss issues of equity and privilege

Representation

Compositional diversity: how proportionally represented students are in their discipline

By racial/ethnic identification, first-generation status, gender identity, sexual orientation, and disability status

Research Questions

How do the following vary across subgroups of STEM fields:

- Student demographics?
- Student perceptions of culturally engaging pedagogies?
- Student perceptions of institutional commitment to diversity?

Looking within STEM fields

- Biological Sciences, Agriculture, & Natural Resources
- Physical Sciences, Mathematics, & Computer Science
- Engineering

Looking within specific STEM majors!

Major Fields

Biological Sciences, Agriculture, & Natural Sciences

- Biology (general)
- Agriculture
- Biochemistry or biophysics
- Biomedical science
- Botany
- Cell and molecular biology
- Environmental science/studies
- Marine science
- Microbiology or bacteriology
- Natural resources and conservation
- Natural science
- Neuroscience
- Physiology and developmental biology
- Zoology
- Other agriculture and natural resources
- Other biological sciences

Physical Sciences, Mathematics, & Computer Science

- Physical sciences (general)
- Astronomy
- Atmospheric science (including meteorology)
- Chemistry
- Computer science
- Earth science (including geology)
- Mathematics
- Physics
- Statistics
- Other physical sciences

Engineering

- Engineering (general)
- Aero-, astronautical engineering
- Bioengineering
- Biomedical engineering
- Chemical engineering
- Civil engineering
- Computer engineering and technology
- Electrical or electronic engineering
- Industrial engineering
- Materials engineering
- Mechanical engineering
- Petroleum engineering
- Software engineering
- Other engineering

Methods: Data

- 2017-2019 administrations of the National Survey of Student Engagement (NSSE)
 - Administered to first-year and senior students at four-year colleges
- 256 institutions that selected to administer the Inclusiveness and Engagement with Cultural Diversity (ICD) Topical Module
 - Coursework emphasis on inclusive and culturally engaging activities
 - Institutional emphasis on diversity and inclusion
- Over 60,000 first-years and 75,000 seniors

Methods: Measures

Course Emphasis

During the current school year, how much has your coursework emphasized the following?

Response options: Very much, Quite a bit, Some, Very little

- Developing the skills necessary to work effectively with people from various backgrounds
- Recognizing your own cultural norms and biases
- Sharing your own perspectives and experiences
- Exploring your own background through projects, assignments, or programs
- Learning about other cultures
- Discussing issues of equity or privilege
- Respecting the expression of diverse ideas

Institution Emphasis

How much does your institution emphasize the following?

Response options: Very much, Quite a bit, Some, Very little

- Demonstrating a commitment to diversity
- Providing students with the resources needed for success in a multicultural world
- Creating an overall sense of community among students
- Ensuring that you are not stigmatized because of your identity (racial/ethnic, gender, religious, sexual orientation, etc.)

RQ1: Proportional Representation in STEM

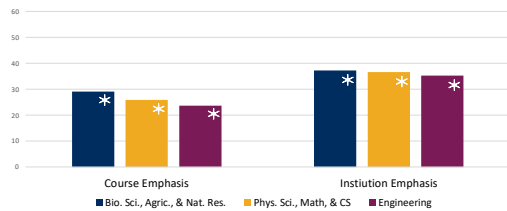
	AI/AXN	Asian	Black	Latina/o	NH/PI	White	Another	Multi
Bio. Sci., Agric., Nat. Res.	+	-	+	+				+
Phys. Sci., Math, CS		+		-		-		
Engineering			-			+	+	-

Often representational diversity investigations stop here.

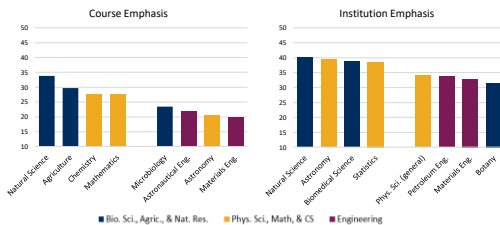
RQ1: Proportional Representation in STEM

	Man	Woman	Non-binary	First-Gen	LGBTQ+	Straight	Disability
Bio. Sci., Agric., Nat. Res.	-	+	-	+	+	-	+
Phys. Sci., Math, CS	+	-	+		+	-	+
Engineering	+	-		-	-	+	-

RQ2 & 3: Perception Differences in STEM



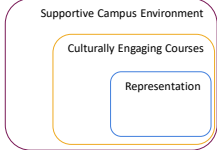
RQ2 & 3: Perception Differences Within STEM Majors



Conclusion

- Overall, STEM fields fall behind non-STEM fields regarding diversity beyond content
- Looking within STEM fields shows areas of strength, instead of looking to non-STEM fields for support we could look for ways to improve within. Biological science fields are one place to start
- Specific majors within fields could tell us helpful stories.
 - For example, what could instructional staff in Materials Engineering learn from instructional staff in Natural Science?
- Stuck at where to start? Try one of our exercises!

Things to Think About



Questions? Thanks so much for joining us!

Find our slides as well as other information about NSSE at nsse.indiana.edu

Allison BrckaLorenz: abrckalo@indiana.edu

Christen Priddie: cpriddie@indiana.edu

Heather Haeger: hhaeger@csumb.edu

Blog: NSSesightings.indiana.edu

@NSSEsurvey  

Analysis

How do the following vary across subgroups of STEM fields:

- Student demographics?
 - Chi-square tests with adjusted standardized residuals (AR)
 - ± 2 AR were considered notable
- Student perceptions of culturally engaging pedagogies?
 - ANOVA with post hoc Tukey tests
- Student perceptions of institutional commitment to diversity?
 - ANOVA with post hoc Tukey tests