Moving the Needle: Place-based Learning Communities Increase Student Success and Close Gaps in STEM

HSU is the most remote & rural CSU Campus

Top Regions of Origin for 2018 HSU STEM Undergraduates	
Los Angeles	32%
SF Bay Area	12%
North California	11%
Local	10%
Central California	8%
San Diego	7%
Coast	5%
Sacramento	5%
Other	10%

Context

- Six-year grad rate @ HSU = 46.5%
  - ~10% behind CSU average
- Rate for incoming STEM = 49.0%
- Gaps for students from traditionally underrepresented groups most pronounced in STEM:
  - 6 year graduation rate for underrepresented groups 39.5%
  - 6 year graduation rate for underrepresented groups in STEM is 37.4%
- Closing equity gaps is both a moral imperative and essential to improve science

3 yr avg 2009-2011 cohorts; HSU OIE

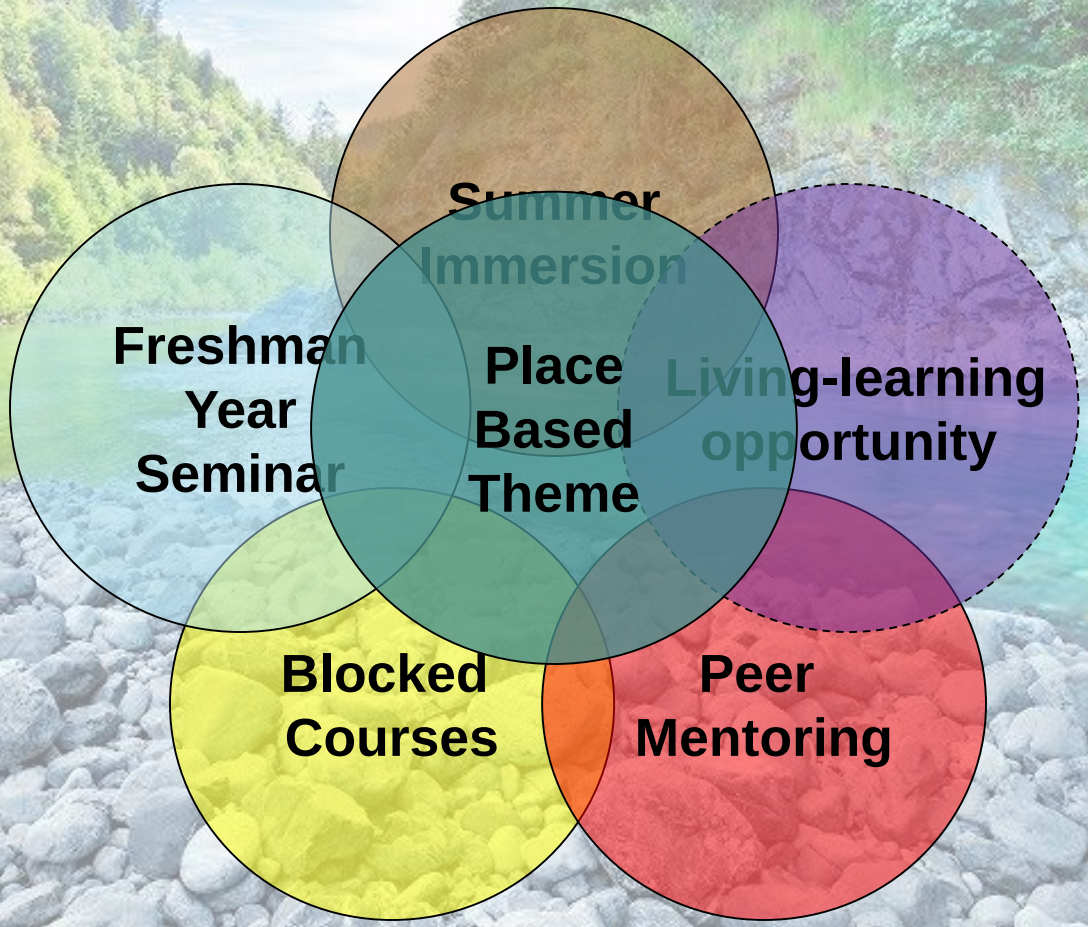
Place-based Learning Community

Our logic model posits that *place-based learning communities* can effect change and advance inclusive excellence.

Cohorts of first year students in linked courses, with interdisciplinary themes rooted in our unique place.

Belonging & Community → Skills & Attitudes → Academic achievement → Retention & Graduation

Place-based Learning Communities Integrate High Impact Practices (HIPs) with a Place-Based Theme



Blue Creek, Klamath River
Photo from Western Rivers Conservancy

KLAMATH CONNECTION PROGRAM

Environmental Resources Engineering

ENVIRONMENTAL SCIENCE

FORESTRY & WILDLAND RESOURCES

WILDLIFE

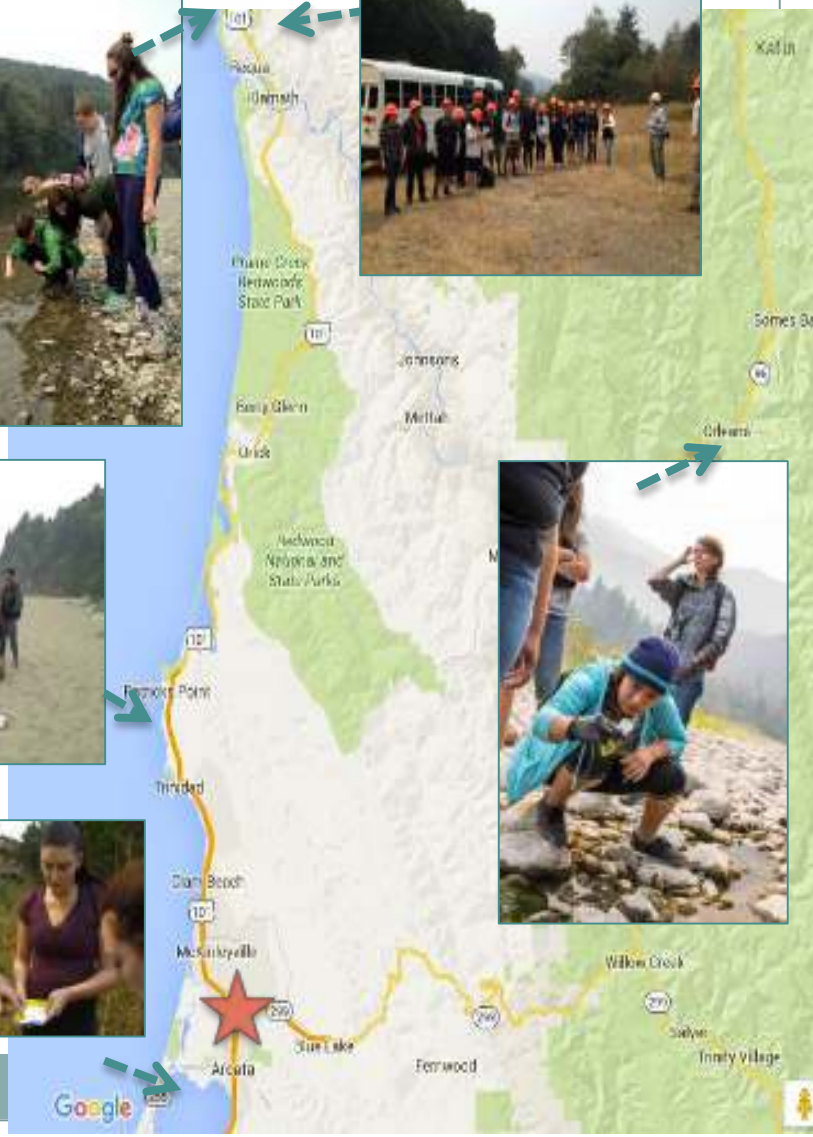
BIOLOGICAL SCIENCES

Fisheries Biology

Zoology

Participants Learn Connections between Science and Society

Curriculum is Developed in Collaboration with Native American Scholars, Scientists, Cultural Experts and Government Officials



https://youtu.be/PnRSiPJr6O0

Assessment

Analysis of first three cohorts (15-16, 16-17, 17-18):

- n = 62, 113, 118 (current cohort is ~160)
- Overall:
  - 39% underrepresented group, 32% Hispanic
  - 36% low-income
  - 44% first-generation

Propensity Score Matching

Reference Group

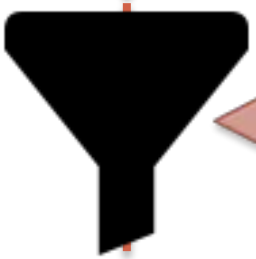
1219 STEM
First Year Students
AY 15, 16, 17

Missing info
-109

Learning Community

293 Students
AY 15, 16, 17

Missing info
-23

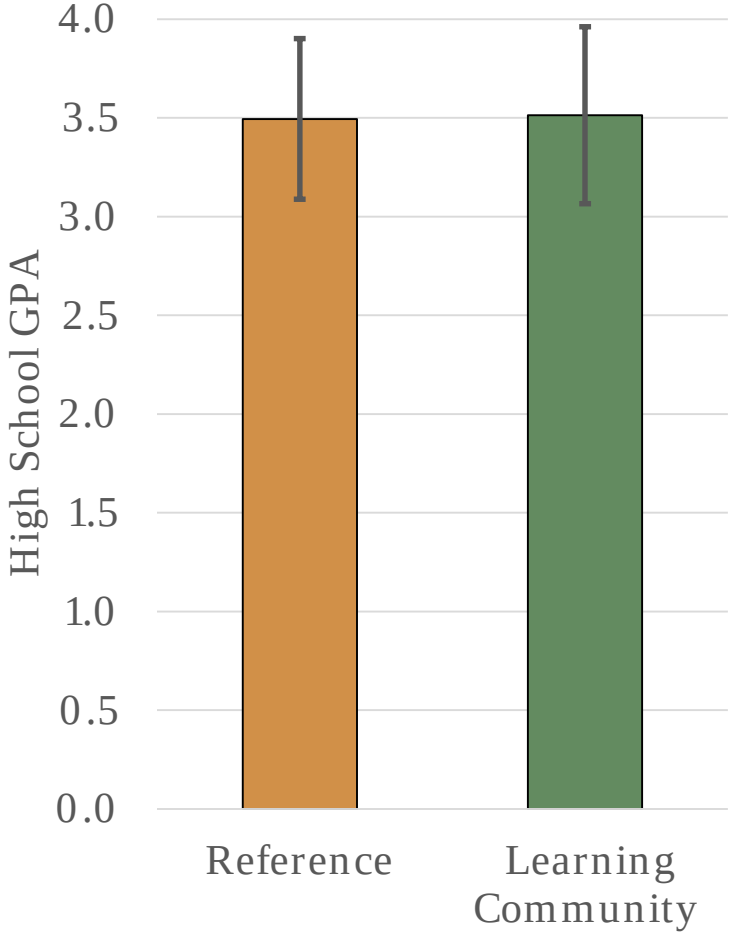


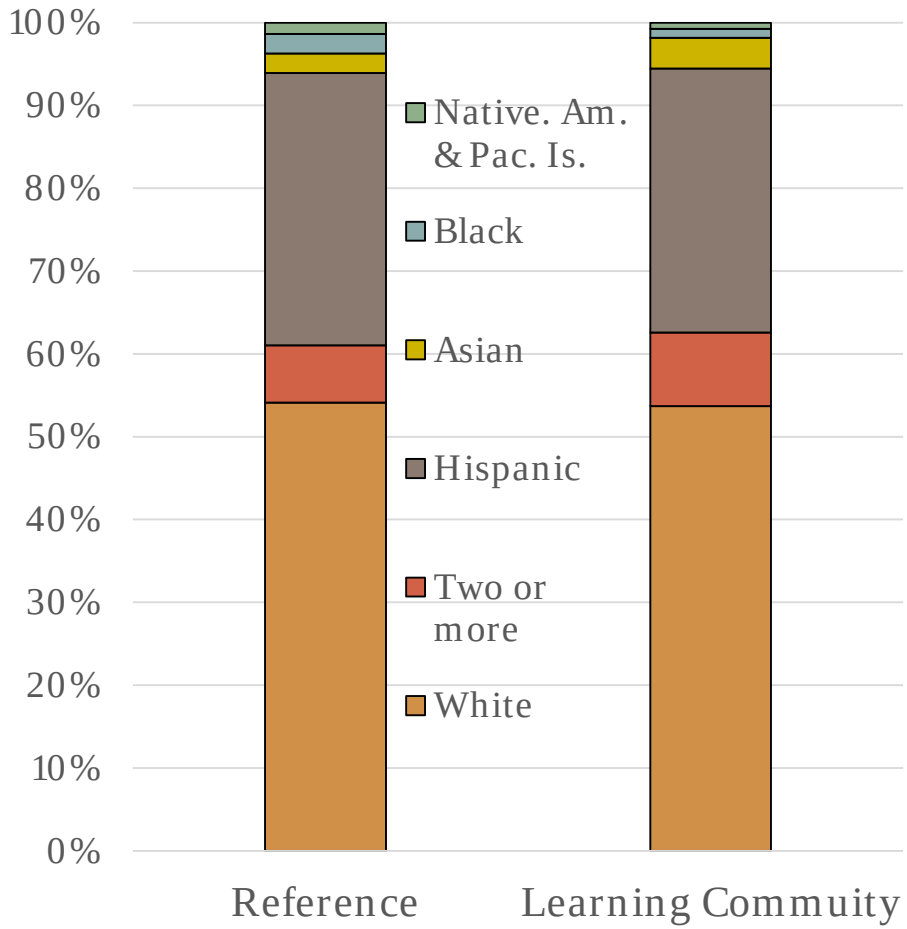
STEM
H.S. GPA
Gender
URG
Math prep
Transfer units

508
Reference

270
Learning Community

* Caliper width = 0.1


4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
High School GPA
Reference
Learning Community


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Native. Am. & Pac. Is.
Black
Asian
Hispanic
Two or more
White
Reference
Learning Commuity

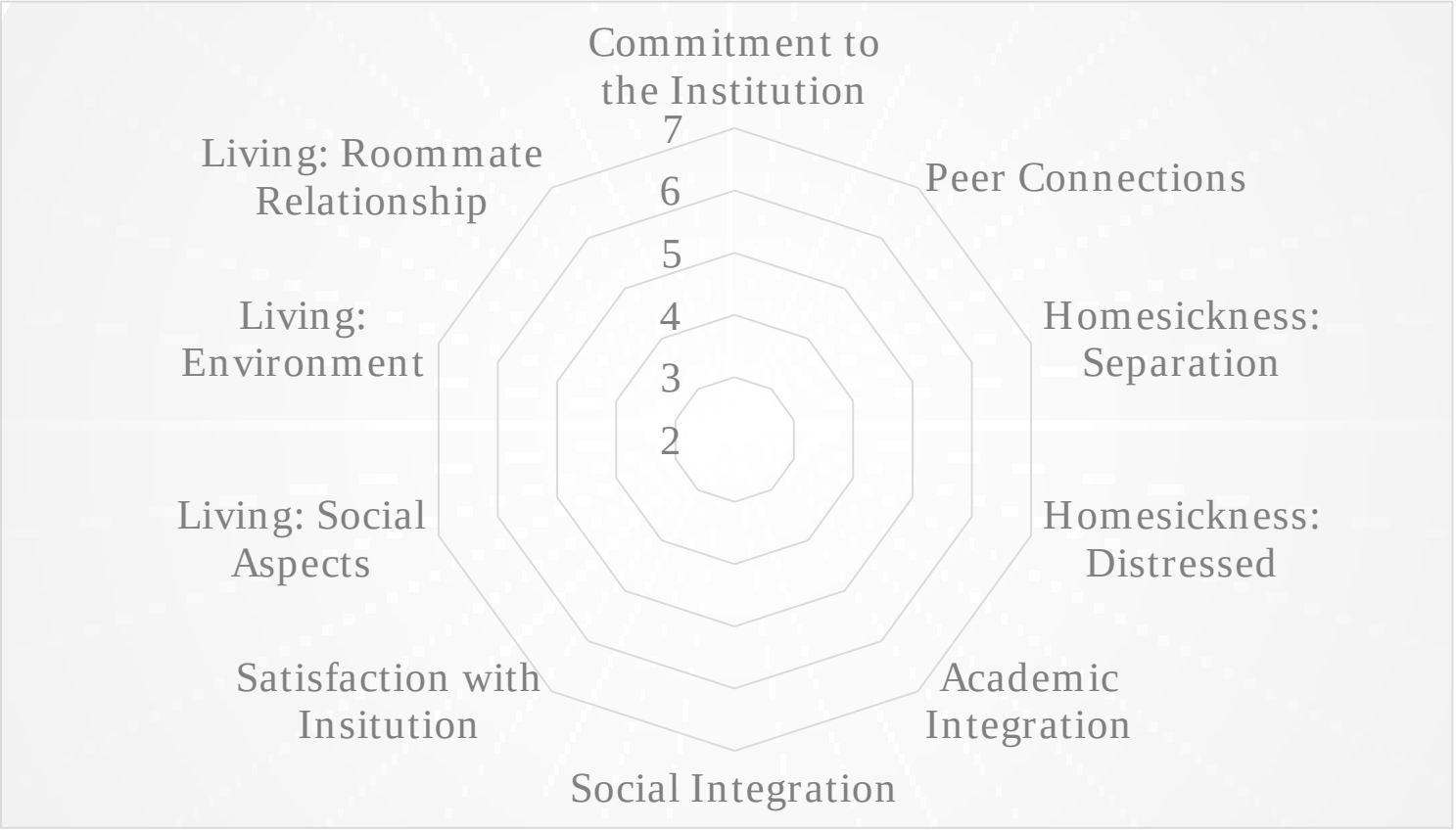
Belonging & Community

Skills & Attitudes

Academic achievement

Retention & Graduation

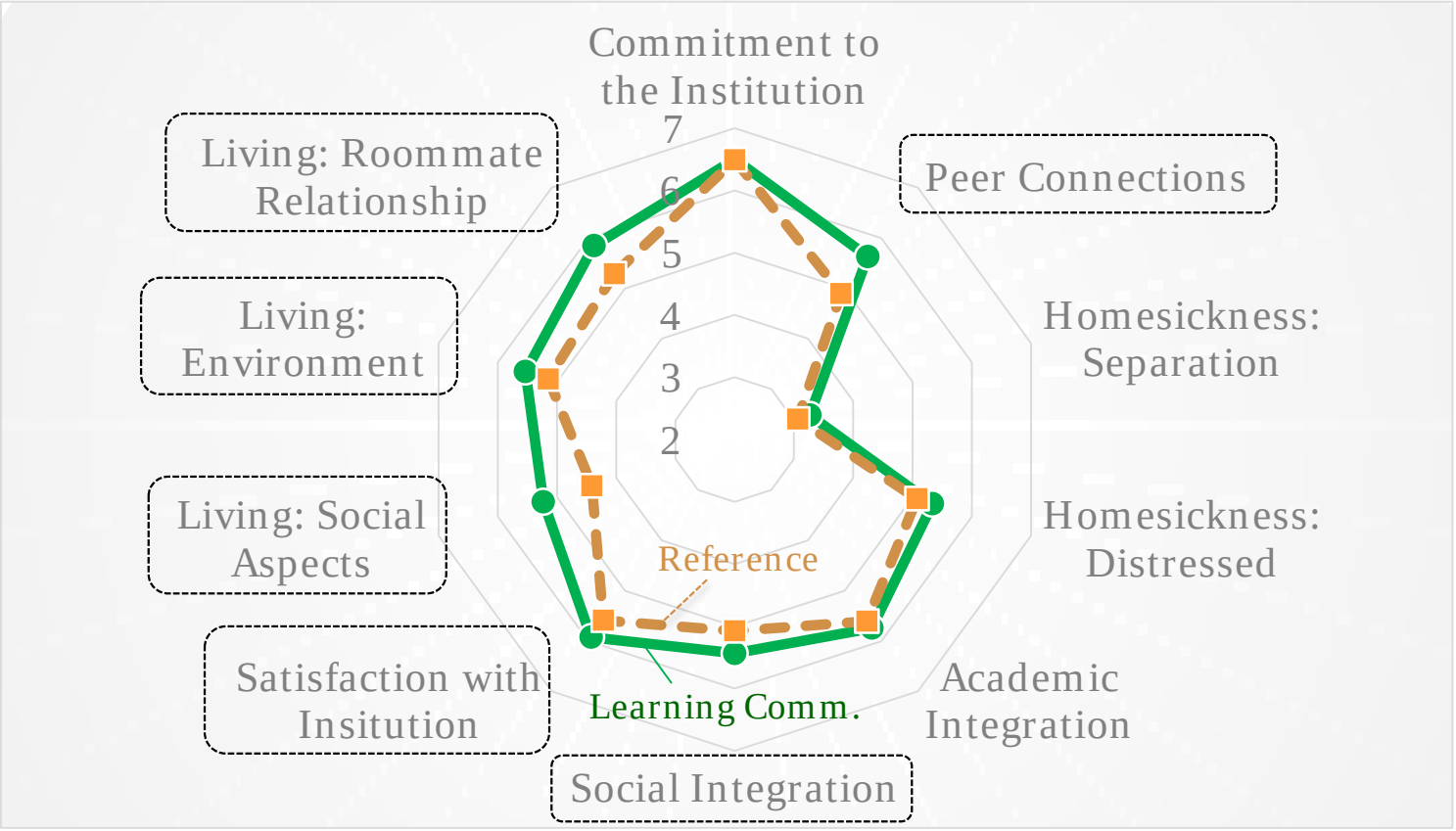
SKYfactor Mapworks™



Belonging & Community | Skills & Attitudes | Academic achievement | Retention & Graduation

Belonging & community stronger in Learning Community than in reference group, fall term

SKYfactor Mapworks™

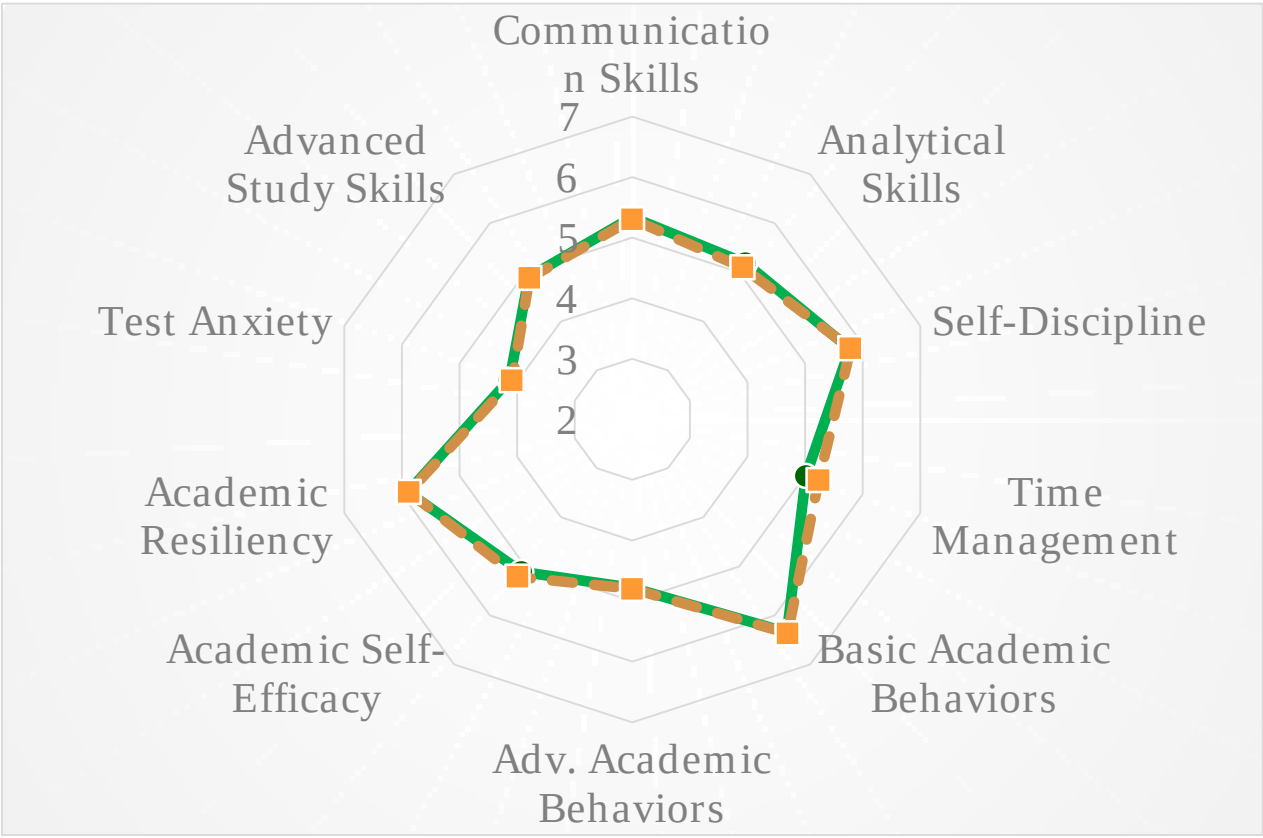


Boxes indicate significant difference (Hedges's g >0.2)

Belonging & Community | **Skills & Attitudes** | Academic achievement | Retention & Graduation

Skills & attitudes not different between Learning Community and reference group, fall term
Spring analysis pending

SKYfactor Mapworks™

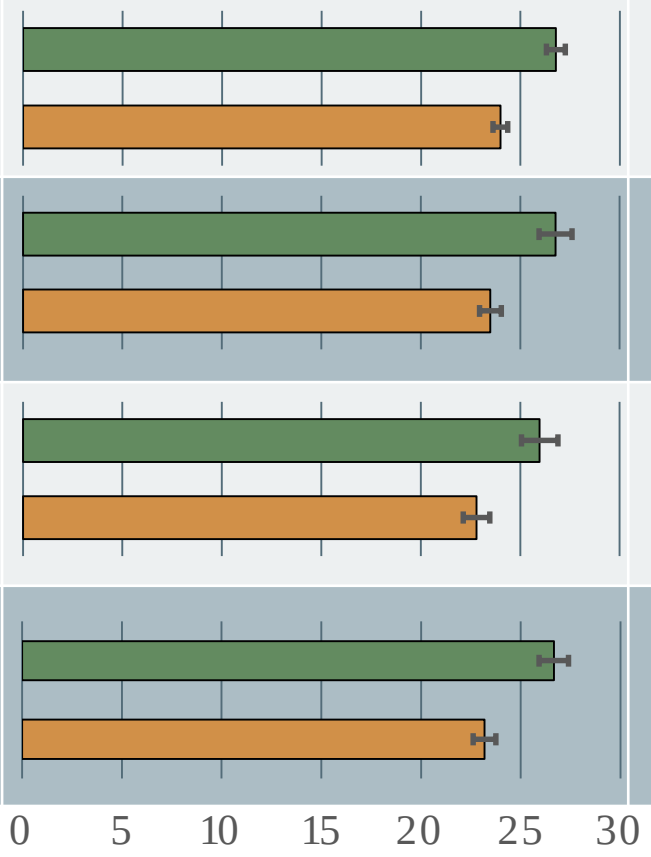


Compare learning community & reference group in first year…

- *Units earned toward degree*
- *Overall GPA*
- *Grades in gateway courses*

Learning community students earned **~3 more units in 1st year** for all student groups

Student groups	n	Learning Community / Reference *mean ± 1 SE*	Hedges's g
All students	270 508		0.34
Latinx	86 167		0.37
Low-income	98 221		0.43
First generation	119 232		0.41



~ 0.2 'Small'

~ 0.5 'Medium'

~ 0.8 'Large'

Overall, very small gains (~0.1-0.2) in 1st year GPA

Student groups	n	Learning Community / Reference *mean ± 1 SE*	Hedges's g
All students	270 320		0.09
Latinx	86 167		0.14
Low-income	98 221		0.19
First generation	119 232		0.27

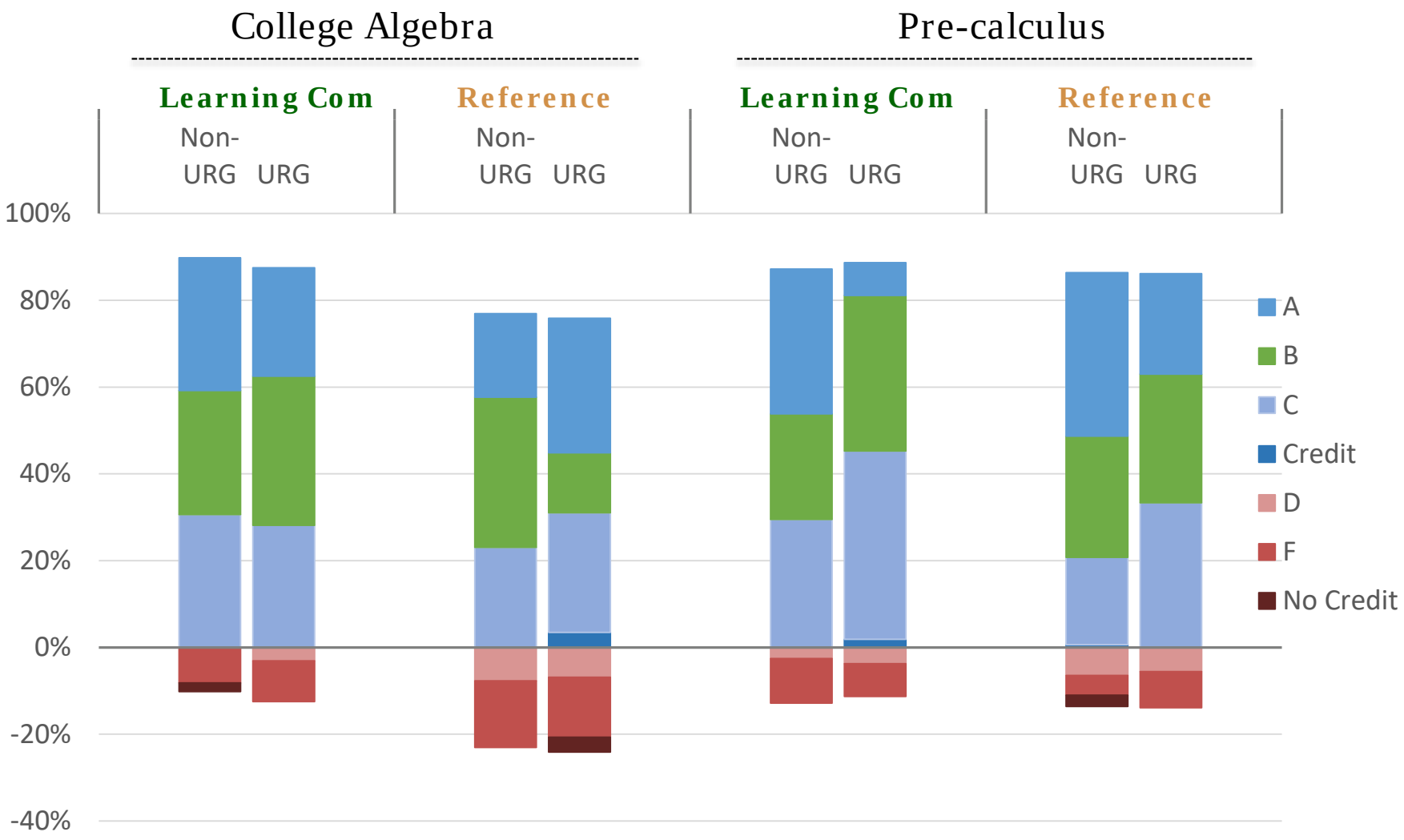
0.0 0.5 1.0 1.5 2.0 2.5 3.0

~ 0.2 'Small'

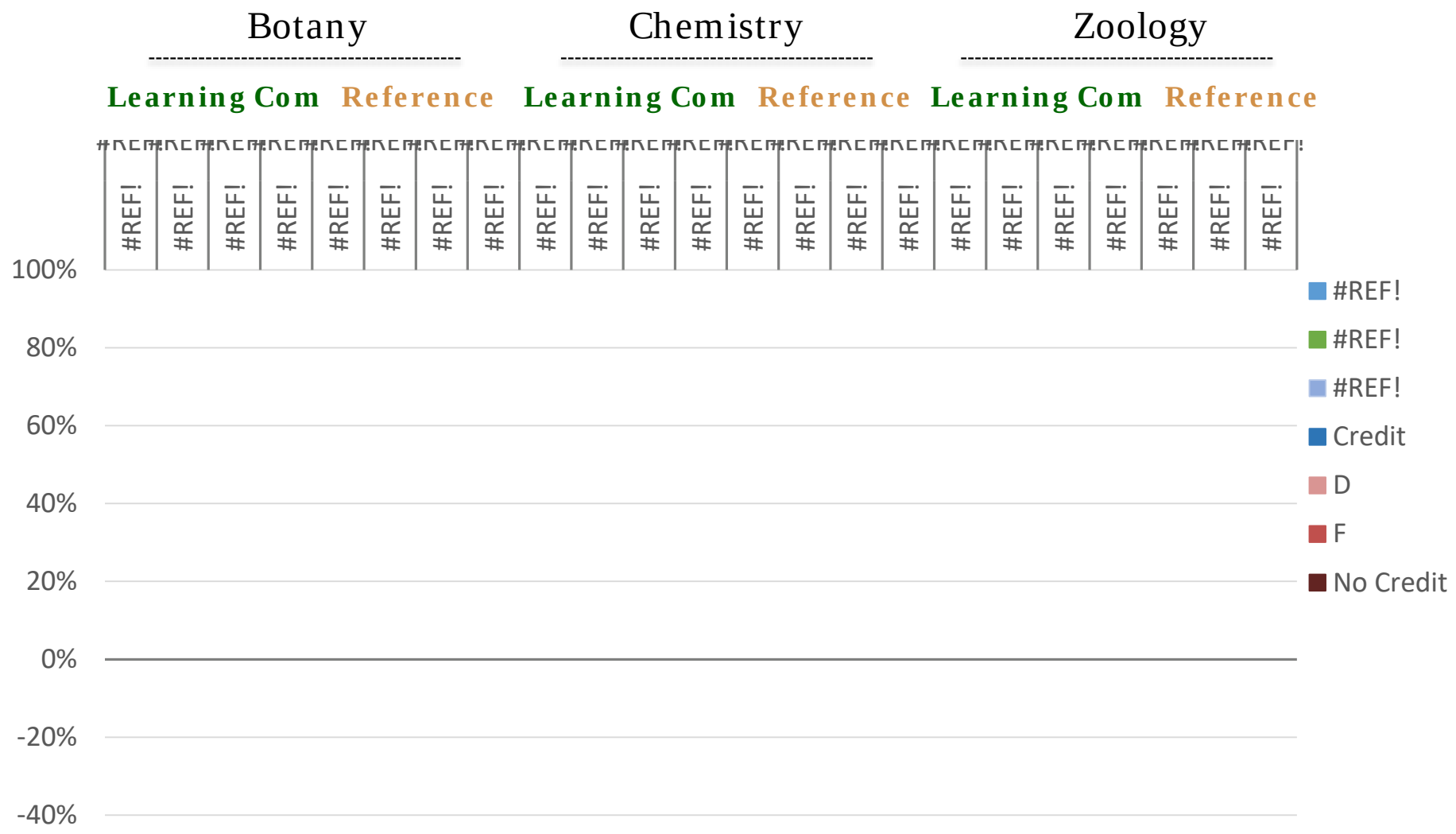
~ 0.5 'Medium'

~ 0.8 'Large'

Effects of learning community mixed in **gateway math**



Learning community improved grades & narrowed equity gaps in **gateway science**



Goals

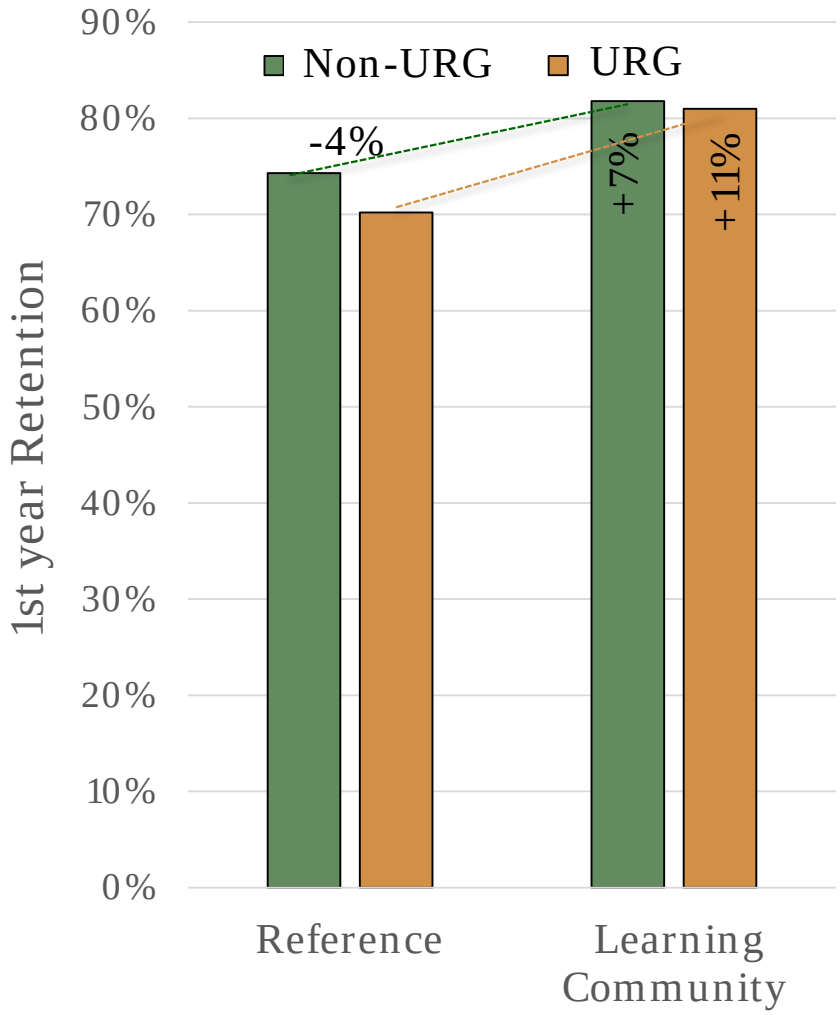
- *Increase 1st year retention by 10%*
- *Cut equity gaps in half*
- *Increase graduation by 5%*

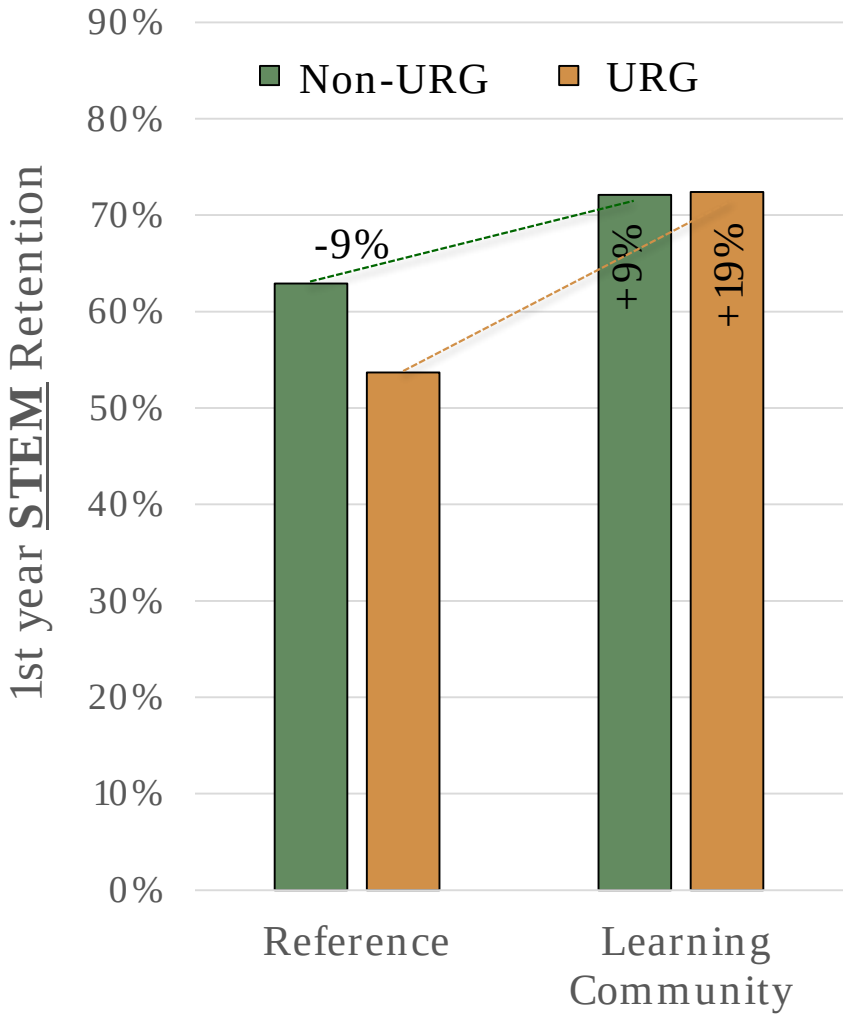
Learning community increased **1st year retention** especially for Latinx students

Student groups	n	Learning Community / Reference	Odds Ratio
All students	270 508	82% / 73% (+9%)	1.66
Latinx	86 167	81% / 68% (+13%)	2.03
Low-income	57 143	75% / 71% (+4%)	1.19
First generation	119 232	77% / 69% (+8%)	1.50

0% 20% 40% 60% 80% 100%

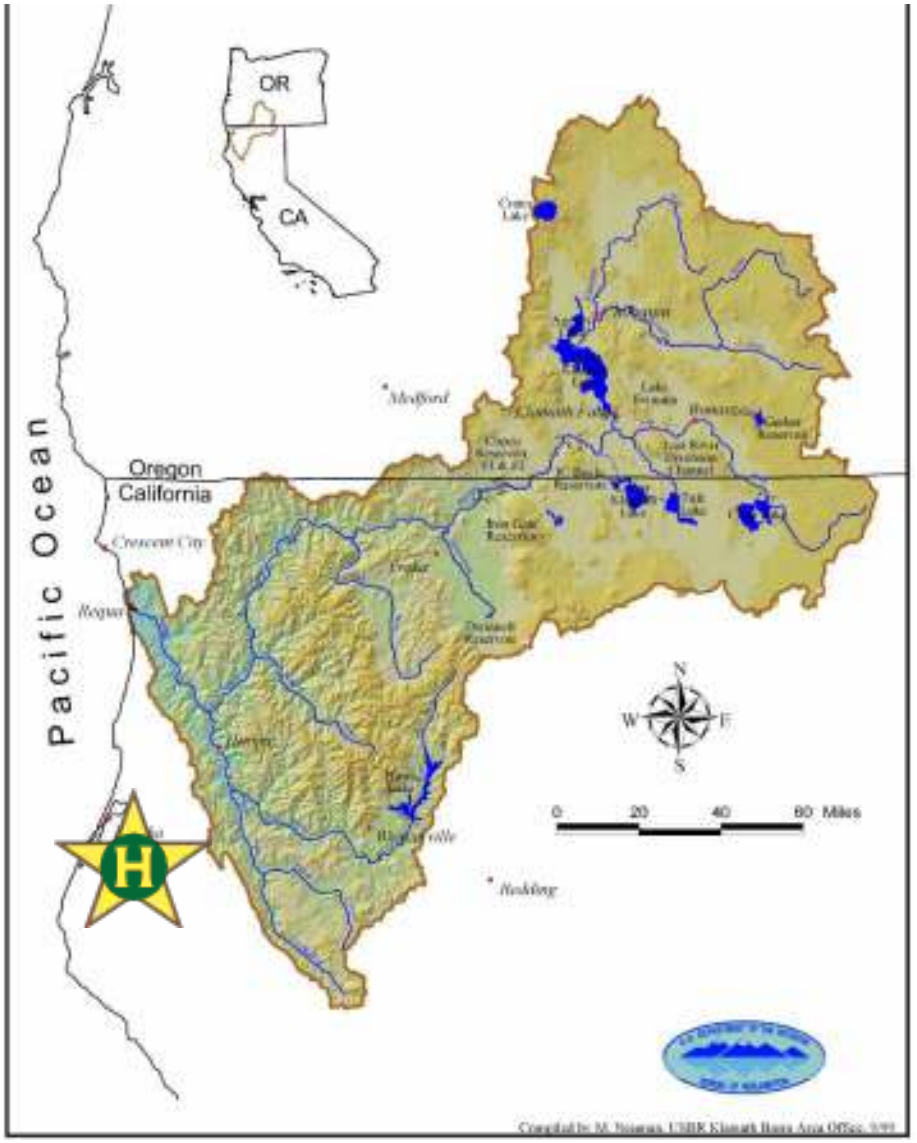
Learning community erased equity gap in 1st year retention

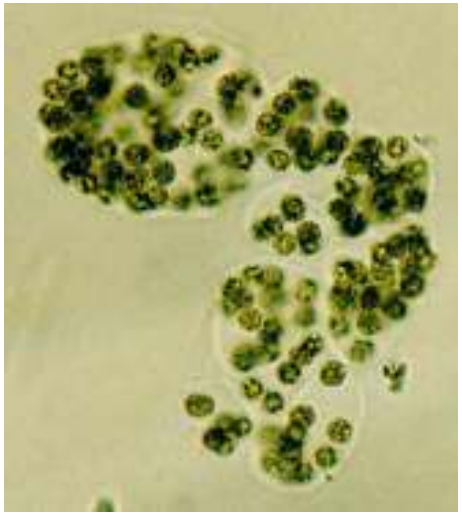




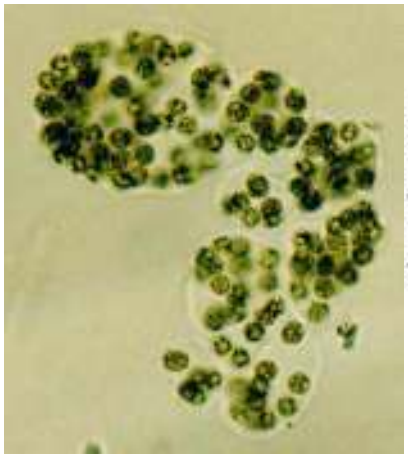
Why are we doing this?

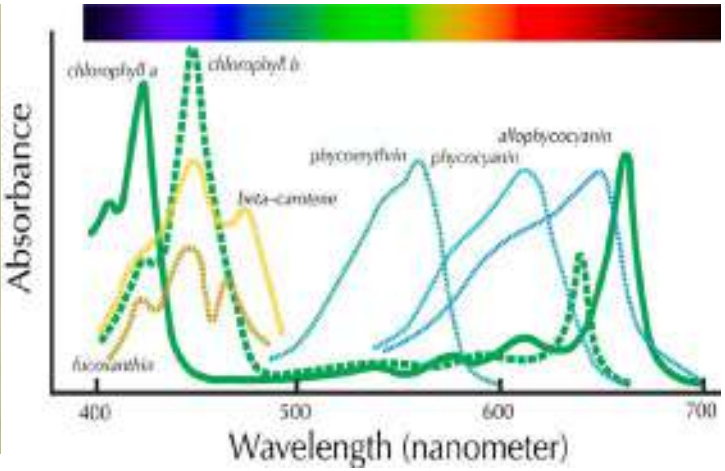
Linking The Place to the Curriculum Helps Students Understand the Relationship to STEM and Society

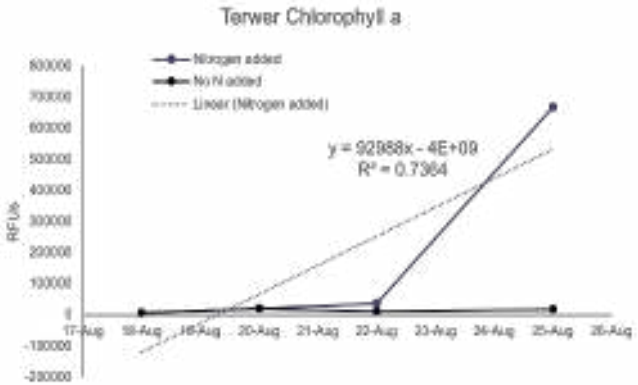




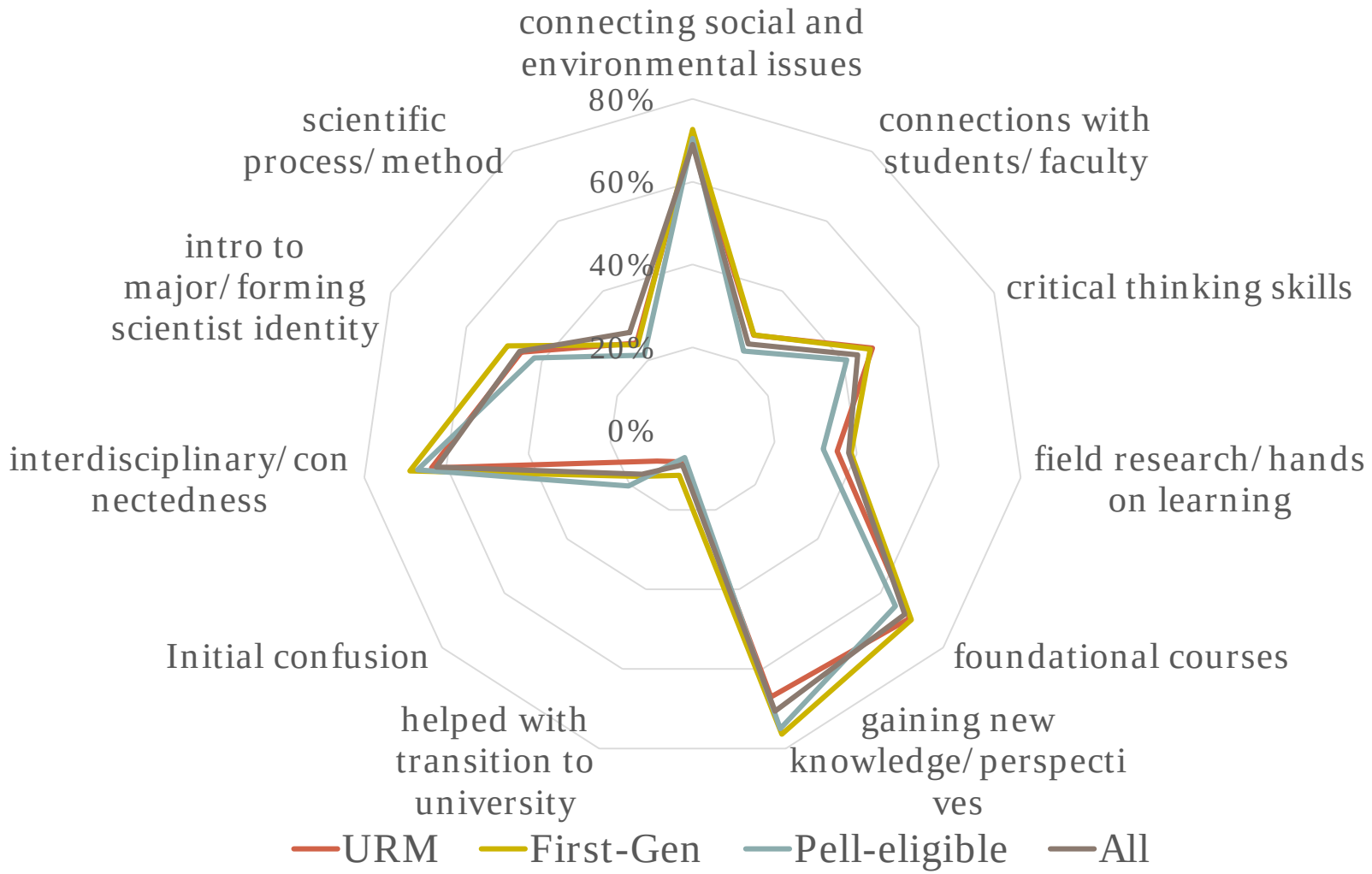
Linking The Klamath to the Curriculum



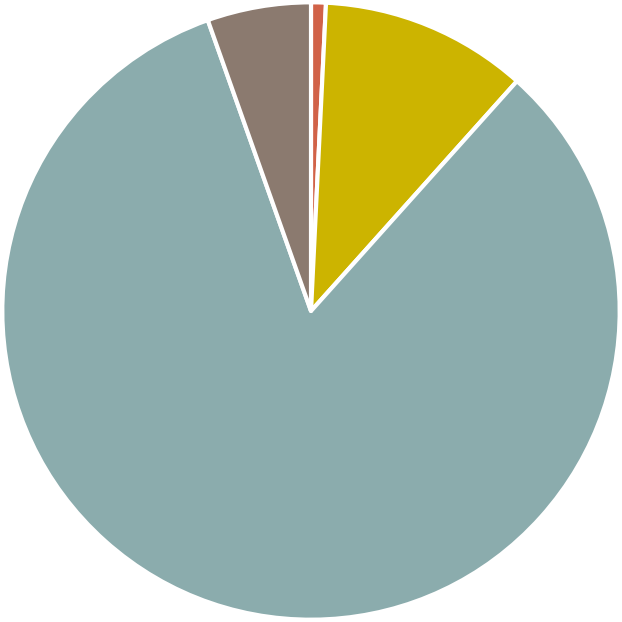




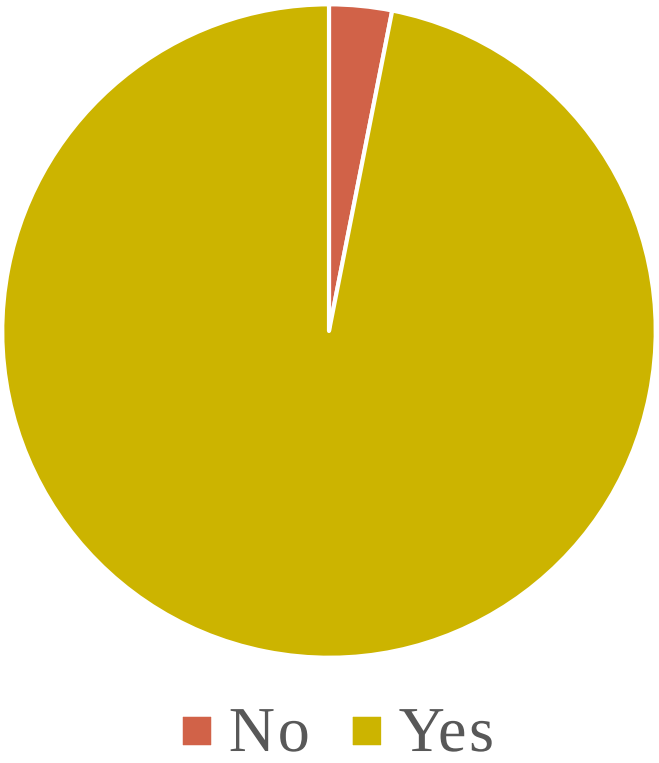
Linked assignments makes curriculum more real, useful, and civically important



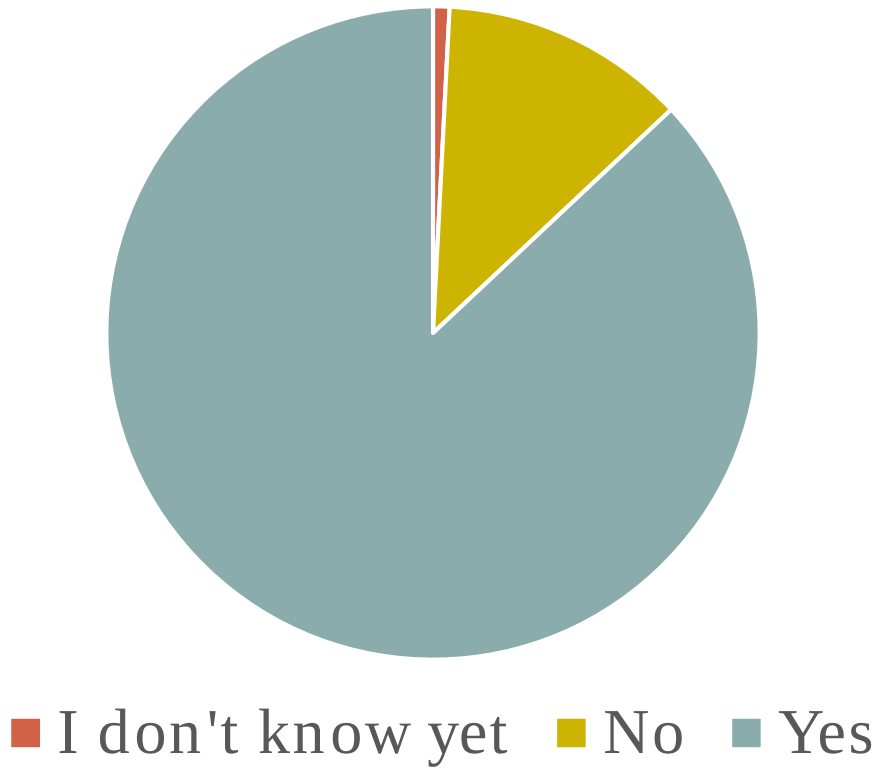
83% of Students "knew a little" about Native American Issues Before KC



97% of Participants Say Knowledge of Native American Issues Increased through KC



87% of KC Freshman Believe Gained Knowledge of Native American Cultures Will Help Them in Careers

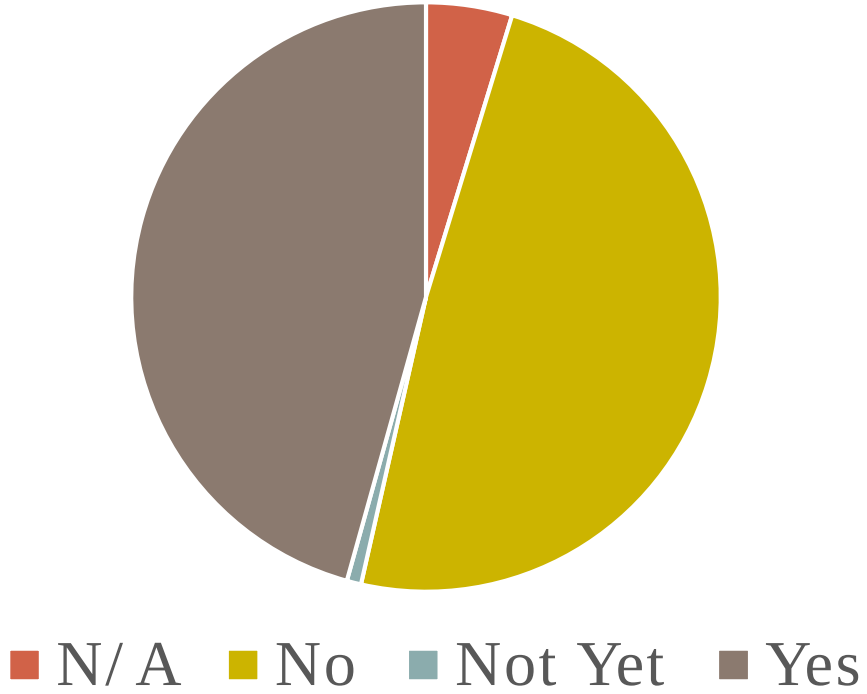


"I believe it will help me understand who I'm working with and how to best work with different communities"

"I will take into consideration how projects will affect the land and the Native American way of life."

"As a doctor, I have to be culturally aware of my patients to treat them"

Overall 46% of KC Students See Parallels with Issues in their Communities; Higher for Hispanic Students



"Native American communities struggle like other minorities in society and government."

"Substance abuse, finding government aid programs, becoming estranged from your cultural background."

"Being a minority, many people underestimate us. The city I come from is slowly going through gentrification. Business people, mainly white, are rebuilding the land to build a stadium for football."

"Pyramid Lake tribe has issues with people fishing in sacred areas."

" I am not versed in these issues back home"

Klamath Freshman Report Many Benefits from a Place-Based Research Curriculum

"Going further into what I previously thought about the experiment during the summer immersion, I was honestly excited but at the same time nervous... I was a little scared that this process would end up being too much for me. I was very relieved to find that the complexity of the experiment grew at the same pace we students grew intellectually... I now see this process as something of a tutorial for future projects students may encounter while trying for their science major, a way for us to get our feet wet so to speak."

Benefits beyond the first year…

"I felt lonely at first, so the living community was helpful in knowing you could go knock on doors."

"And seeing the people you knew around campus made it feel more welcoming."

"I met my best friend in Klamath Connection, and we live together off campus now."

"The hands-on experiences of the Klamath Connection gave me the confidence to apply for research jobs."

Benefits beyond the first year…

How has learning about issues that affect Native American communities better prepared you for your career?

“Prepared to me interact with different kinds of people.”

“It reminds me that my work involves people and affects people”

“In my career I will work side by side with many different cultures and communities”

“I've considered more potential career paths”

Next Steps

- ~90% of STEM Freshmen by 2020

2015&16

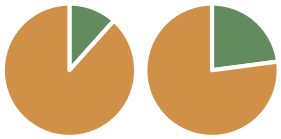
2017

2018

2019

Comp Sci & Math Theme

2020



Funding

- CSU STEM Collaboratives
- HSI STEM
- HHMI Inclusive Excellence
- SENCER Transcending Barriers
- STEM VISTA program

Staying Connected

Website

https://hsistem.humboldt.edu/hsi-stem-grant

facebook.com/humboldtpblc

instagram.com/humboldtpblc/

Acknowledgements

- HSI STEM Staff
  - Steven Margell
  - Katlin Goldenberg
  - Nicole Ryks
  - Sarah Bacio
  - Raven Palomera
- HSI STEM Steering Committee
- RAMP Program
- Office of Inst. Effectiveness
- Yurok, Hoopa, Wiyot, and Karuk tribes
- Native American Studies Program
- INRSEP
- El Centro
- Office of Diversity Equity & Inclusion
- HSU Translation Services
- Coll. of Arts Humanities & Soc. Sci.
- Admission & Office of the Registrar
- Residential Life