The Inclusive Caltech Core (IC^2) Project December 5, 2017

25 in attendance: 12 faculty, 8 staff, 3 students, 1 Head TA, 1 Guest

- Overview
- Student data – updates from fall
- Discussion
- Winter/spring plans

Cindy Weinstein, Vice Provost, Chief Diversity Officer, Professor
Kevin Gilmartin, Dean of Undergraduate Students, Professor
Sarah Reisman, Chemistry Executive Officer, Professor
John Hall, Core Steering Committee Chair, Professor
Cassandra Horii and Jennifer Weaver, CTLO
Hanna Song, Caltech Center for Diversity
Lesley Nye and Barbara Green, Undergrad Dean's Office

The Inclusive Caltech Core (IC^2) Project

~235 first year students

STEM Core:	Pseudo-Core:	Advising:
Math, Physics, Chemistry, Menu	CS ACM	Freshman Advisors

IC^2 Focus Areas:

- Up-to-date student data
- Evidence-based, inclusive teaching practices
- Follow-up: implementation and data
- Opportunities for faculty discussions

IC^2 Year One Activities

Faculty Interests

SPRING-SUMMER
- Pre-survey
- Data

Retreat

SEPTEMBER
- Data
- Evidence-based practices

Follow-up

ACADEMIC YEAR
- Ongoing discussions
- Feedback
- Data

Strong interests in students':
- College/Caltech interests
- Academic self-concept & habits of mind
- Demographics

CIRP-TFS, Admissions data

Discussion themes:
- Extremely qualified students
- Also more diverse
- Begin with strong academic confidence, with a few notable gender differences

So far:
- Fall early feedback (5 large courses + confidence & belonging questions (frosh)
- Fall Core faculty lunch
- December regroup: what we have learned; plans
- Teaching method demos
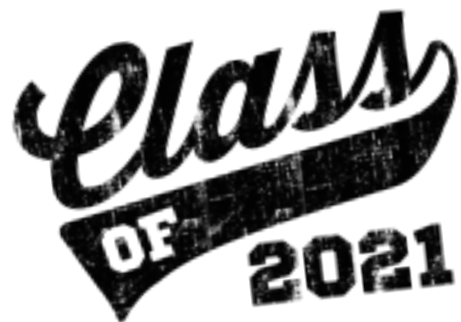
The Class Entering in Fall 2017

❑ 237 Students

❑ 109 women, 46%
(2016: 44%; 2015: 46%; 2014: 40%; 2013: 35%)

❑ URM = 15.6% (17.7% in 2016)

  ❑ 28 Hispanic / Latinos

  ❑   6 African Americans

  ❑   3 Native Americans

❑ 21 International
(27 in 2016, 18 in 2015)

❑ Extremely well-qualified!
Mean SAT Math has stayed constant (v. high) while mean SAT Writing has gone up since 2010

Diversity numbers reflect our admission reporting, not IPEDS guidelines

▪ 71% are from *public or charter high schools*

▪ 5% are *first generation*

▪ 11.5% are *Pell eligible*

▪ 20% are *athletes*

▪ 14.5% *LGBTQ (self-reported)*

Incoming Caltech students arrive with strong <u>academic self-concept</u> and strong science and research <u>self-efficacy</u> (belief in one's ability to succeed)

<u>Implications for Learning:</u>
Self-awareness, confidence, and self-efficacy in academic environments help students learn by encouraging intellectual inquiry and motivation.

<u>Questions from September 2017 Discussions:</u>
- We expect students' academic confidence to drop some, but how and when does that happen? Does it recover?
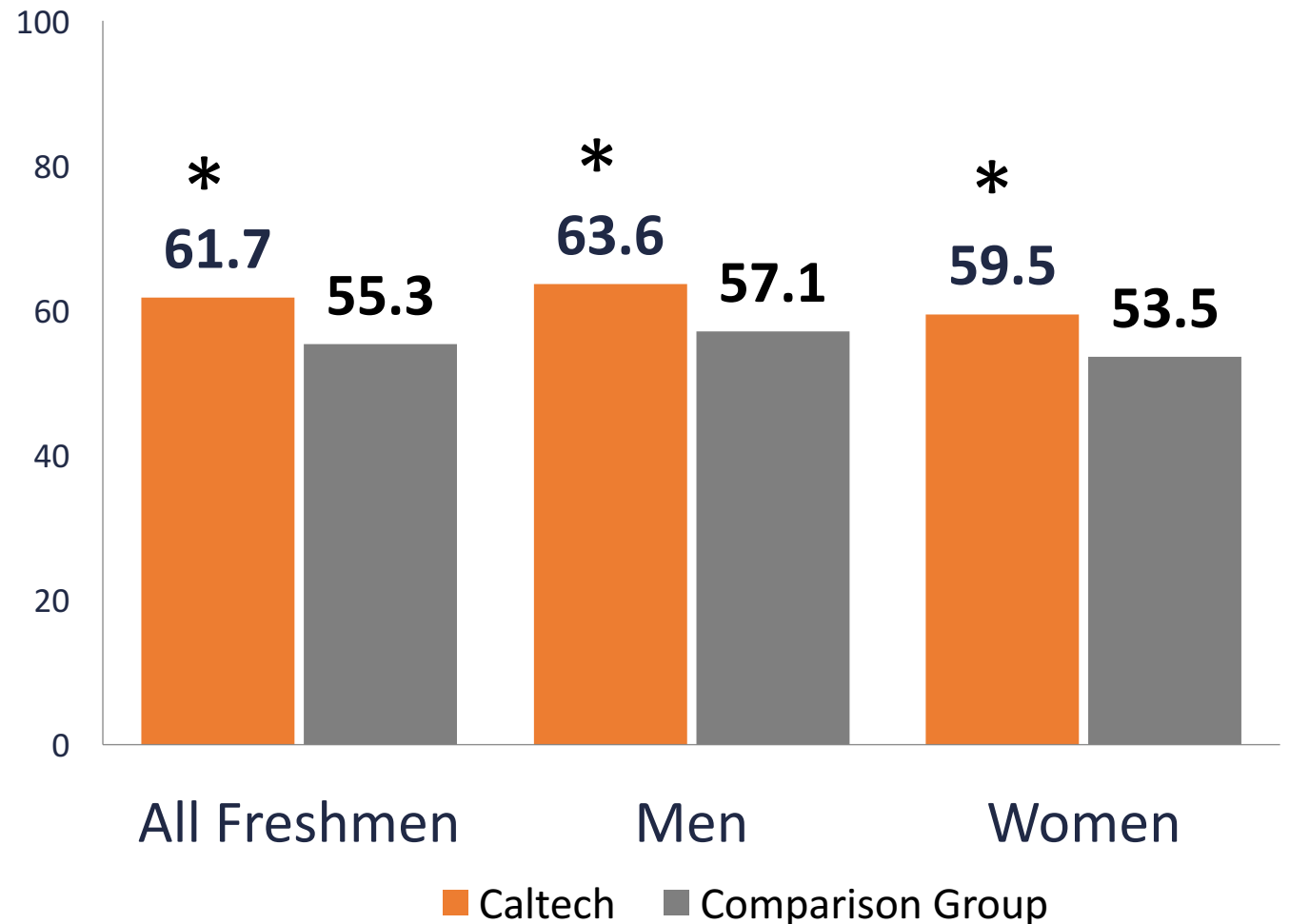
Incoming Caltech students are academically confident with a strong "Academic Self-Concept"

Male-identifying students report significantly stronger academic self-concept than female.

Academic Self-Concept includes:
- Self-rated academic ability
- Self-rated mathematical ability
- Self-rated intellectual self-confidence
- Self-rated drive to achieve

(Note: These data from previous class of Caltech entering freshmen; Caltech conducts the Freshman Survey in select years)

	Caltech	Comparison Group
All Freshmen	61.7 *	55.3
Men	63.6 *	57.1
Women	59.5 *	53.5

Class of 2021: mid-quarter fall

85% response rate; week 4

- Math 1a, Physics 1a, & Chemistry 1a Feedback
  Frequency of attendance, time expenditure outside of class, degree to which course components help support learning, TA feedback, open-ended comments

- General questions about Caltech experience so far
  Sense of belonging, engagement, need for/use of resources, change in academic self-concept components since arriving, open-ended comments
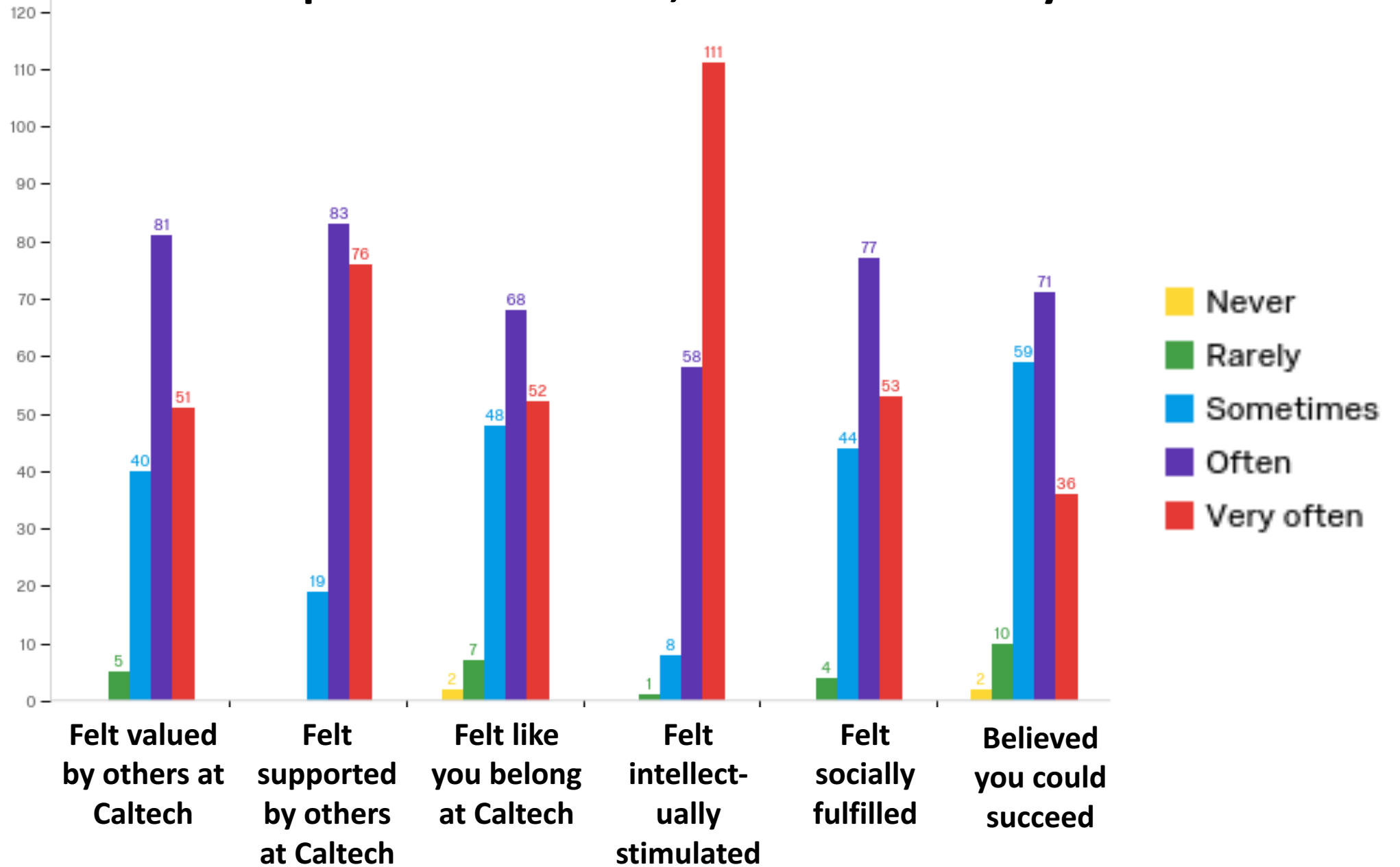
Also surveyed CS 1 and Ma 2a students for course feedback
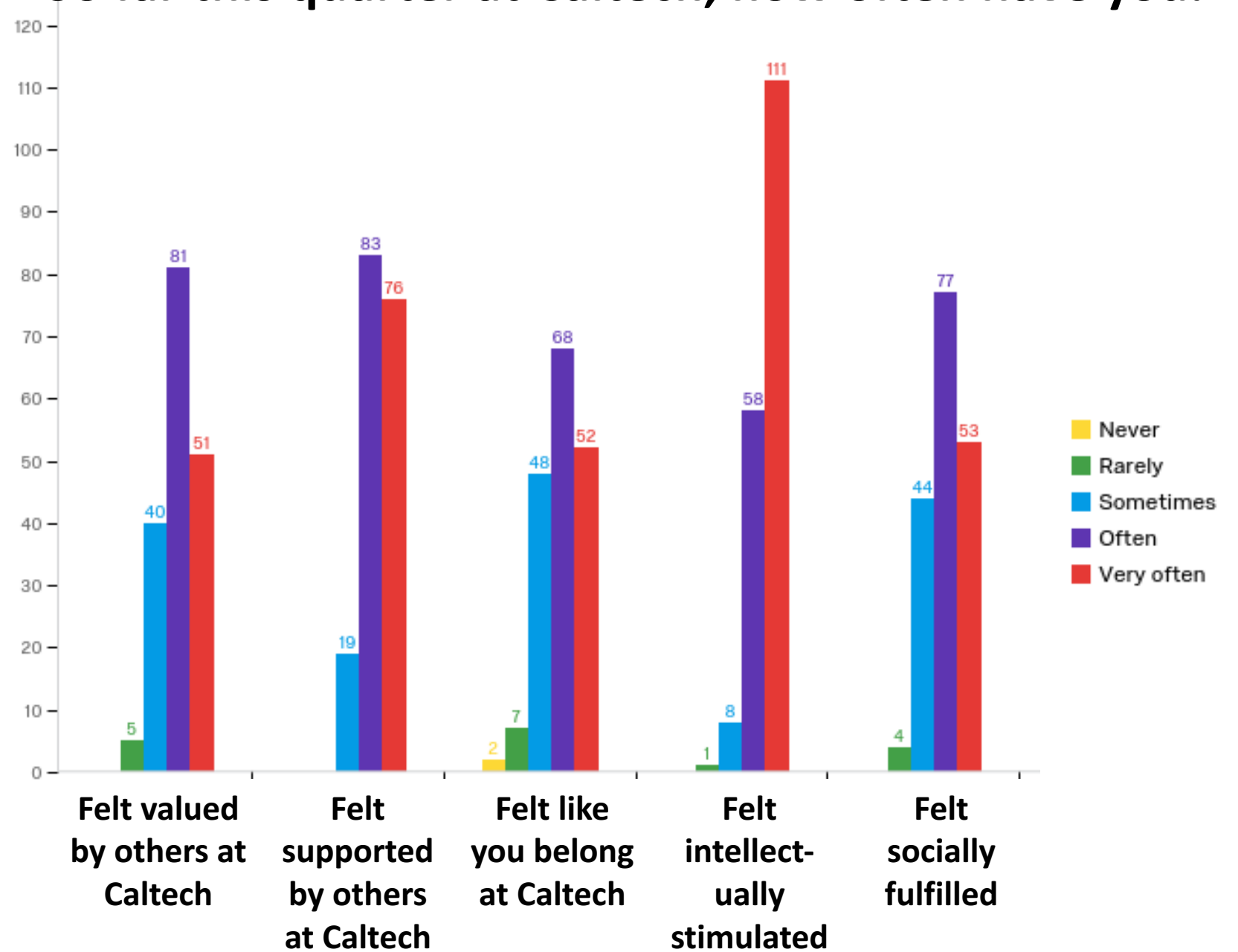
Class of 2021: mid-quarter fall

85% response rate; week 4

- Sense of belonging & engagement
- Change in academic self-concept components since arriving

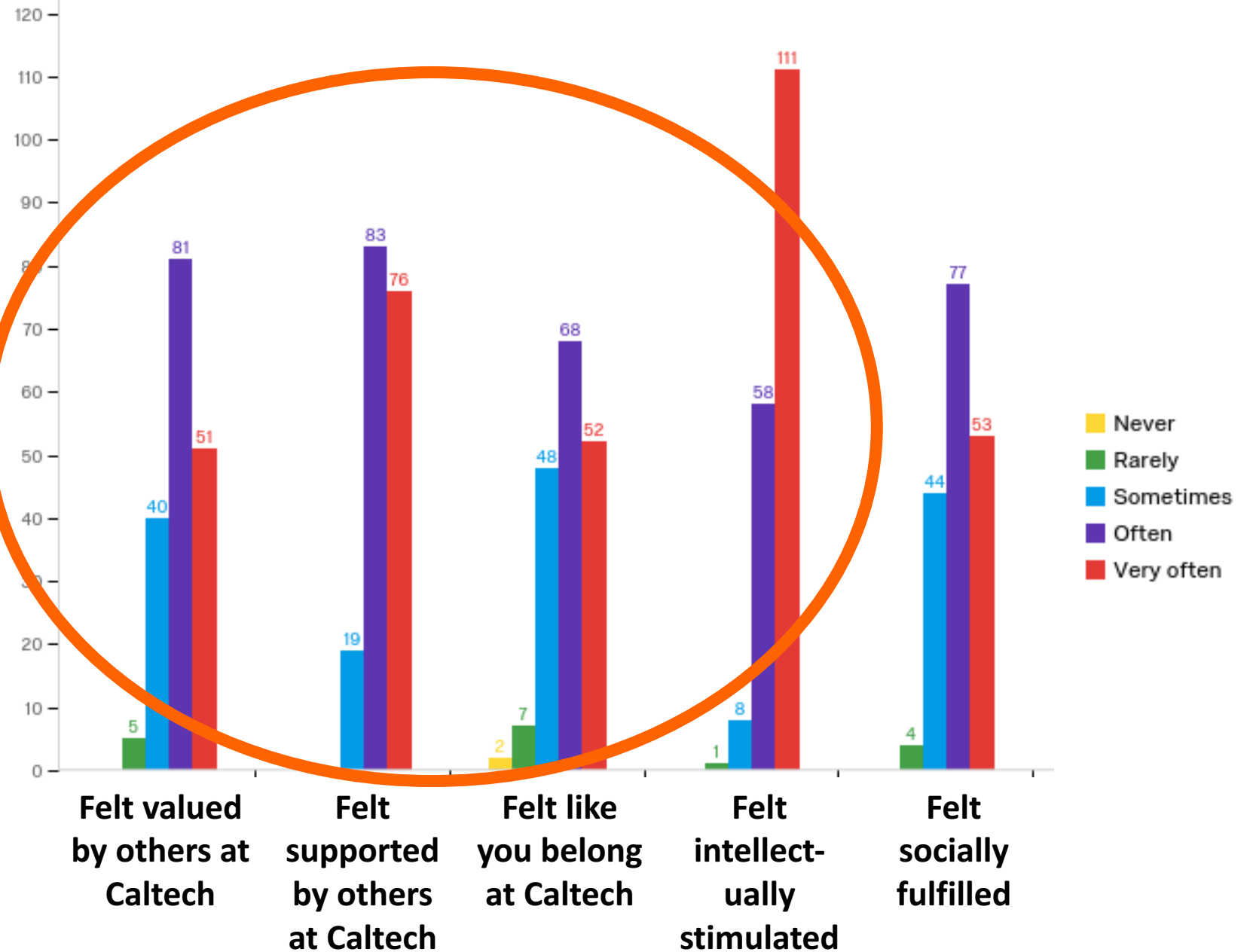So far this quarter at Caltech, how often have you:

So far this quarter at Caltech, how often have you:

Strong Qualitative Themes:
Value, Belonging...

- People are friendly, accepting, laid-back, and easygoing
- Caltech is challenging, interesting, engaging in good ways
- Sense of collaboration & motivation among peers
- People are willing to help
- People are passionate
- Feeling comfortable being oneself

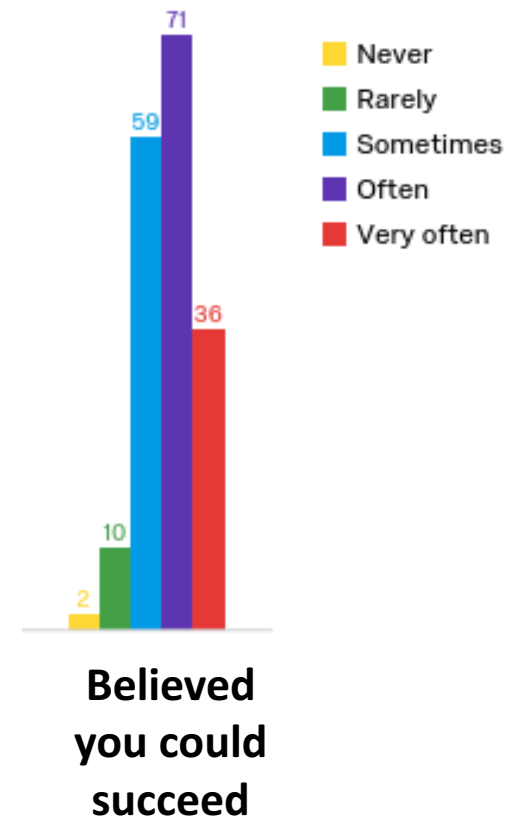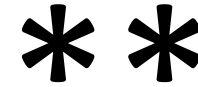## So far this quarter at Caltech, how often have you:

Legend:
- Never (yellow)
- Rarely (green)
- Sometimes (blue)
- Often (purple)
- Very often (red)

Category	Rarely	Sometimes	Often	Very often
Felt valued by others at Caltech	5	40	81	51
Felt supported by others at Caltech		19	83	76
Felt like you belong at Caltech	7 (Never 2)	48	68	52
Felt intellectually stimulated	1	8	58	111
Felt socially fulfilled	4	44	77	53

Since starting at Caltech, how do you feel you've changed in the following areas?

Legend:
- Much weaker (yellow)
- Weaker (green)
- No change (blue)
- Stronger (purple)
- Much stronger (red)

Category	Much weaker	Weaker	No change	Stronger	Much stronger
Academic Ability	2	13	40	99	24
Drive to Achieve		9	53	82	34
Mathematical Ability	3	18	44	87	25
Risk Taking	1	12	74	65	24
Intellectual Self-confidence	21	58	42	40	17
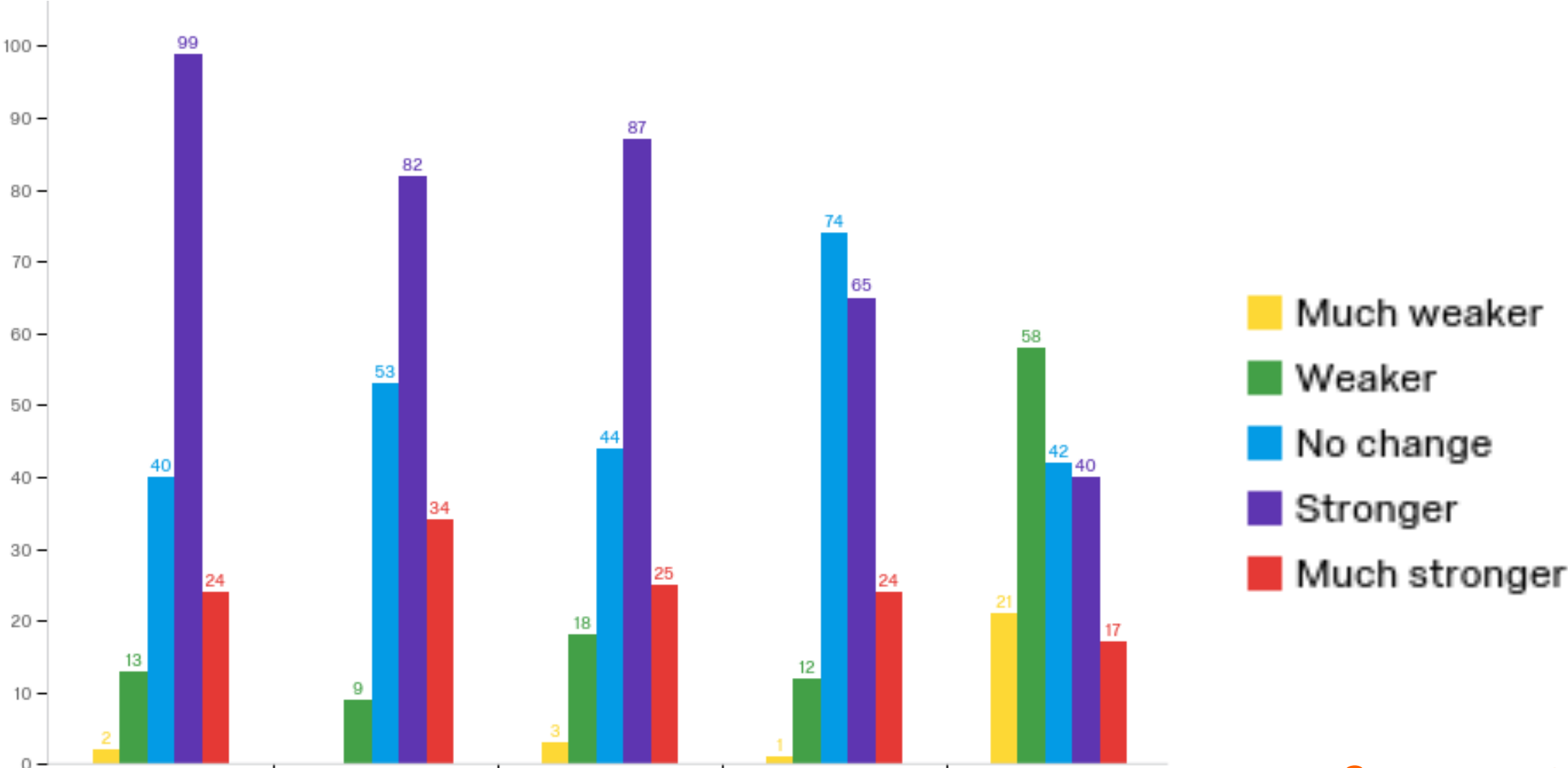
Components of "Academic Self-Concept" ← (pointing to Intellectual Self-confidence)
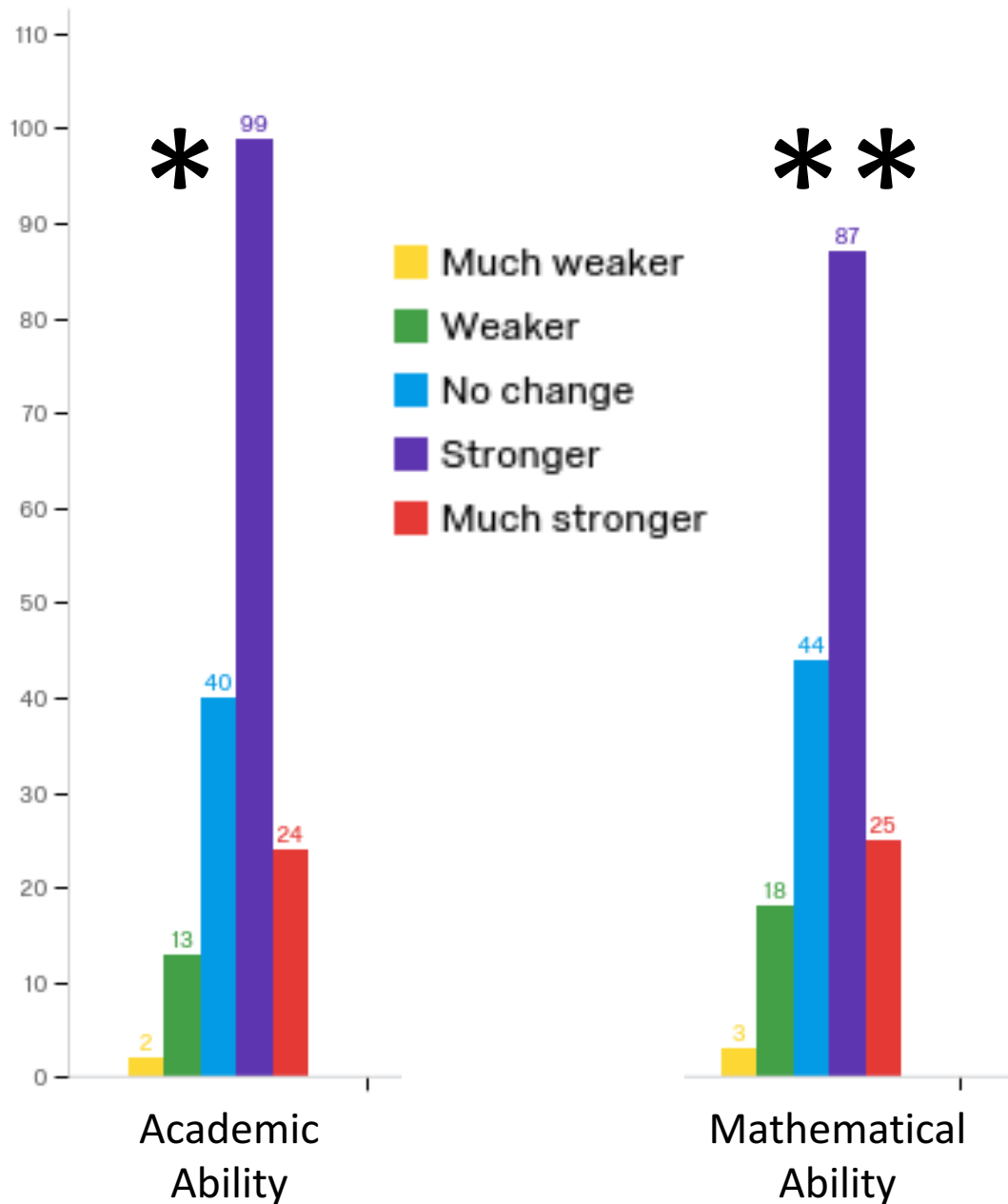
Academic & Mathematical Ability:

5-point scale (much weaker = 1, much stronger = 5)

Male-identifying students perceived greater change toward stronger in both areas:

	Male-ID	Female-ID
• Academic*	3.89	3.58
• Mathematical**	3.91	3.38

* $p<0.05$

** $p<0.001$

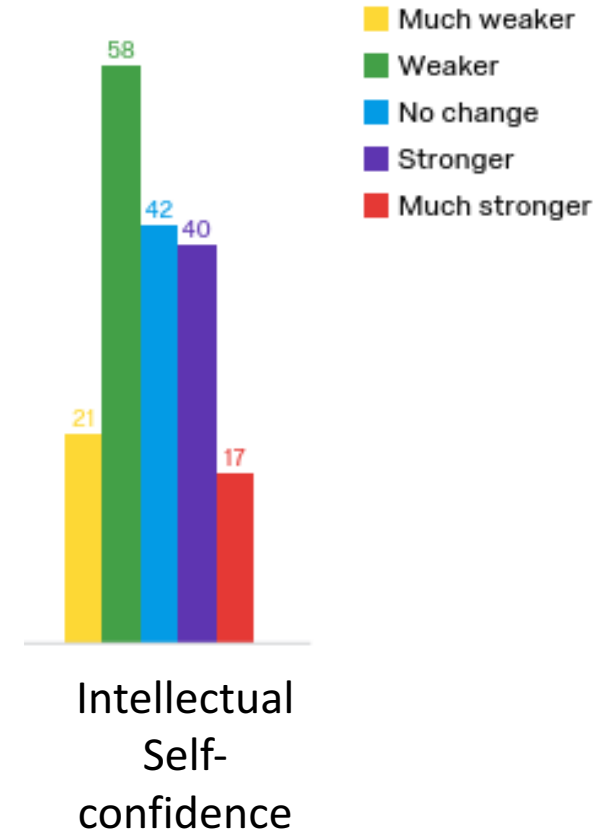# Intellectual self-confidence:

- **Male students: on average, stronger**
- **Female students: on average, weaker**

Male-identifying students: 3.18
Female-identifying students: 2.54

(p < 0.001)

∗∗

Legend:
- Much weaker
- Weaker
- No change
- Stronger
- Much stronger

Values: 21, 58, 42, 40, 17

Intellectual Self-confidence

Qualitative Themes

- **Less confident** but **more supported** than in high school
- **Imposter syndrome**
- Feeling like you **can't help others as much as they help you** academically
- Hard to find **time to think and study** in depth (most academic time spent meeting deadlines)

Much weaker
Weaker
No change
Stronger
Much stronger

58
42
40
21
17

Intellectual Self-confidence
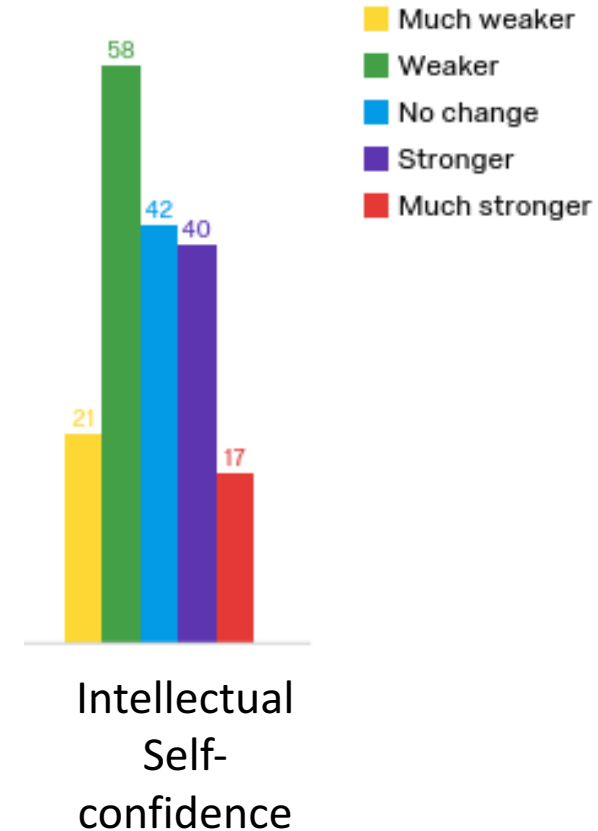
Questions & Discussion:

Independent of actual potential and/or performance, **how might students' confidence and beliefs about their abilities manifest** in class/elsewhere?

What ideas come to mind to help with this?

Discussion

Conversation 1 – Student confidence and beliefs about their abilities

-some women students have been told that they didn't belong here by their peers (and that criteria have been loosened to let them in)

-not supported by incoming SAT scores, etc.

-FSRI program is giving students (women, URM, first gen) research experience and functioning as equitable access / opportunity program but students wonder why they are being invited to join and ask if it's a bridge program

-students who are invited and do FSRI have better math scores in first quarter than those that are invited and chose not to do FSRI

-solutions: have admissions explain why and how students are being accepted

-students should have access to information about admission rubrics / expectations

-info about women having higher SAT

-give more info to students during frosh camp about the demographics of the incoming class and break out by demo groups

-placement exam grades for physics haven't changed over time (nor has the physics exam changed since 1980)

Discussion (cont.)

how might students' confidence and beliefs about their abilities manifest in class?

-women might not apply for opportunities (e.g. physics Ph11)

-solution: send emails invite them

-less confident students might be less likely to join study groups

-less confident students / struggling students might choose to work alone

-solution: check in with students during class

-solution: being clear with students about finding help and what resources exist

-less confident students might be less likely to raise their hands during class

-this may not be reflective of their knowledge

-potential solution: stratifying students by aptitudes / scores into recitations or sections

-Q. how to determine gaps in prior knowledge / familiarity vs. capability?

-issue: students who are upset / disagree that they are not as smart as they think they are (or may not have the context to adequately place themselves with their peers)

-issue: objection is usually because students think they will be denied opportunities instead of thinking that they are smart enough that they should have placed out

Discussion (cont.)

-solution: at frosh camp, have upper year students who had to go through writing class or through basics / remedial recitation to talk about how it helped them, how they were still able to have opportunities and be successful

-issue: students are self-sorting as to whether they are 'grad student' material based on mid-quarter results and placement test results

-solution: because ill-defined what is necessary to get into grad school, give students an idea of what is necessary (and reduce panic)

-issue: students are taught K-12 that there is a linear track

-note: UGs comment that freshmen year is the first time to start thinking about / figuring out what they want to do with their lives

-note: UGs comment that the pre-freshmen classes (e.g. FSRI) would be helpful to mitigate issues of not having taken AP classes

-solution: freshman advisors need more information about reasonable expectations for graduate school for each of the different disciplines

-note: UG upper-year students don't give the best advice to freshmen students and advice might be wrong / out of date
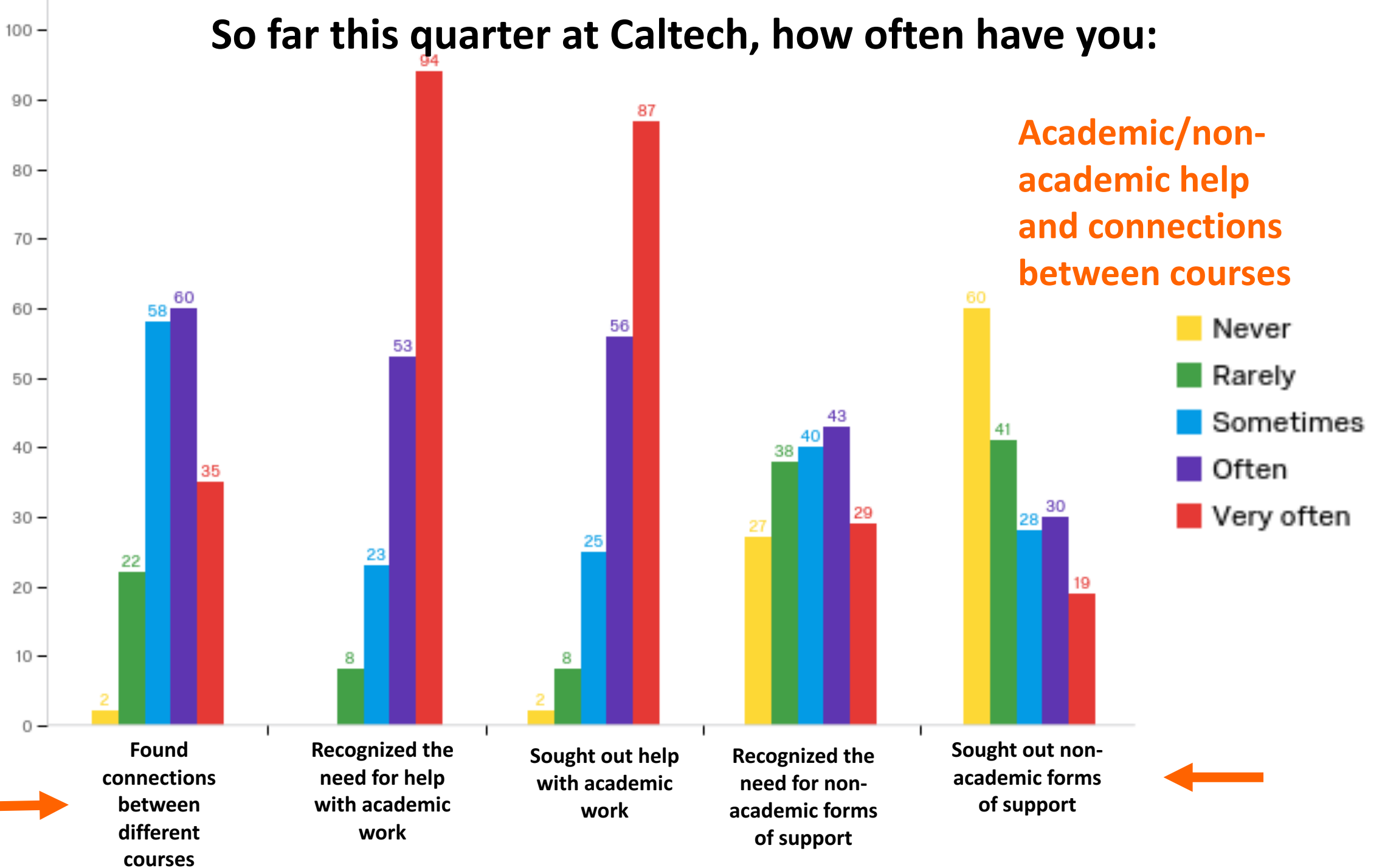
-solutions: give equal opportunity to participate / active learning / structure

Class of 2021: mid-quarter fall

- Need for/use of resources: Academic & non-academic

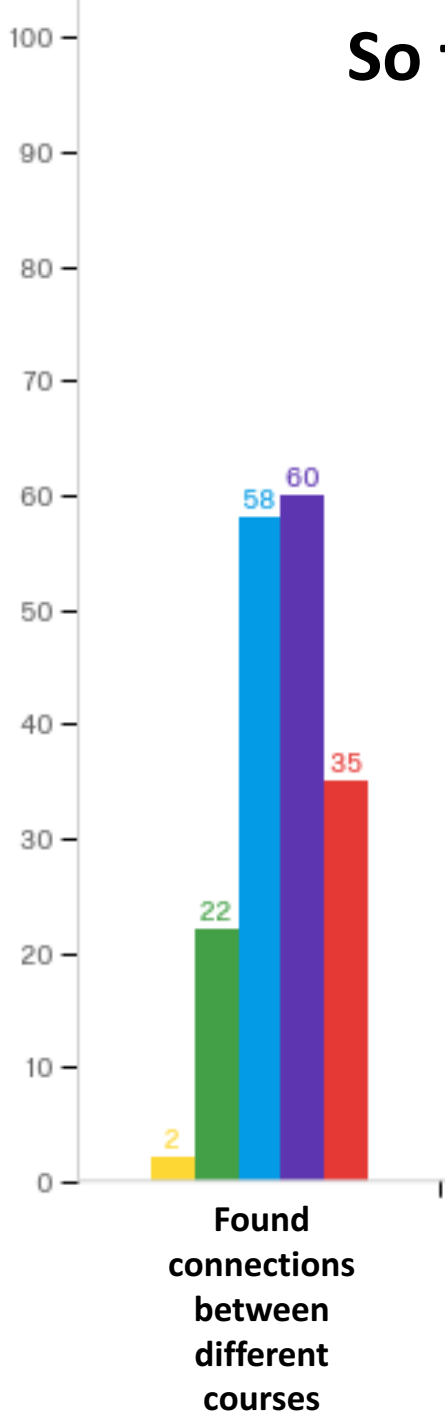# So far this quarter at Caltech, how often have you:

Frosh:
Mixed in seeing connections

Upperclass:
May see more connections (anecdotal)

Relationship between expertise and richly-connected knowledge structures

Discussion

Students seeing connections between coursework:

-frosh are not able to see the connections between classes in core whereas upper year students are better able to see how the courses connect

      -solution: peer advising about what courses students should take

-solution: would be nice to understand how things connect (why am I taking this course and why do I need it if it's not my major?) -> might be best to do this in the courses themselves -> make the connections to other courses

-e.g. problems in core courses where it's demonstrated how math is applied to physics, etc
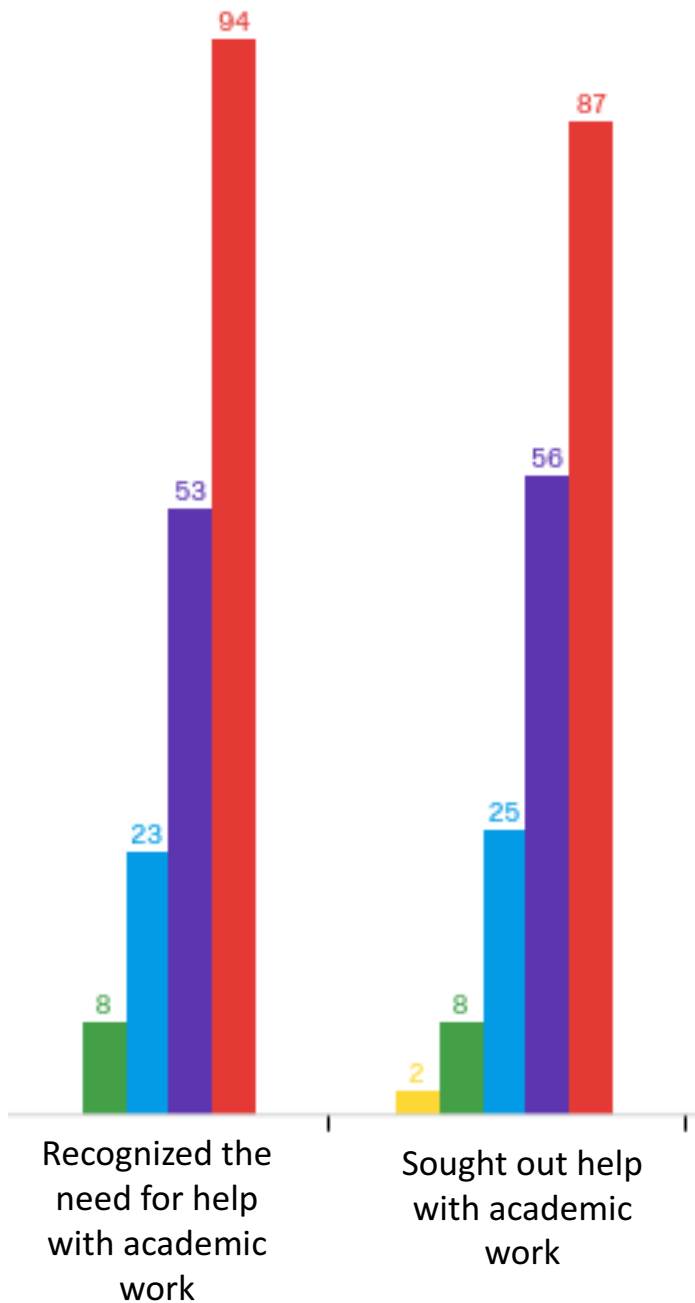
Non-academic support:

Larger gap between **recognizing and seeking help**

- 72 students often or very often recognized the need and
- 49 often or very often sought out support

Never
Rarely
Sometimes
Often
Very often

Recognized the need for non-academic forms of support

Sought out non-academic forms of support
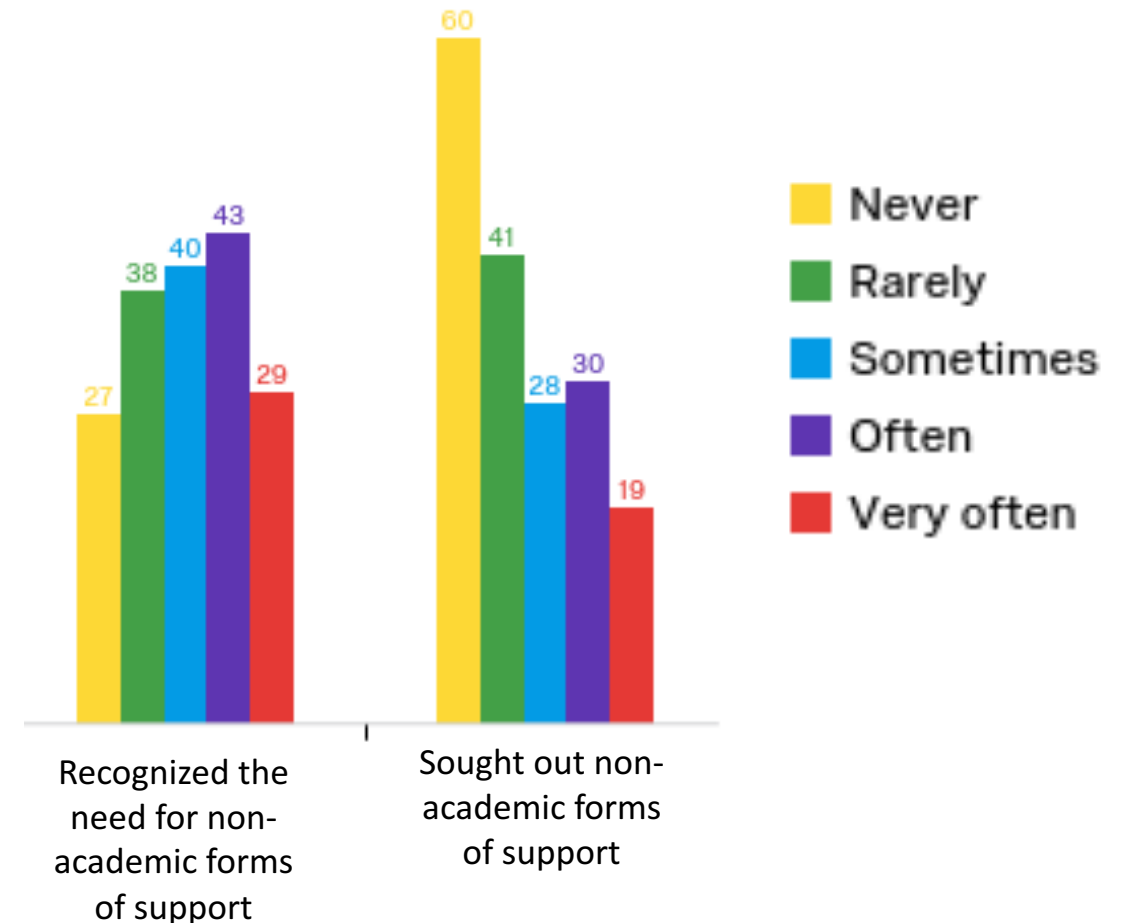
Questions & Discussion:

- How might we encourage students to seek help & using resources?

- Academic and non-academic?

Seeking help & using resources

- Periodically reinforce helpfulness and normalcy of use of resources.
- Give specific examples of when resources may be useful and easy ways to access.
- Emphasize/reinforce a growth mindset in classes/advising: E.g.:
  - Struggling does not imply lack of intelligence.
  - Normal to get things wrong and work hard in this class/at Caltech.
  - Frequent feedback & opportunities to improve.

Discussion

-How might we encourage students to seek help and using resources?

-dean's tutors can be found on the website (myth that you have to contact the dean directly)

-tell students about resources available to them (e.g. HWC tutors)

-advertise resources to students

-give students information about what office hours are and how to attend them (and what your expectations are as faculty members)

-advisors should normalize access to help such as the counselling center

-UGs: 'How to Succeed' panel has been successful for students; perhaps need to do something for non-academic help as well

-solution: changing perception of office hours as something you use when you don't understand to something that you do when you want to learn more / how to be successful in a class by using TAs / instructors by attending their office hours

-making office hours more accessible

-changing thought process that you learn by going to class, going to recitations, going to office hours and learning with your TA / go to office hours and learning with your instructor

-resources for students: help.caltech.edu (with all resources listed such that students have a one-stop shop for resources