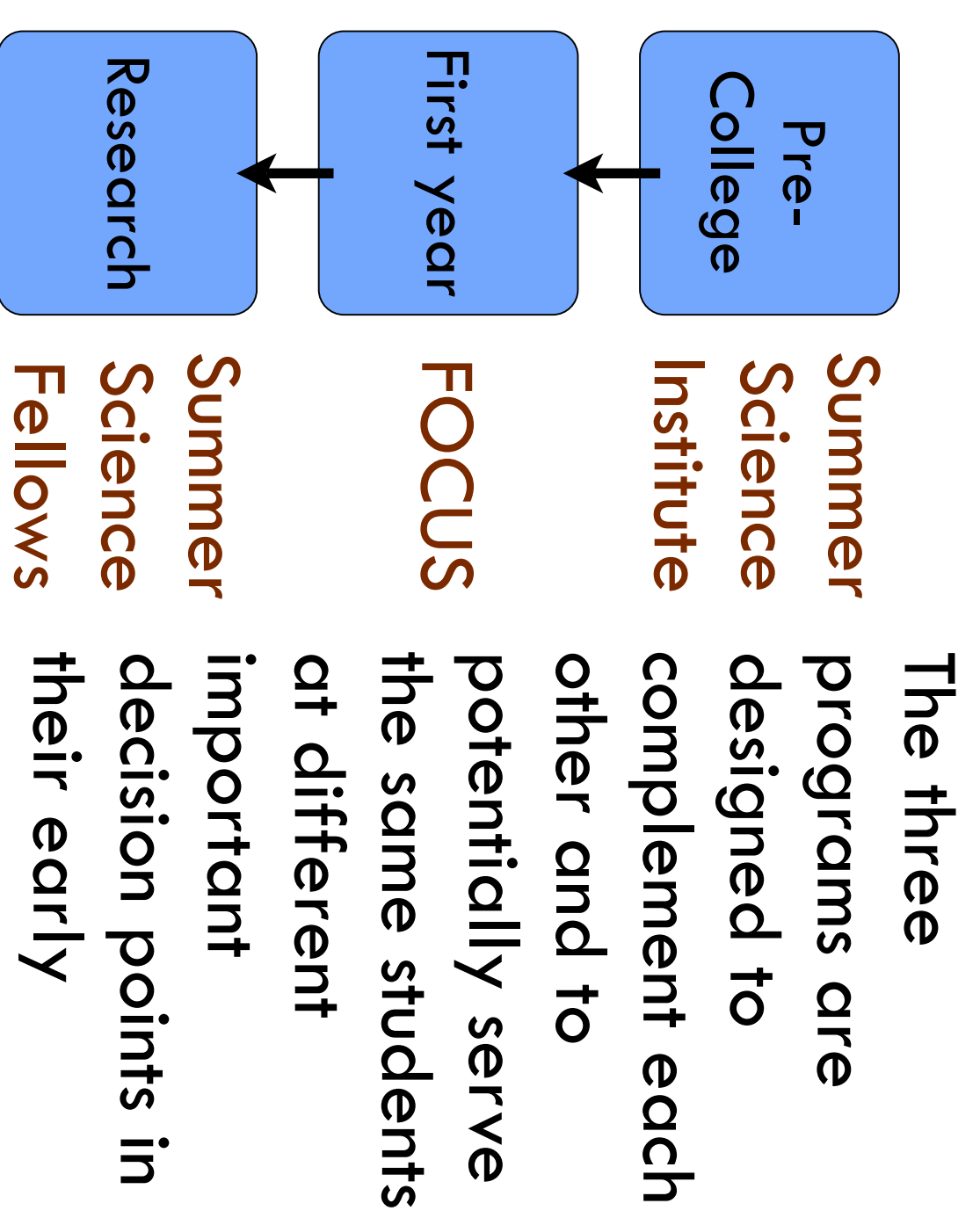


# Three Overlapping Programs Contributing to Broadening Access to the Sciences at Carleton College

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Carleton strives to establish a culture of success for all of our science students. We have created two cohort programs to nurture students from backgrounds that are underrepresented among practitioners in many mathematics and science fields: FOCUS (Focusing on Cultivating Scientists) and CSSF (Carleton Summer Science Fellows) offer programming for students primarily during the academic year and summer research, respectively. FOCUS, embedded in the Carleton curriculum, provides first-year students with academic credit for STEM-related coursework, while continuing to support older students less formally; CSSF provides a smaller cohort of students with summer research stipends for 2 – 3 summers. CSSF students work on or off campus and participate in cohort activities during the academic year. A third initiative is CSSI (the Carleton Summer Science Institute), an intensive program for rising juniors and seniors in high school. Students in the program take courses and participate in research for three weeks

## Sustained engagement.



The FOCUS and Science Fellows programs were designed with insight gained from cohort programs such as the TRIO program, the Posse program, the Meyerhoff Scholars program at UMBC, the Biology Scholars Program at UC-Berkeley, and the Mellon-Mays program.

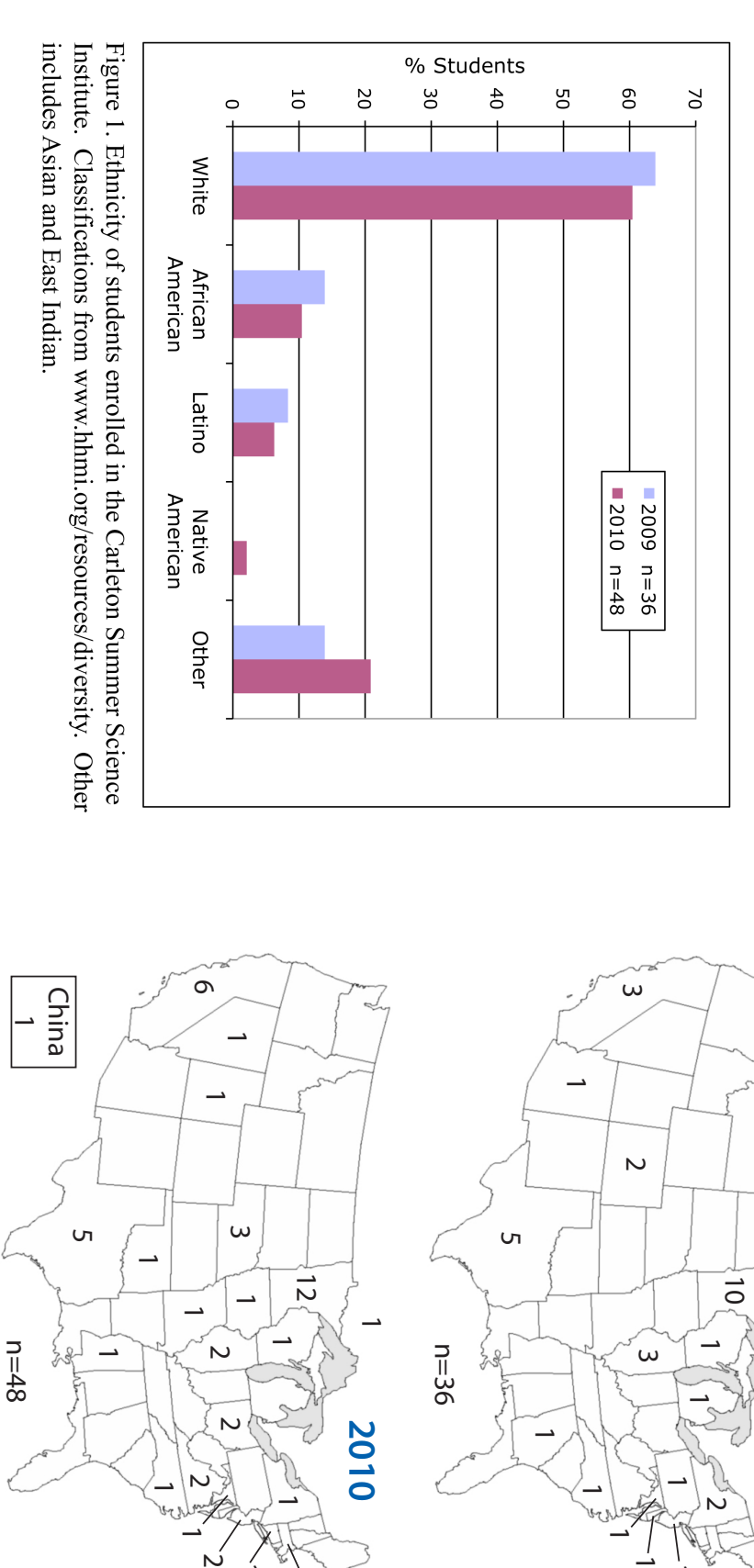
## Support

These programs are funded by the Howard Hughes Medical Institute (HHMI) grant to Carleton College, the North Star STEM Alliance (NSF-LSAMP), and the NSF S-STEM program.

## Carleton Summer Science Institute

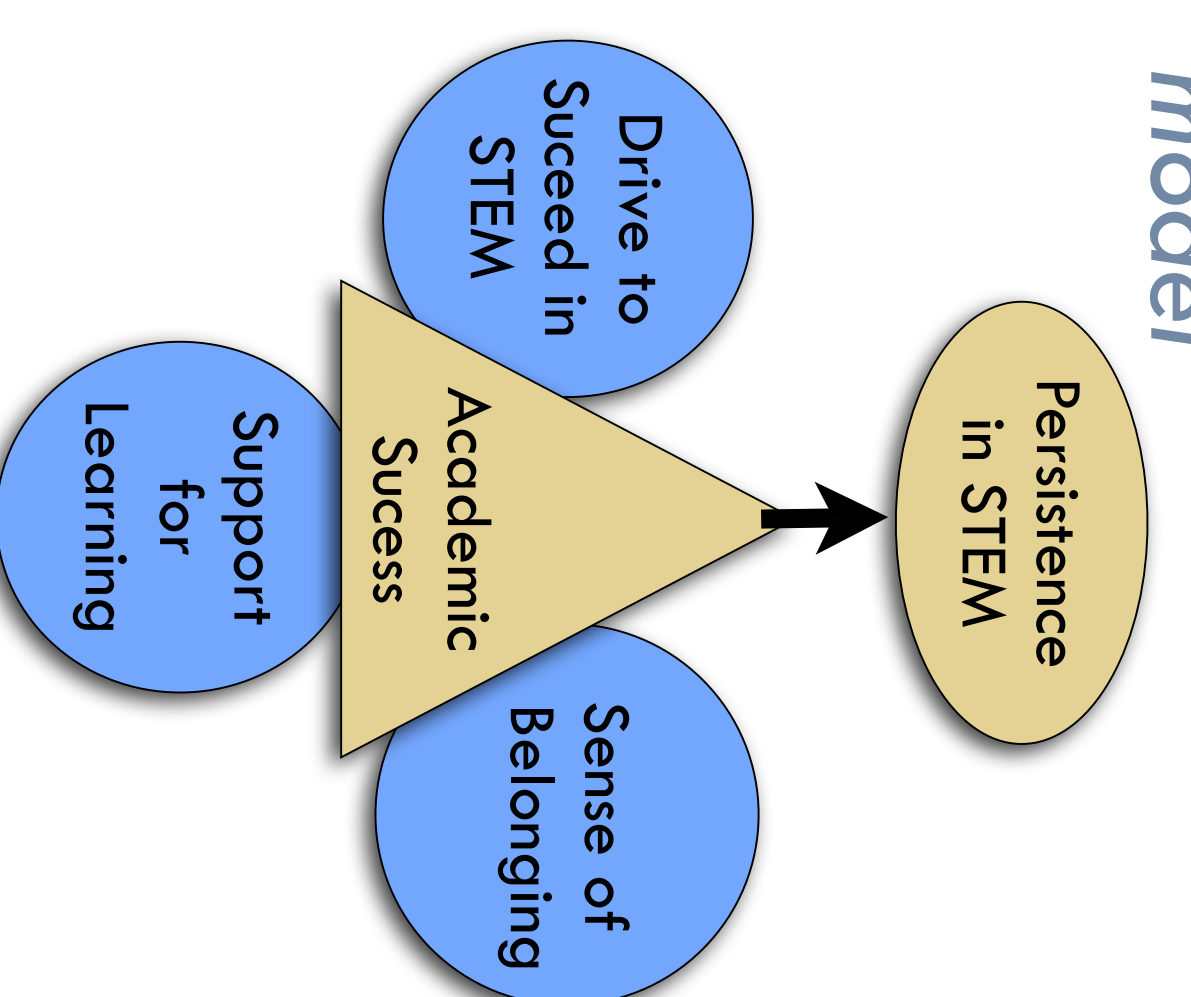
- Enrolls 36-48 students/year
- Tuition based program for high school students with demonstrated STEM interest
- Scholarship availability helps target program to broad range of students
- Curricular components
  - \* Exposure to science not in the high school curriculum - neuroscience, biophysics
  - \* Research experience
  - \* Discussion of science ethics, public policy

## Demographics



## Assessment

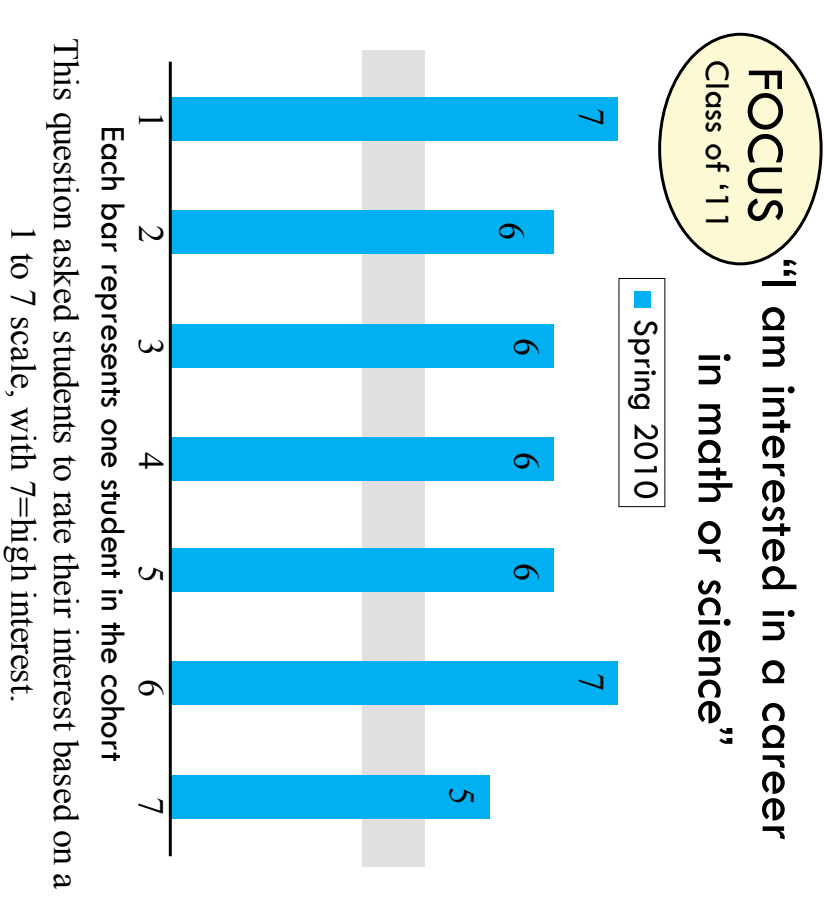
A conceptual model



Academic success is a prerequisite for persistence. Supporting academic success is the aim of our cohort programs, so our assessment thus far has centered on measuring components of that support.

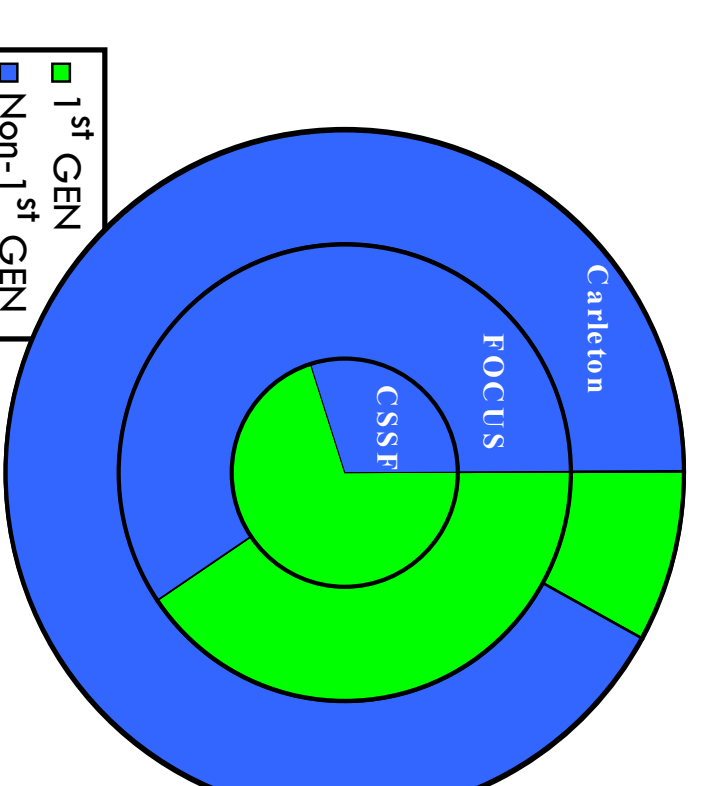
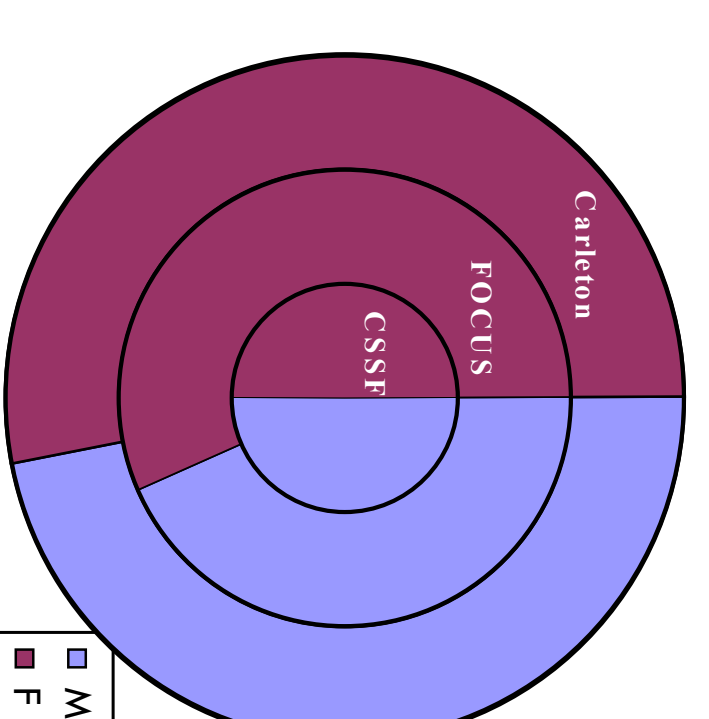
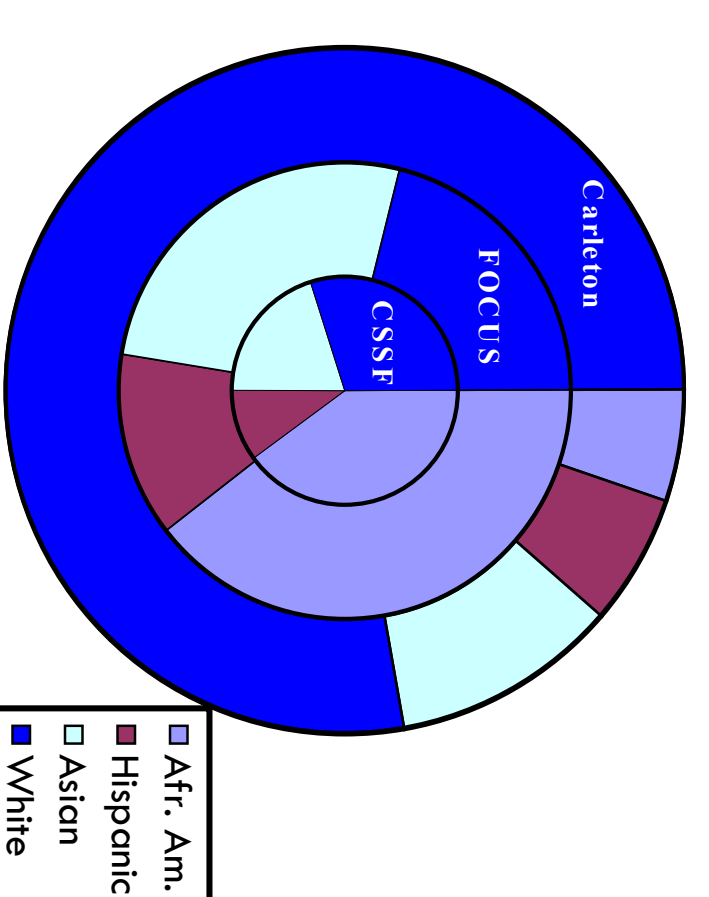
## Drive to Succeed

This is fueled by excitement over new knowledge and exploration in faculty-student research: three SSF student interviewees described their research as exciting because the research was geared to answering a relevant issue and was new not only to the students but also to the professors mentoring them. One student said, “so it’s fun... Some of the stuff [the faculty member] hasn’t even done yet either. He’s just giving it to us to try and figure it out. And as we prove it, we explain it to him.”



## FOCUS

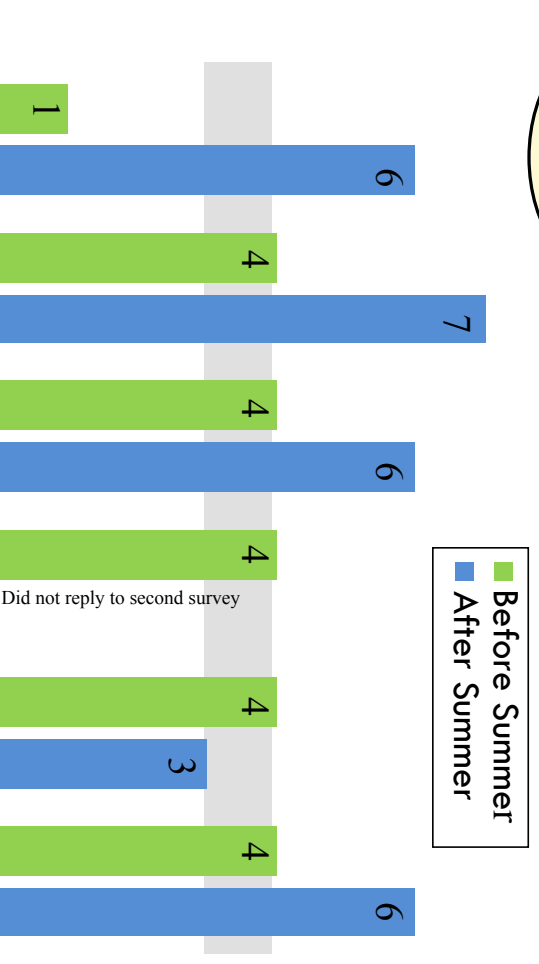
- Enrolls 9 - 15 students/year.
- Curricular components include:
  - \* First-year seminar
  - \* Year-long colloquium
- Project work related to STEM
- Peer-mentoring program in STEM
- Work-study opportunities
- Advising by STEM faculty
- Opportunities to work with multiple STEM faculty members
- Community building



## Support for Learning

The Summer Science Fellows opened students’ eyes to scientific and math career options, gave them greater comfort in lab settings, helped them gain more in-depth knowledge about subject matter through hands-on learning, and helped them learn how to learn from their peers. One of the science fellows told us in an interview that her summer research project gave her a better understanding of a particular field of study than a course on the same topic: “It’s like I get a behind-the-scenes on the classes... You’re seeing how it all functions, not just the theory behind it.”

First CSSF Cohort  
 “My knowledge about where to find research resources is”

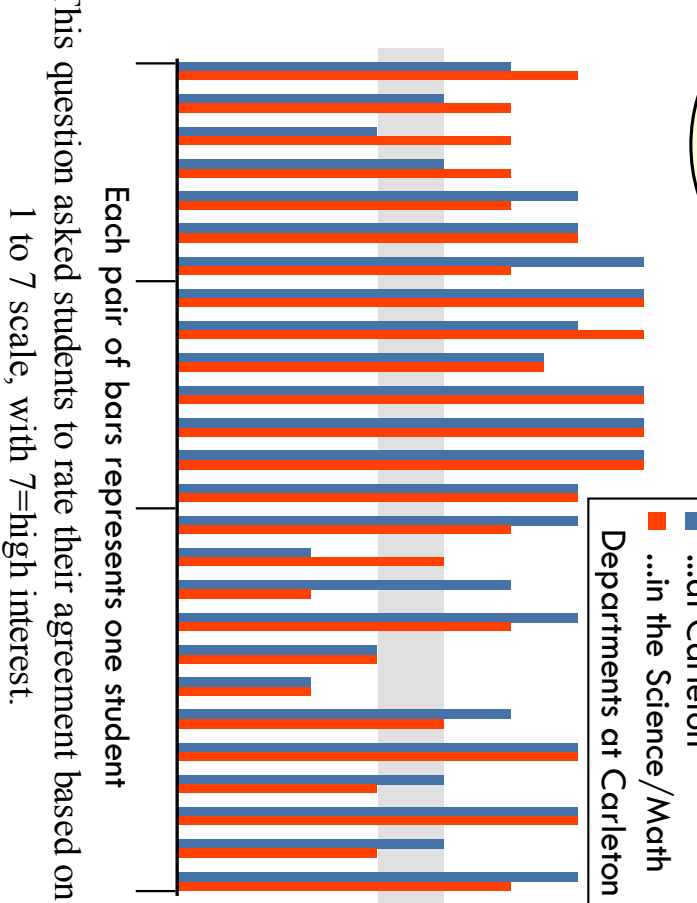


Each pair of bars represents one student in the cohort. This question asked students to rate their knowledge based on a 1 to 7 scale, with 7=high.

## Sense of Belonging

The cohort programs create connections with students and faculty in Carleton’s math and science community, and foster social/academic support among students in the cohort. One SSF student described the support he/she received from her fellow science fellows: “My science group has helped me get through difficult portions of my research during the summer as well as being my friends. This group has helped me navigate my scientific pursuits at Carleton.”

All FOCUS Classes



Each pair of bars represents one student. This question asked students to rate their agreement based on a 1 to 7 scale, with 7=high interest.

## Summer Science Fellows

- Enrolls 4 - 6 students/year
- Students apply in first or second year
- Research stipends for 2 - 3 summers
- Research carried out:
  - \* At Carleton
  - \* At other institutions
- Academic-year activities include:
  - \* Research poster presentation
  - \* Student panel discussions
  - \* Trips to research labs
  - \* Community building

## Outcomes

### FOCUS

- Of the 23 students who have declared majors:
  - 19 are STEM majors (Bio, Chem, Geo, Math, Physics, Psych)
  - 9 will have completed at least one summer of research by the end of summer 2010
  - Two were selected as HHMI EXROP scholars for Summer 2010
  - 12 will have completed at least one term of study abroad by Fall 2010
- Of the 37 total FOCUS students:
  - More than half have student-work contracts within STEM departments as TAs, mentors, etc.

### Summer Science Fellows

- Of the 6 returning students in Summer 2010:
  - All were invited to return to their summer 2009 research groups
  - One will continue her work at Carleton College
  - Five pursued other programs (REU, etc.) on their own, with a 100% success rate
  - Three have presented their work at regional or national conferences
- The 10 CSSF students in Summer 2010 will be at Carleton College (4), UC-Berkeley, Columbia, Cornell, Oregon State, Texas A&M, and UW-Madison

## Essential Program Components

- Strong STEM faculty involvement to lead the programs
- Programming designed to help students feel “ahead of the game”
- Support from the Administration
- Funding to buy:
  - \* Faculty time
  - \* Course replacements
  - \* Assessment support