



Lab  Central
ignite

SSSTAR

SUPPORTING STUDENTS IN STEM

transforming and advancing representation

YEAR 5 ANNUAL REPORT



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OVERVIEW



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MEASURING IMPACT



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GRANTEES



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COLLECTIVE ACTION



OVERVIEW: STRENGTHENING AND DIVERSIFYING THE FUTURE STEM WORKFORCE

In 2017, Biogen, a global biotechnology company headquartered in Kendall Square—one of the world’s most powerful and innovative life sciences and technology hubs—initiated a new philanthropic approach to strengthening and diversifying the STEM workforce pipeline. Employment in STEM fields is projected to continue growing: between 2020 and 2030 there will be an estimated 10.7 million additional STEM jobs in the US, an increase of 10.7%, compared with 7.5% for all other occupations. In Massachusetts, STEM jobs will account for 40% of total employment growth through 2028. Yet students from under-resourced communities are disproportionately unexposed to and unprepared for STEM careers. More than

a third of Black (40%) and Latino (37%) students drop STEM majors before earning a degree, compared with 29% of white STEM students. Locally, in Cambridge Massachusetts, only 16% of Black eighth graders and 28% of Latinx eighth grade students are meeting grade level expectations in math, compared to 59% of White and 70% of Asian peers. In Somerville, 22% of Black eighth graders and 14% of Latinx eighth grade students are meeting expectations in math compared to 46% White and 50% Asian peers.

The STAR Initiative is a \$12 million, five-year investment that brings together several high-performing nonprofits and the Cambridge and Somerville, Massachusetts public school districts in a coordinated network to serve students grades 6-14 who have been historically underrepresented in STEM college and career pathways, including students of color, economically disadvantaged students and English language learners.



ANALYSIS SHOWS

over the past five years, STAR students in both school districts have enrolled in and passed more STEM courses than their peers.





BUILDING AN EQUITABLE STEM EDUCATION ECOSYSTEM



Over the past five years, STAR has served over 4000 students and over 600 educators across Cambridge and Somerville. STAR's collective action and longitudinal approach to advancing STEM education equity has resulted in positive outcomes for students. Analysis shows that over the past five years, **STAR students in both school districts have enrolled in and passed more STEM courses than their peers.**

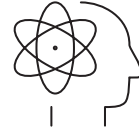
The Biogen Foundation is excited to have entered into a new partnership with LabCentral Ignite to grow and deepen STAR's reach and impact in its next chapter. As of July 2023, while the Biogen Foundation remains a lead funder, STAR has transitioned to becoming part of LabCentral Ignite's broad

Kindergarten-Boardroom platform for diversifying the STEM profession pipeline. This sustainability strategy positions STAR to scale its foundational work by shifting from being funded solely by one life sciences company, to becoming a locus of local STEM ecosystem building work that's supported by multiple companies and other funding sources. Biogen Foundation and LabCentral Ignite are thrilled to welcome Pfizer as a new investor in this critical work.





OVER THE PAST 5 YEARS



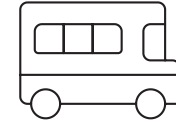
4000+

Students



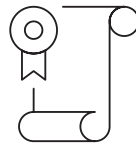
600+

Educators



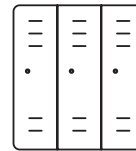
2

School Districts



6

Nonprofit Grantees



15

Schools Served



92%

of STAR Students are from social identity backgrounds underrepresented in STEM



87%

of STAR 9th graders from low-income households passed all STEM courses (vs. 78% of non-STAR peers)



49%

of STAR high school students from low income households choose honors level science courses (vs. 39% of non-STAR peers)





REFLECTING ON 5 YEARS OF IMPACT

STAR has enabled grantee organizations to increase and deepen their capacity to help students of color, economically disadvantaged students and English language learners develop and sustain their interest in STEM, gain necessary STEM exposure and enrichment opportunities, and successfully transition into postsecondary education in pursuit of STEM careers. Through STAR, grantee organizations have been able to increase the number of students and schools they serve, deepen and expand programs, and help hundreds of educators engage students in STEM subjects more successfully.

“The STAR Network is the type of systemic approach required to meaningfully address systemic issues related to how racism, sexism and other forms of oppression prevent equitable access to STEM careers.

— YOUNG PEOPLES’ PROJECT



This report highlights the STAR Initiative’s accomplishments in Year 5 (2022-2023 school year) as well as the impact achieved over the course of STAR’s first five years.

92%
of STAR Students are from social identity backgrounds underrepresented in STEM.

41%
of all Somerville Students in grades 6-12 that identified as Black, Latino or low-income participated in at least one STAR program.

27%
of all students grades 6-12 in Cambridge who identify as Black, Latino or low-income participated in at least one STAR program.





MEASURING IMPACT



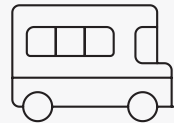
4000+

Students



600+

Educators



2

School Districts





LEADING INNOVATING IMPACT MEASUREMENT OF STEM ECOSYSTEM WORK






"Having access to data specialists is a huge success and an extremely valuable offering. The data, especially student trends and patterns, is critical for making the case for afterschool programming even stronger."

— THE YOUNG PEOPLES' PROJECT

One of the most important and unique aspects of the STAR Initiative that stands out in the national landscape of STEM education ecosystems is the engagement of both the Cambridge and Somerville public school districts in the network. In order to strengthen the partnerships between out-of-school-time programs and schools, and maximize the potential to measure STAR's impact, the Biogen Foundation began supporting STAR Data Specialist positions in each school district in 2020. Analysis by the Data Specialists is showing that STAR is making a positive impact on student engagement and performance in STEM subjects.





For example:

-  STAR students are enrolling in honors level STEM classes at higher rates than peers not enrolled in STAR
-  STAR 9th grade students enroll in and pass more STEM courses than peers not enrolled in STAR
-  The STAR Data Specialists roles have contributed to systems-level change by adding capacity to both school districts' ability to assess out-of-school-time programs' impact on students.



STAR STUDENTS ENROLL IN HIGHER LEVEL STEM COURSES

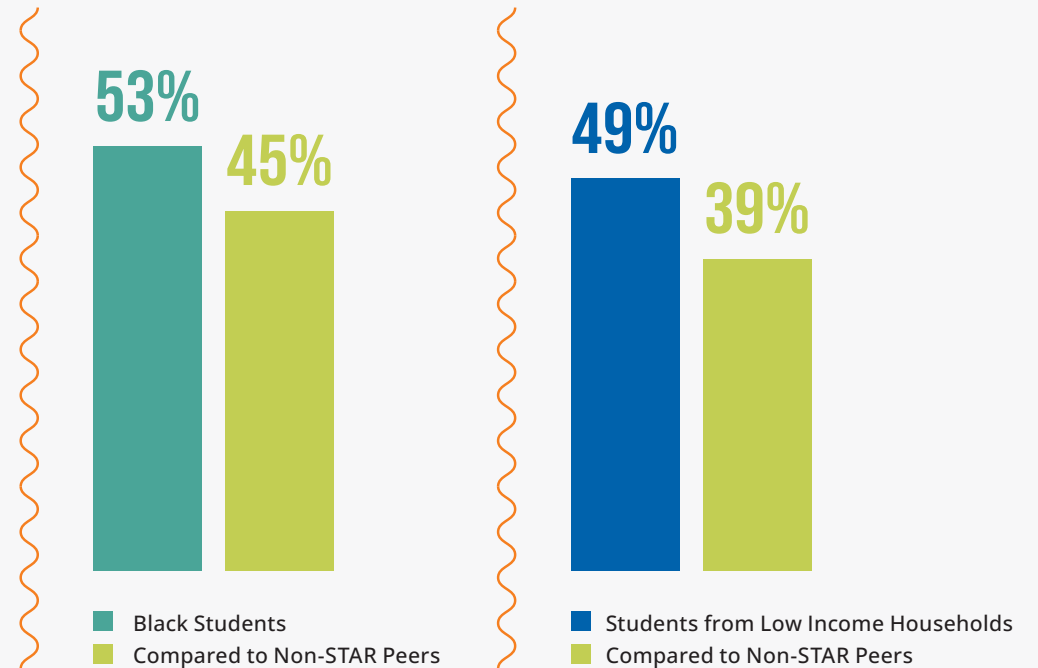
Deciding to enroll in an honors level STEM class demonstrates that students may:

-  Believe they are STEM competent
-  Feel they belong in STEM spaces
-  See STEM as important for their future success
-  Have experienced support in STEM spaces

Enrollment in honors STEM courses is demonstrative of **higher STEM motivation** and sets students up to be **college ready** in STEM majors.



Across both Cambridge and Somerville, students participating in STAR choose to take honors level of Geometry, Algebra II, Chemistry and Biology at statistically greater proportions than their non-STAR peers from similar social identity backgrounds.



"We've learned more about the needs of the students that the district and providers serve and innovative ways to meet those needs."

— ROBERT EMERY,
Data Specialist, Cambridge



STAR STUDENTS ARE STARTING HIGH SCHOOL WITH STEM SUCCESS

Passing core 9th grade courses keeps students on track to graduate and passing all STEM courses in 9th grade keeps doors open to pursue more rigorous STEM courses.

Across both Cambridge and Somerville, students participating in STAR have passed all STEM Courses in 9th grade at a higher rate than their peers.



86%

79%



Black and/or Latino Students
Compared to Non-STAR Peers

87%

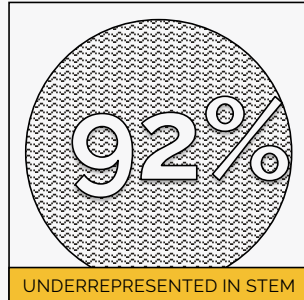
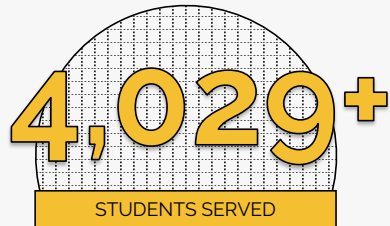
78%



Students from Low Income Households
Compared Non-STAR Peers



PUBLIC DATA, ACCESS TO EMPOWERMENT



STAR programs specifically work with students grades 6-14 who are traditionally underrepresented in STEM fields. This includes students that identify with one of more of the following: Women/Girls, Black/African American, American Indian/Alaskan Native, Pacific Islander, Hispanic, Latinx, LGBTQ+, Multilingual Learners, are from low-income households, and/or receiving special education services. Students can participate in more than one program and many participate for multiple years! We can proudly say that we have worked with 4,029 unique STAR students across Somerville and Cambridge!

REPRESENTATION IN THE FIRST 5 YEARS OF STAR

54%	Latinx	13%
19%	African American/Black	43%
27%	Multilingual Learners	9%
68%	Low Income	49%



WITH THE HELP OF STAR...

21+

New STEM Programs Established

17+

STEM Programs Expanded or Deepened

87%

Underrepresented 9th Graders Passed ALL their STEM Courses

STAR GRANTEE ORGANIZATIONS

110+

High Schoolers Trained as Math Literacy Workers



YPP uses math literacy work to develop the abilities of elementary through high school students to succeed in school and in life through peer-to-peer learning and teaching opportunities. YPP trains, employs, and supports high school students as math literacy workers that help their younger peers after school and in the summer.

2

MONTHS MATH GROWTH

During summer programming, while other students typically experience loss in skills.



BTGB is a six-year model that prepares highly motivated low-income students starting in 6th grade through high school graduation with academic programming -- including in STEM subjects-- and college access programming. BTGB also trains the next generation of urban teachers using a unique Students Training Students model.

\$624,728

Scholarship funds awarded to students in 2021-2022.



Enroot empowers multilingual immigrant high schoolers improve academic performance (including STEM subjects), build community and confidence, develop a clear pathway for higher education and career and graduate prepared to transition to and graduate from postsecondary education.



77,000

Streams on Instructables, an open access site for sharing lesson plans.

Lesley University STEAM Lab supports educators to increase student engagement as they explore, test, and refine hands-on real world, student-centered activities in a way that is responsive and catered to the specific needs of their students.

PUBLIC DATA DASHBOARDS SHOWCASE STAR'S IMPACT

This spring the STAR Data Specialists created public Data Dashboards. The dashboards provide one location to publicly share out STAR's impact, including district-level data to explore and common outcomes across school districts in a nearly identical format.

To learn more, visit [STAR's Data Dashboard here.](#)



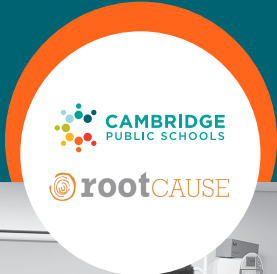
INCREASING SCHOOL DISTRICTS' CAPACITY TO ASSESS IMPACT OF OUT-OF-SCHOOL-TIME PROGRAMS

The STAR Data Specialists' work has strengthened capacity in both Cambridge and Somerville school districts to assess the impact of out-of-school-time (OST) programs on students. The extensive impact of these positions were highlighted in a white paper co-authored by Cambridge Public Schools and Root Cause in December, 2022.

"The work of the STAR Data specialist has had a direct impact, one for one, on the needs of Cambridge Public Schools (CPS) to capture all OST partner data. Every work product created for the STAR Initiative has been employed by CPS with all other OST partners. The initial 18 months of this partnership has moved CPS forward years in respect to managing OST partner data."

— **STEVE SMITH, Chief Information Officer,**
Cambridge Public Schools

The Biogen Foundation STAR Initiative & CPS Impact



December 2022

9th Grade Passing Rate from 2018/19 to 2021/22 School Years

Category	STAR	Cambridge
SCIENCE		
Economically Disadvantaged	89%	81%
Black		
STAR	86%	83%
Cambridge		83%

9th Grade Passing Rate from 2018/19 to 2021/22 School Years

Category	STAR	Cambridge
MATH		
Economically Disadvantaged	91%	83%
Black		
STAR	89%	83%
Cambridge		83%

Percentages in Honors-Level STEM Courses 2018/19 to 2021/22

Category	STAR	Cambridge
SCIENCE		
Economically Disadvantaged	55%	42%
Black		
STAR	59%	39%
Cambridge		39%
BIOLOGY		
Economically Disadvantaged	61%	45%
Black		
STAR	60%	45%
Cambridge		45%
CHEMISTRY		
Economically Disadvantaged	55%	46%
Black		
STAR	56%	42%
Cambridge		42%




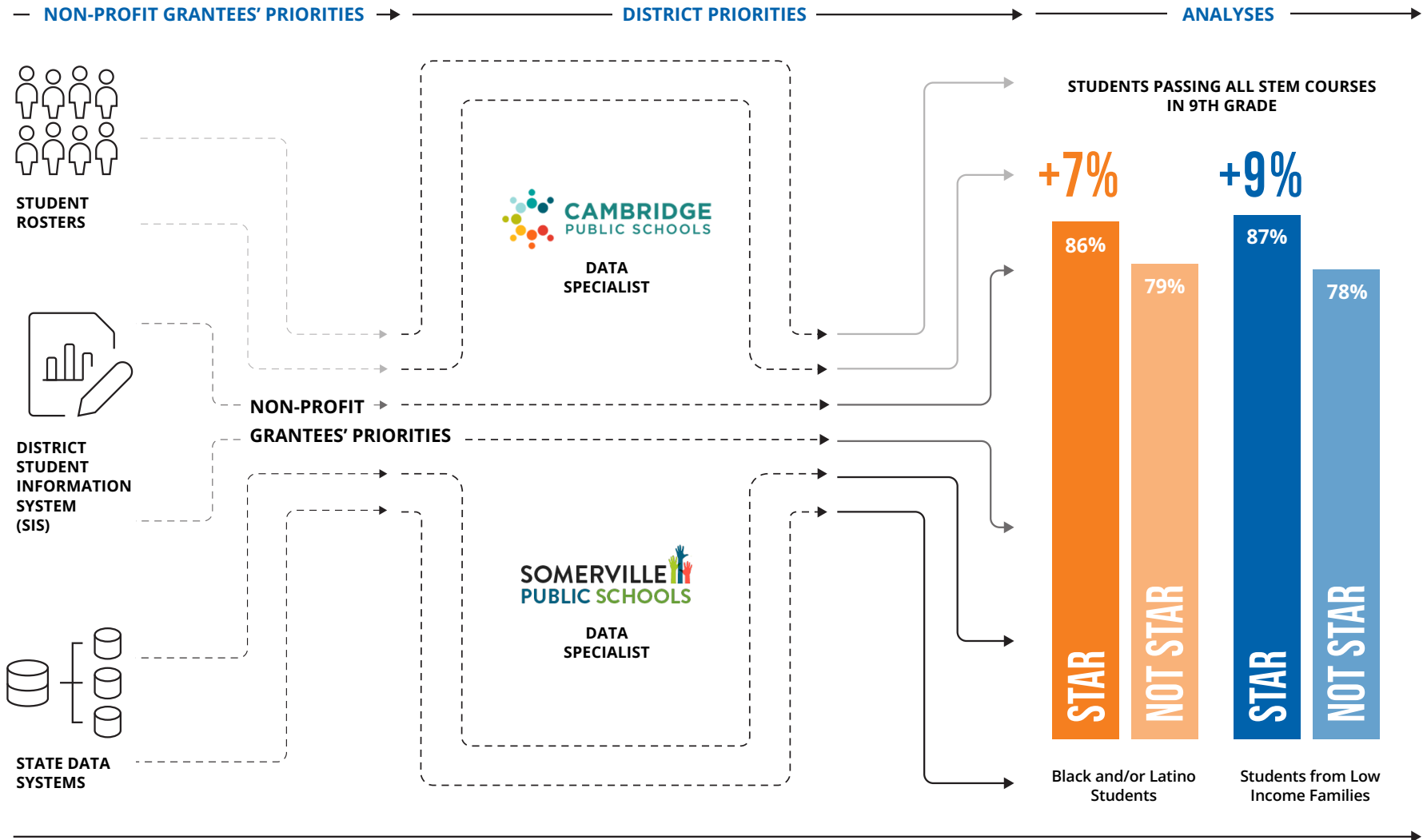
Photo Courtesy of Breakthrough Greater Boston (BTGB)

Learn more and read the report [here](#).



SHARING STAR'S UNIQUE APPROACH TO EVALUATION WITH A NATIONAL AUDIENCE

In April, 2023, Root Cause facilitated a panel presentation on the impact of STAR's data collection and evaluation at the National Partnerships for Educational Access (NPEA) conference in Boston. Panelists included the STAR Data Specialists from each district, and the Co-Director of Cambridge Agenda for Children and Out-of-School Time. An audience of educators, administrators and researchers engaged with the panel around the unique insights the Data Specialists can capture through their roles accessing district-wide data.





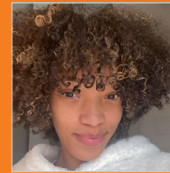
ADVANCING EQUITY: FOSTERING SCIENCE STARS

When Jada first joined the STAR Initiative five years ago, she didn't think her future college career would center on STEM. Now a senior at Cambridge Rindge and Latin High School, she is applying to leading East Coast universities with plans to major in a STEM-based field like biotechnology. Jada is now taking classes like Advanced Placement Environmental Science and Biotechnology .



"I love everything about the program,"

she said. "The instructors are great to work with, and through the years, I've progressed from learning math through STAR to teaching math to middle-schoolers from all different backgrounds. It's pretty cool."





GRANTEES



YEAR 5 ACHIEVEMENTS



STAR Grantees served 1110 students and 137 educators across Cambridge and Somerville in the 2022-2023 school year. In Year 5, STAR programs continued to serve predominantly students of color and economically disadvantaged students:

58%

Low Income Students

77%

Students Of Color



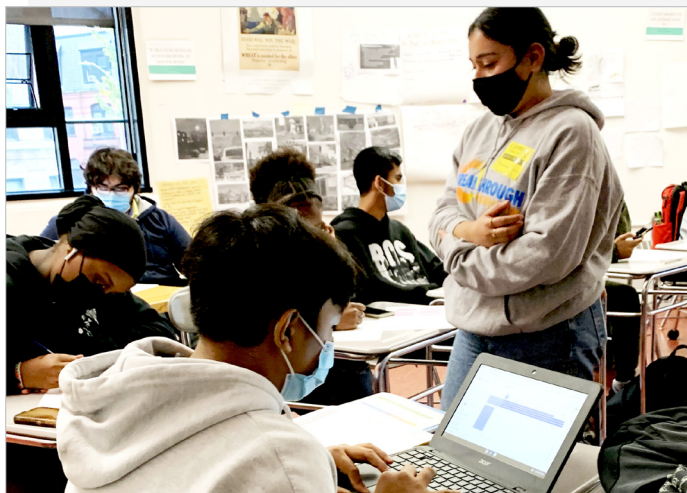


BREAKTHROUGH GREATER BOSTON (BTGB) prepares low-income students for success in college by providing them with academic support—including in STEM subjects—and college preparation and application support, from middle school through high school. Additionally, it trains the next generation of urban teachers using a unique Students Teaching Students model.

STAR funding has enabled BTGB to significantly increase their impact—geographically and programmatically—in order to provide more hands-on, inquiry based learning and career development opportunities for their students.

IN YEAR 5

- **57 Teaching Fellows** received 500 hours of training, mentorship, professional development, and classroom experience during the summer of 2022:
 - 71% of Teaching Fellows made gains in their overall skills.
 - 88% indicated they feel prepared to pursue a career in teaching.
 - BTGB implemented **intensive college readiness programming** for 11th & 12th graders.
- Increased **experiential learning opportunities** through site visits to local STEM industry leaders like Biogen, Broad Institute and Google where students learned about STEM careers and connected to mentors.
- 100% of BTGB '22 students who applied to college were accepted.
- 93% immediately enrolled in a 2 or 4 year college.
- BTGB is on track to far exceed national college graduation rate of 14% for low-income students.



500+

low-income
7-12th grade
students were
served

94%

attendance
rate



“By dedicating the monthly space and scheduling the time for intentional and thoughtful collaboration, STAR has successfully navigated a significant challenge to collaboration. Given the crisis of COVID, it could have been easy for organizations to get stuck working in isolation. Instead, STAR has helped foster collaboration to ensure we are learning from each other and working cross-functionally to improve the lives of our students.” — BTGB



ENROOT empowers low-income, immigrant youth in high school to achieve academically, personally, and professionally. Enroot provides academic support including STEM subjects, and inspiring out-of-school opportunities like internships in STEM-related fields, and guidance for post-secondary education. STAR funding enabled Enroot to serve more students, increase the amount of STEM offerings, and create new programs to best fit their students' needs.

IN YEAR 5

- Enroot served **94 English language-learner high school students** across Cambridge and Somerville and expanded support by launching programming with Somerville 8th graders in an effort to better support students as they transition to high school.
- In Somerville, Enroot **deepened student support** by working closely with school counselors to increase mental health supports, and with their Multilingual Learner Education Department and Tutor Program to help students obtain peer support jobs - such as tutors and Computer Lab Assistants - in their schools.
- Enroot expanded their **College Success Program** to support students through their transition to postsecondary opportunities and beyond.
- **Enroot increased STEM career exposure opportunities** through internships, seminars, company visits, career panels, and workshops. One-third of all Enroot interns are in STEM-related positions.



150

college applications submitted

\$600k

in scholarships received



"Because of Enroot I am the first in my family to attend college in the United States. Enroot helped me achieve my goals that I saw as a long shot. I work for the company of my dreams. Enroot helped me balance both school and work while also helping me find resources to fund my four year degree." — **ENROOT STUDENT, Computer engineering major**



LESLEY University contributes to the “Teacher Support” component of the STAR Initiative. Lesley University supports teachers to increase student engagement, particularly in STEM subjects, through formal and informal professional development and by co-designing courses with educators that use hands-on, student-centered learning activities.

IN YEAR 5

Lesley began to shift from building capacity of individual teachers to working with entire districts and programs by developing new programming and pathways to advance the achievement of underrepresented youth. Highlights of their work in Year 5 include:

- Continuous development of high-quality, standards aligned **curriculum**:
 - Lesley developed 4 math courses at Cambridge Rindge and Latin high school and helped both districts align curricula between 8th and 9th grades.

- Ongoing collaboration with Somerville teachers to develop AP Computer Science class.
- Developed a Lesley University credit-option course for Cambridge public after school programs’ youth workers.
- Lesley worked with Cambridge Youth (after school) Programs to incorporate STEAM as a central topic in their programming, which will reach 600 students, 87% of whom are from groups underrepresented in STEM.
- Lesley added **35 interdisciplinary videos** on Instructables.com: Resources for students & educators all over the world.



1500

hours of in-person professional development

89

to educators and administrators



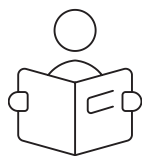
“We are...excited to see the remarkable dedication and commitment to Math Equity in both districts, something that requires thoughtful and tenacious advocacy and understanding.” — LESLEY



UASPIRE ensures that low-to-moderate income and aspiring first-generation college students have the financial information and resources necessary to find an affordable path to and through college. STAR funding has enabled uAspire to expand their services to include college persistence support so they can continue supporting students into their first two years of college. Being in STAR enables uAspire to better connect with and serve students interested in STEM education and career pathways.

IN YEAR 5

- uAspire served **261 students** from Cambridge Rindge and Latin School high school and **188 students** from Somerville High School.
 - uAspire provided ongoing support for 518 students from Cambridge and Somerville in their first two years in college.
 - uAspire **expanded advising capacity** from two days per week to four days per week at Somerville High School.
 - uAspire provided **financial aid education and support** including helping more students complete their FAFSA and other important financial documents before and while attending college.
- 212 Cambridge seniors and 143 Somerville seniors submitted their FAFSAs
 - 105 Cambridge students and 77 Somerville students renewed their FAFSA for their second year of college.
- **uAspire's Succeed Advising program**, which provides ongoing support for students through their first 2 years of college with expanded financial advising, **is now in its second year.**



90%+

of uAspire students who enrolled in college after graduation are still enrolled in their 2nd year



"One of the STAR network's biggest accomplishments has been the space to allow its partners to candidly discuss the challenges its students are facing across both districts, and showcase the value of partnership." — UASPIRE





THE YOUNG PEOPLE'S PROJECT (YPP) uses math literacy work to develop the abilities of elementary through high school students to succeed in school and in life, and in doing so involves them in efforts to eliminate institutional obstacles to their success. YPP's programming has two major components: Flagway, a national competitive tournament where students practice and celebrate learning math, and the Computational Thinking Lab, both of which implement a near-peer mentor model where high school students are trained as math instructors for elementary-school students. STAR funding is helping YPP expand their student-driven math literacy programs in Cambridge and Somerville.



IN YEAR 5

- **YPP grew programs and partnerships** in Cambridge and Somerville
 - YPP enrolled 99 middle school students from Cambridge and Somerville and hired 20 Math Literacy Workers in its Flagway program this year. **Notably, the school team with the most engagement hours, Putnam Avenue Upper School in Cambridge, placed first at the National Flagway Tournament against seven other local and national YPP Flagway teams!**
 - YPP enrolled 104 participants in their 2022 summer Computational Thinking Lab and hired 46 Math Literacy Workers.
 - YPP students showed **significant gains on their district and state administered math assessments:**
 - YPP students in **60th percentile** for State Administered Math Assessment vs. non-YPP students in 46th percentile.
- **70 YPP high school students** engaged in 10 key STEM learning labs at the **MIT Summer Training Institute** covering topics like Engineering Design, Training Teachers, Nutrition, Life Skills.
- YPP hosted two new events: **Pi Day** at MIT Museum and an **April Showcase** at Cambridge Street Upper School, both which enabled YPP to share their work with the Greater Boston community.



78%

more growth on average in math than their peers nationally.



COLLECTIVE ACTION



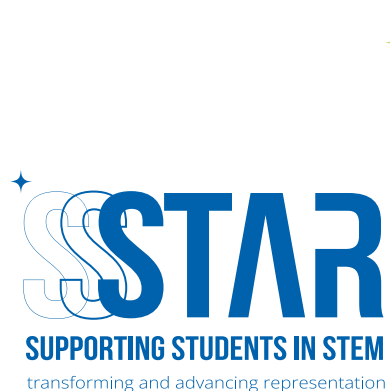
COLLECTIVE ACTION is an approach to systemic change involving people and organizations impacted by and impacting a challenge who share power, trust, and resources to achieve a common purpose. The STAR ecosystem's shared goal is to provide a seamless pathway for ALL students to have equitable access to STEM learning opportunities that prepare them for STEM careers.





COLLECTIVE ACTION: STAR HAS STRENGTHENED RELATIONSHIPS AMONGST OUT-OF-SCHOOL-TIME PROGRAMS AND SCHOOL DISTRICTS

For five years, Biogen's sustained and relationship-driven commitment to STAR has given grantees and school districts the time and space for dynamic collaboration where collectively they have been able to serve more students, design new programming, deepen existing programs, and forge innovative partnerships. Stakeholders continue to center these relationships as STAR transitions to LabCentral Ignite and partners renew their vision for STAR's next chapter.



"I'd say STAR has majorly improved Somerville's connection to out-of-school-time partners. STAR has helped to shed a light on the importance of OST programming for students, especially as we continue to work towards academic and social emotional recovery post COVID.

— **SAM ELIGENE**, Director of Data, Assessment and Accountability, Somerville

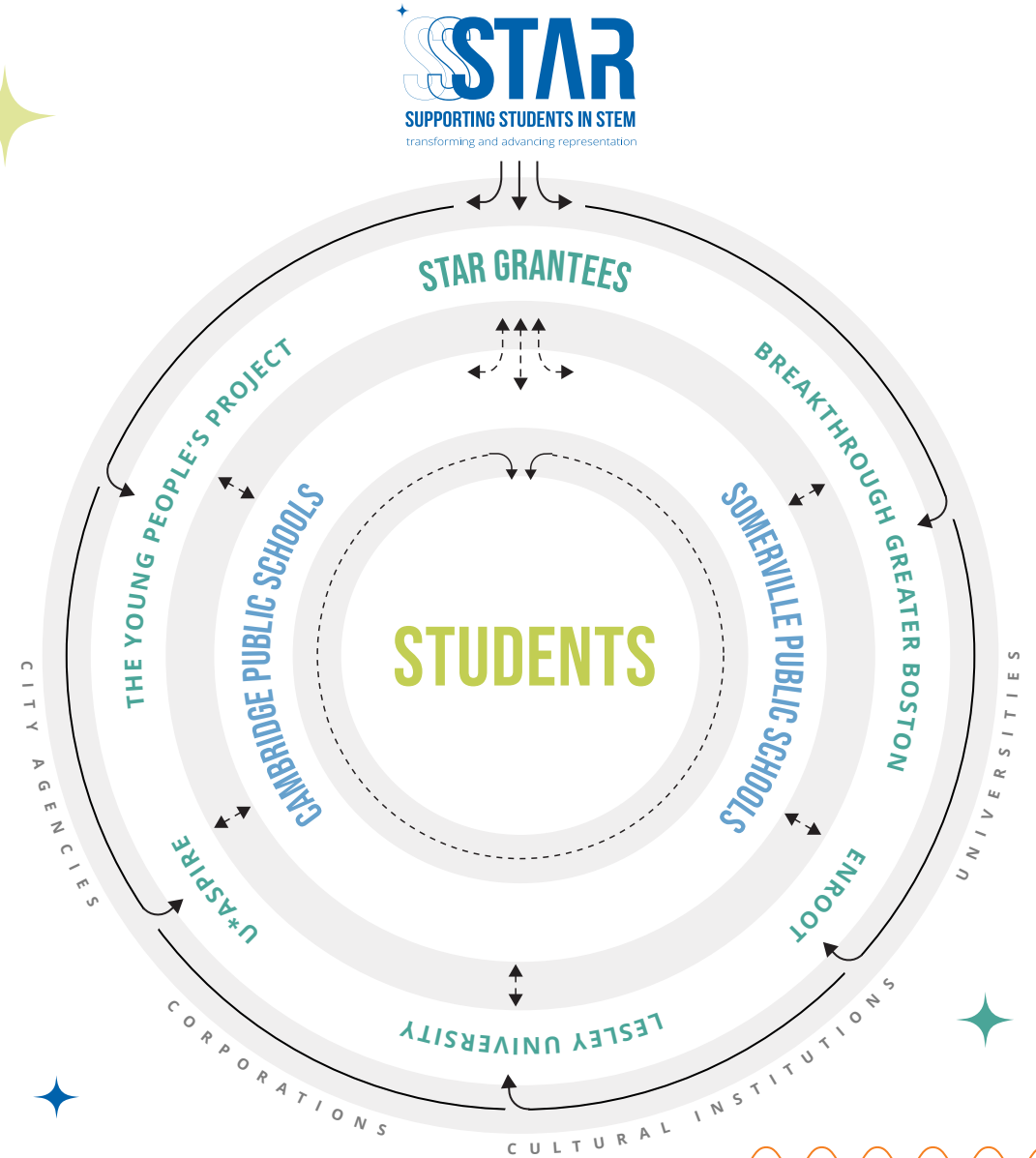
"The STAR network is a wonderful mix of expertise and passion for equity. We have enjoyed the opportunities to connect, other and extending the scope of our work in ways that are more complementary."

— **LESLEY UNIVERSITY**

COLLECTIVE ACTION

THE STAR MODEL was designed based on research of what’s working in STEM education and is part of a national movement of STEM ecosystems working to effect systemic change in STEM education. STEM ecosystems cultivate relationships across stakeholders and maximize each stakeholder’s unique contribution. Typically, these networks have one backbone organization, or network manager (Root Cause in the case of STAR), that facilitates collective action amongst stakeholders, which can include: schools and districts, out-of school-time programs, leading STEM institutions (i.e. higher education, industry leaders, science centers, etc.), the private sector, other community-based organizations, young people and their families. A highly functioning coordinated network has the potential to provide a seamless pathway for ALL students to have equitable access to STEM learning opportunities that prepare them for STEM careers—something that is virtually impossible to achieve when stakeholders work independently from one another. The Biogen Foundation has made a visionary investment through STAR. There is no better place poised to lead the way in building a strong local STEM education ecosystem than the Kendall Square area in Greater Boston.

ROOT CAUSE has served as the backbone organization for the STAR initiative since its inception, co-designing the initiative with the Biogen Foundation, and subsequently acting as the coordinator, facilitator and data manager of the initiative. Root Cause has worked with the Biogen Foundation to determine the initiative’s strategic goals, and manages the logistical aspects of the network. This includes ensuring all stakeholders are well aligned and working towards the common purpose and that decision-making is shared, strategic, and reflective of the network’s needs while promoting a culture of trust and accountability among stakeholders.





WHAT'S NEXT

As of July 2023, STAR has transitioned to become an integral part of LabCentral Ignite's efforts to diversify the STEM profession pipeline through a 'Kindergarten to Boardroom' approach. Under the leadership of LabCentral Ignite, we remain steadfast in our commitment to addressing racial inequity in STEM education in Cambridge and Somerville.

STAR will forge ahead in the new year with initiatives aimed at improving outcomes and fostering enthusiasm for STEM fields among historically underrepresented young people. Our vision for the future of STAR is an inclusive and collaborative youth-centered STEM ecosystem where all underrepresented students have the opportunity to cultivate curiosity, experience a sense of belonging, develop a strong STEM identity, and feel empowered to shape their own path towards contributing to a more diverse and vibrant community and workforce.

In 2024, LabCentral Ignite will call upon our broader ecosystem, including the private sector, community-based organizations, STEM experts, and institutions, to engage with and support STAR's mission.

If you're interested in getting involved or providing funding support, please reach out to us at ignite@labcentral.org.




CONTACT

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Lab  Central
ignite

Learn more at labcentralignite.org/star-ecosystem.


STAR
SUPPORTING STUDENTS IN STEM
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