

The Biogen Foundation STAR Initiative & CPS Impact



December 2022

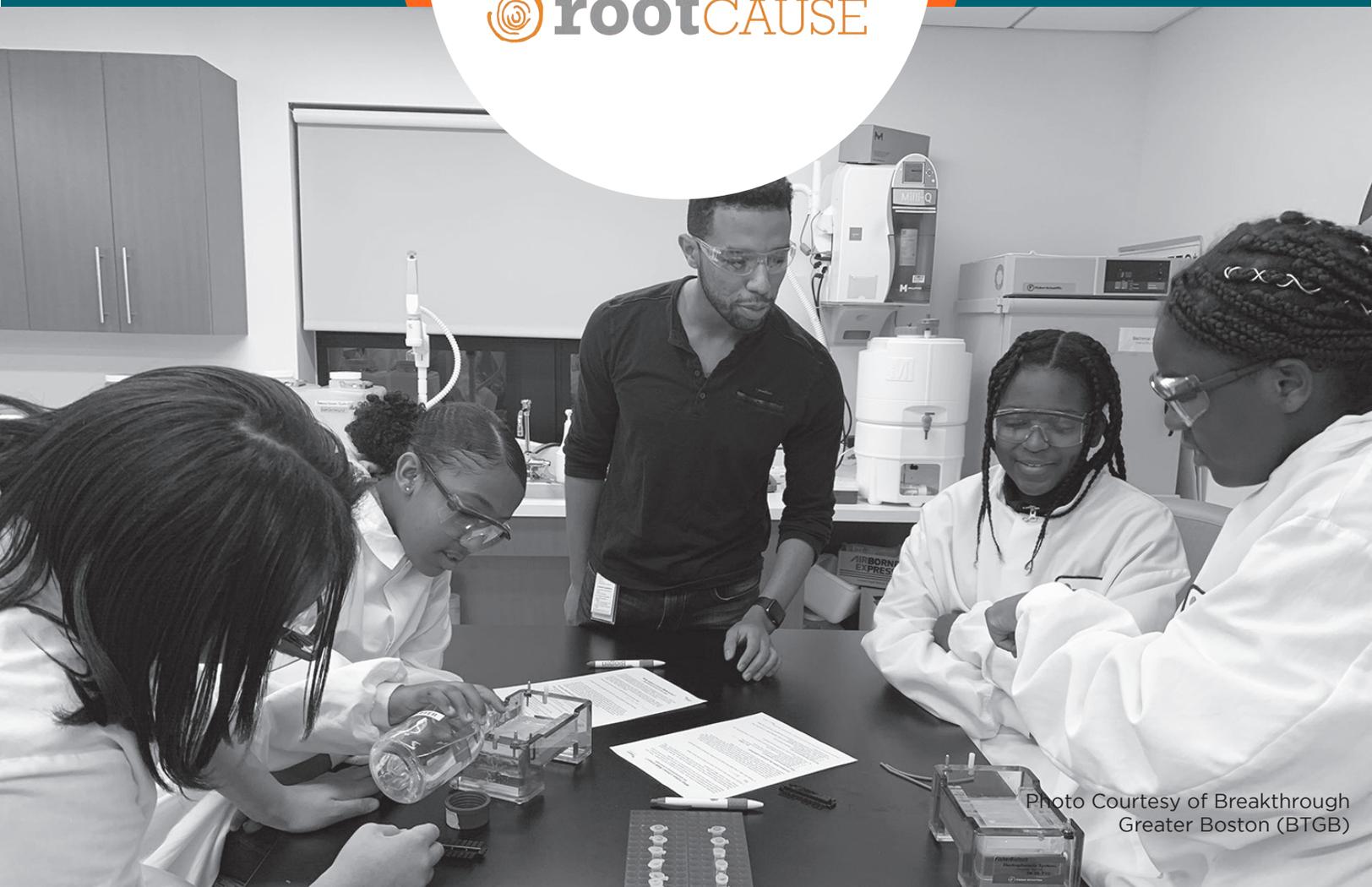


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Greater Boston (BTGB)

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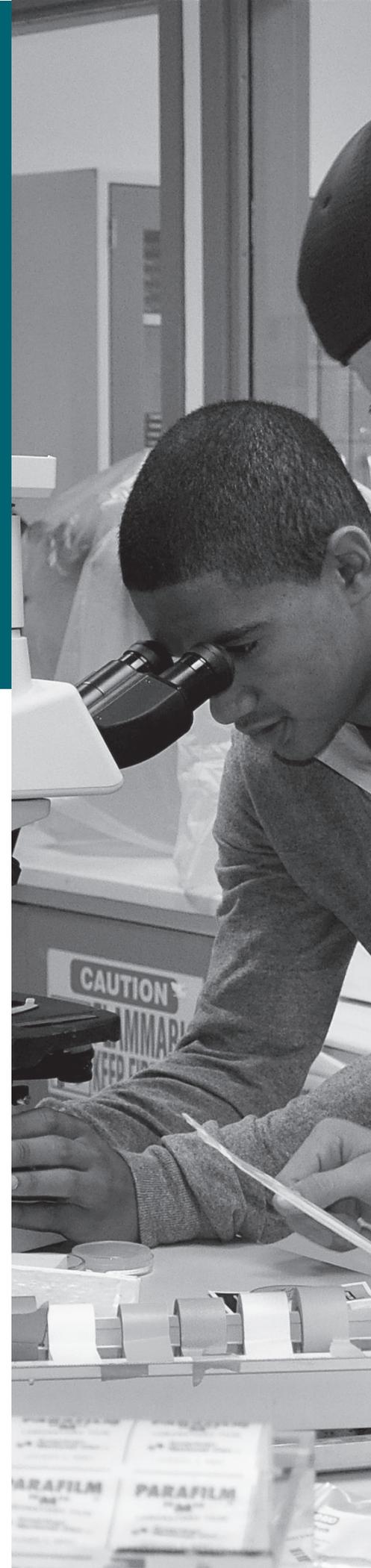
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Executive Summary

This white paper highlights the benefits that The Biogen Foundation STAR Initiative's Cambridge Data Specialist/Data Manager position has had for Cambridge Public Schools (CPS). By adding capacity to the district's efforts to capture and assess the impact of out-of-school-time (OST) programs, STAR's data sharing and analysis is helping programs better meet students' needs, enabling CPS to understand the external supports students benefit from the most, and providing more insight into trends in math and science.

The increased capacity of Information, Communication & Technology Services (ICTS) to manage all participation data of partner OST programs and measure impacts on student performance has grown beyond the scope of The Biogen Foundation STAR project. The enhanced ability for CPS to track and report out on student participation and impacts has a potential for long lasting impacts.



Introduction

Overview of The Biogen Foundation STAR Initiative & Creation of New Role

In 2017, Biogen, an industry leader in Kendall Square – one of the world’s most powerful life sciences and technology hubs– initiated a new philanthropic approach focused on deep and sustained investments over multiple years towards strengthening and diversifying the STEM workforce pipeline. While employment in STEM fields is growing and projected to continue growing, students from under-resourced communities are disproportionately unexposed to and unprepared for STEM careers. 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.***The Biogen Foundation’s STAR (Science, Teacher support, Access & Readiness) Initiative addresses this disparity by ensuring students who have been historically underserved are reached well before college with opportunities to engage in STEM activities and learning they otherwise would not have had access to.

(*From US Bureau of Labor Statistics, **from MassGov website, *** from Education Advisory Board)

The Biogen Foundation’s STAR Initiative is designed to drive STEM education equity in Cambridge and Somerville, MA. STAR is a \$12 million, five-year investment that brings together six high-performing nonprofits and two school districts in a coordinated network to serve students grades 6-14 who have been historically underrepresented in and marginalized from STEM college and career pathways, notably students of color, economically disadvantaged students, and English language learners.

Root Cause, a Cambridge-based, purpose-driven nonprofit consulting group, 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 works 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.

The myriad challenges the pandemic has posed for students and families has highlighted the critical role that out-of-school time organizations play in leveling the playing field for students who typically do not have equal access to STEM exposure and enrichment opportunities. One of the most important and unique aspects of the STAR collective action initiative is the **engagement of both school districts in the network**. STAR liaisons from each grantee organization and each school district, have met monthly and worked collaboratively for four years with the shared goal of advancing STEM education equity.

The collaboration of school districts and grantees in STAR led to a proposal for embedding staff in the school districts to help analyze the impact of this collective action initiative. In 2020, to support and optimize the connection between the work of schools and STAR grantee organizations, The Biogen Foundation funded two new part-time STAR Data Specialist positions who work for the Cambridge and Somerville public school districts. Embedding positions in the districts made it possible to maximize data sharing amongst all the stakeholders and to enable analysis of multiple angles of STAR’s impact. STAR Data Specialists were hired in both Cambridge and Somerville at the end of 2020.

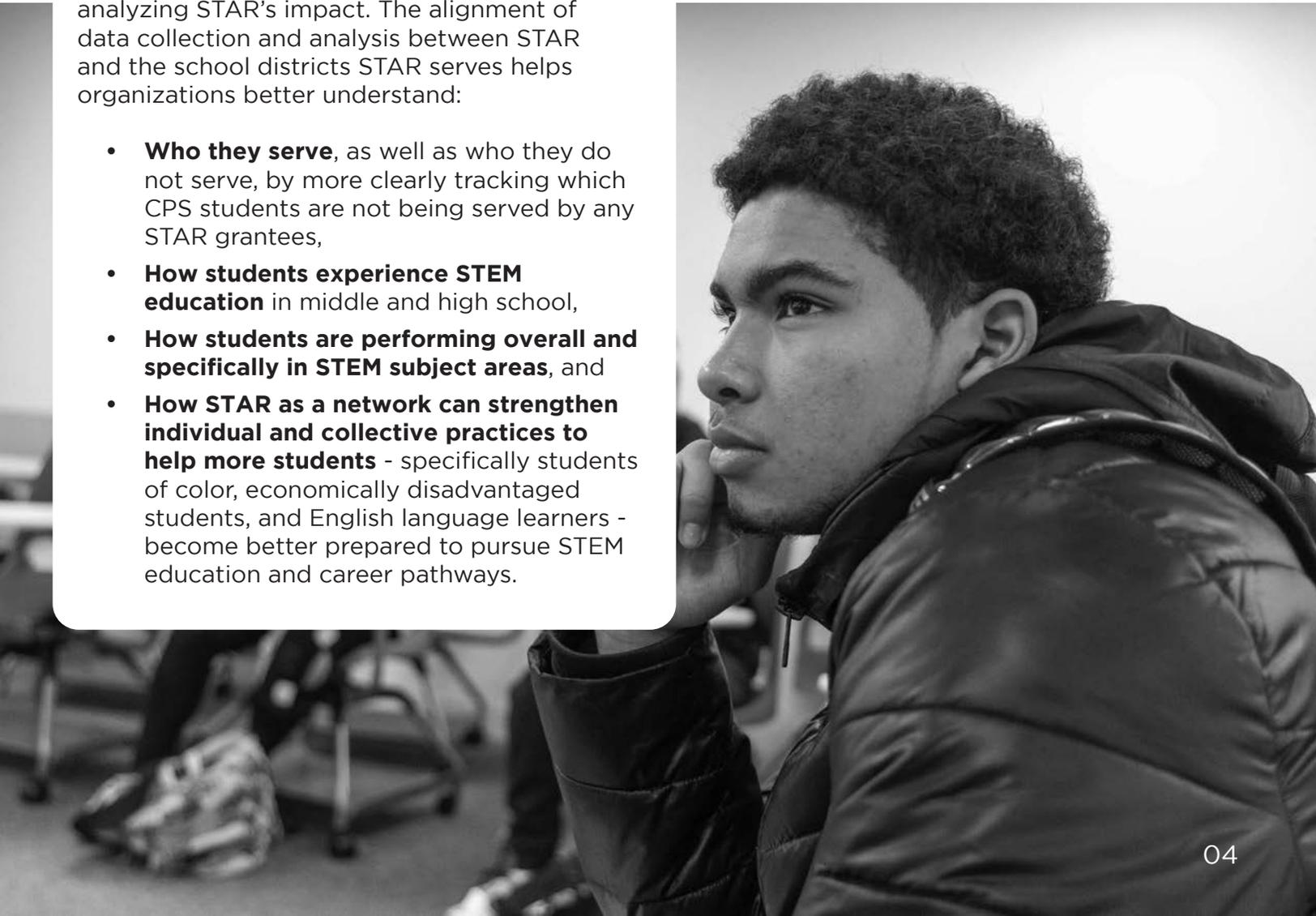
The Biogen Foundation provides funding for a .5 FTE STAR Data Specialist position. Cambridge Public Schools was also able to provide funds for an additional .5 FTE CPS Data Manager position, thus creating a joint full time position. Biogen's sustained commitment to STAR has given grantees and school districts the time and space to work in dynamic collaboration to share resources and information, serve more students, design new programming and innovative partnerships, and drive systemic change. This relationship-driven approach has provided great support across the network throughout the COVID-19 pandemic while student, educator and family needs continue to change rapidly.

Over the first four years of the initiative, STAR grantees have served 1,449 Cambridge students.

The Biogen Foundation's investment in **supporting STAR Data Specialist** positions in each school district is helping to optimize the work of grantee organizations and schools by analyzing STAR's impact. The alignment of data collection and analysis between STAR and the school districts STAR serves helps organizations better understand:

- **Who they serve**, as well as who they do not serve, by more clearly tracking which CPS students are not being served by any STAR grantees,
- **How students experience STEM education** in middle and high school,
- **How students are performing overall and specifically in STEM subject areas**, and
- **How STAR as a network can strengthen individual and collective practices to help more students** - specifically students of color, economically disadvantaged students, and English language learners - become better prepared to pursue STEM education and career pathways.

The Biogen Foundation originally conceived STAR as a 4-year, \$10 million effort to strengthen local STEM education ecosystem building work. In 2021, the Foundation pledged to extend its funding beyond four years and to lay the framework for STAR to be a permanent pillar in the Cambridge and Somerville community. The Biogen Foundation recently announced that it is partnering with [Lab Central's Ignite](#) initiative this year to transfer ownership of the STAR Initiative beginning in Year 6 (July 2023). While The Biogen Foundation will remain a major funder, this partnership will enable STAR to transition from being solely funded by The Biogen Foundation to becoming part of local STEM ecosystem building work that's supported by multiple companies. STAR will become part of Lab Central's broad K-boardroom strategy for diversifying STEM profession pipelines.



Shared CPS/The Biogen Foundation Position

The STAR Data Specialist portion of the new joint CPS position worked with the STAR data and evaluation committee, consisting of school district representatives, Root Cause and STAR grantee liaisons, to develop an initial evaluation plan that has guided his work to date.

Table 1. STAR Outcomes & Research Questions

Outcomes	Research Questions
General: Understanding who is being served	How have the profiles of students served in STAR programs changed since the STAR initiative began? <i>What is the profile of students served by STAR initiative programs?</i>
Short Term: Students develop interest in STEM	How has participation in STAR programs impacted the interest students have in STEM? <i>How do students' interests in STEM compare between those enrolled in STAR programs and peers who are not?</i>
Mid-Term: Students develop capacities to be successful in STEM	Have students improved habits of mind for 21st century learners? (Ex. persisting, problem solving, communication) <i>Are STAR students more likely to enroll and persist in high level math and science courses or take additional STEM courses?</i>

Data capturing changes in STAR students over time (Bold)
Data comparing STAR students with non STAR students (Italicized)

Prior to the creation and support for the new STAR Data Specialist position, CPS had been struggling to build a data collection and analysis infrastructure to assess which students are being served by out-of-school-time (OST) programs, what kind of support these programs provide, and ultimately what their impact is on strengthening students' engagement, confidence, academic achievement and growth in school. During the first year of the pandemic, when all learning was occurring remotely, CPS developed the Community Partner Portal (CPP) in an effort to better connect out-of-school-time partners with CPS students as well as to capture and analyze participation rates. One goal of this work is to ensure students who most need complementary programming and supplemental support have equitable access to out-of-school-time programs, and that they are getting connected to supports appropriate for their needs and interests. The CPP was also designed so that OST programs can be categorized, such that STEM programs and the students participating in them can be identified for further analysis.

The STAR Data Specialist has been working to improve the CPP's functionality, data quality and ability to connect to other district data sources. While some OST programs are not yet connected to or uploading their enrollment regularly into the portal, some preliminary data has provided insights into the impact of student participation in OST programs. The Agenda for Children, a partnership between the City of Cambridge's Department of Human Services and CPS focused on supporting the youth serving community in Cambridge, continues to work with programs to initiate and support them with their use of the CPP.

Although the data currently available through CPS's CPP is not comprehensive and still being built upon, the Cambridge STAR Data Specialist is able to compare students in STAR programs to students in all other OST programs, and to students not enrolled in any OST programs.

Opportunities have arisen for the STAR Data Specialist to **align STAR research with the 2017-2020 CPS District Plan*** including Algebra 1 pass rates, AP & Honors enrollment proportionality, and chronic absenteeism, by helping to measure goals using accurate and current data. This work has involved:

- Meeting with the STAR Data and Evaluation Committee, which includes district research, assessment and evaluation personnel, to narrow lines of inquiry
- Extending the reach of STAR data analysis to school district stakeholders, including Math and Science directors
- Identifying indicators of impact - from STAR as well as each school district's strategic initiatives - on student STEM course enrollment and performance in STEM subjects

**The STAR Data Specialist is currently seeking alignment with the newly released 2022-2025 CPS District Plan.*

The data analysis the STAR Data Specialist has conducted has tremendous potential for helping the district analyze all OST programs as well as enrollment patterns and implications.

In the CPS Data Manager portion of his role this position focuses on:

- Supporting the work of ICTS's data team to ensure the quality of data in CPS's student information system (SIS), submitting regular state reporting including for The Education Personnel Information Management System (EPIMS), and developing tools to display the structure of the district's data.
- Building and maintaining district data dashboards such as the CPS COVID-19 Data Dashboard and CPS District Outcomes Data Dashboard
- Developing tools which make use of data collected in the Community Partner Portal including reports and data dashboards and improving the functionality of the Community Partner Portal.
- Developing functionality so that the OST related data entered into CPP migrates and syncs with CPS students' records in Aspen, the district's SIS.
- Analyzing district equity in math and science through discussions and requests with department directors.
- Developing connections across the city to provide programs like Birth to 3rd Grade Partnership and Agenda for Children OST to leverage student data to improve their own initiatives.



Photo Courtesy of
The Young Peoples'
Project

The Biogen Foundation STAR Success

High level impact

Following lines of research inquiry outlined in the STAR evaluation plan, the Cambridge STAR Data Specialist has determined some key promising, positive indicators of STAR's success for Cambridge public school students:

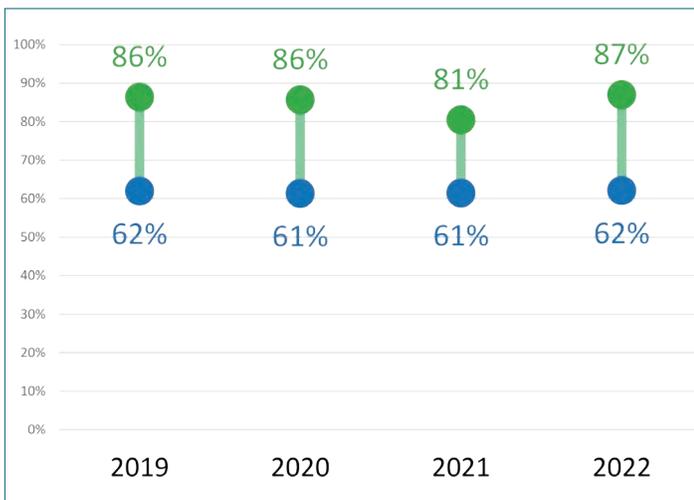
- STAR is **consistently serving student populations that are underrepresented in STEM**
- Black and economically disadvantaged STAR students are **performing better in math and science** courses during their freshman year compared to their peers
- Black and economically disadvantaged STAR students are **taking more honors-level math and science courses** later in high school compared to their peers.

Key Findings for Cambridge students in each of these areas include:

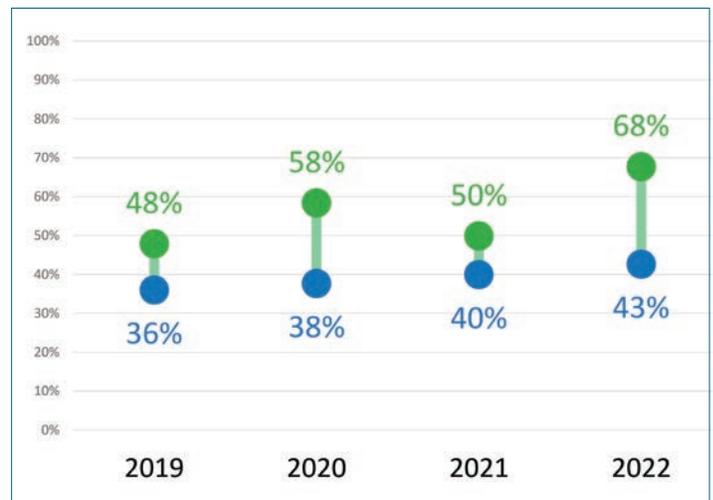
The percentages of students of color and students from economically disadvantaged families in STAR programs are much higher than the percentages of students of color and students from economically disadvantaged families in the school district at large. This trend, to a lesser degree, held true with non-native English speakers and female students.

- During the 2021-2022 school year STAR programs served a higher percentage of students of color and economically disadvantaged students than in any other STAR year

Students of Color



Economically Disadvantaged Students



● STAR

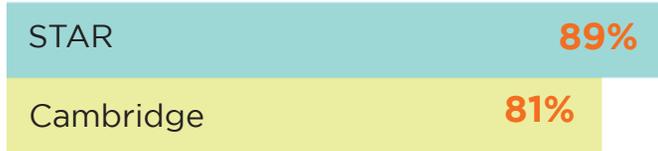
● CPS
(gr 6-12)

A larger proportion of both Black and economically disadvantaged students participating in STAR pass 9th grade math and science classes compared to their peers across the district.

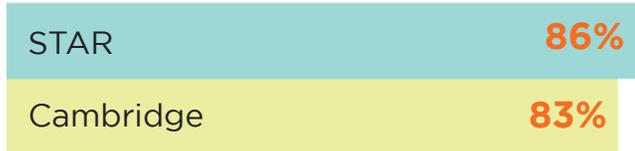
9th Grade Passing Rate from 2018/19 to 2021/22 School Years

SCIENCE

Economically Disadvantaged

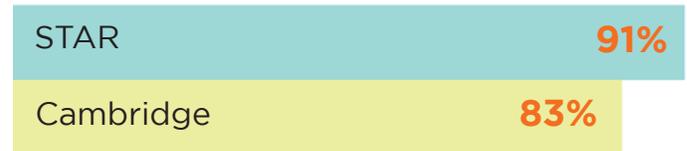


Black

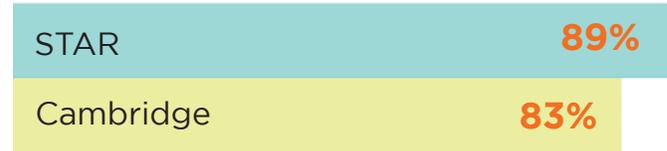


MATH

Economically Disadvantaged



Black

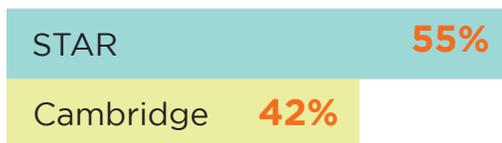


Black and economically disadvantaged STAR students are taking more advanced math and science courses later in high school compared to peers.

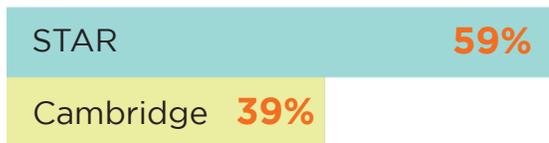
Enrollment Percentages in Honors-Level STEM Courses 2018/19 to 2021/22

CHEMISTRY

Economically Disadvantaged

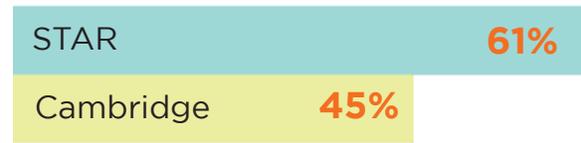


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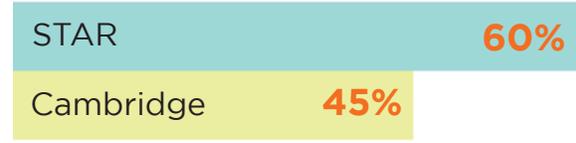


BIOLOGY

Economically Disadvantaged

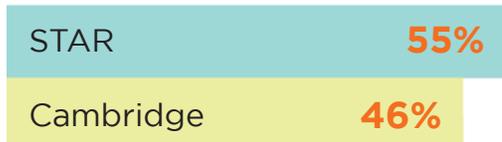


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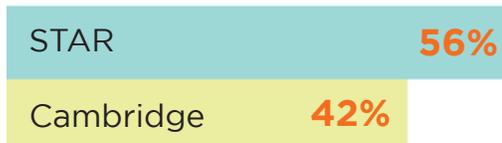


ALGEBRA II

Economically Disadvantaged



Black



Students have more opportunity to enroll in higher level courses as they progress through high school. **In Cambridge, a higher proportion of both Black and economically disadvantaged students who have participated in STAR programs have enrolled in honors-level Algebra II, Biology and Chemistry** when compared to their peers. These honors level courses are more advanced, accelerated and/or in depth compared to their college prep-level alternative. Students must earn a B or better in previous STEM courses as a baseline prerequisite to enroll. **Participation in these honors-level courses could serve as an indicator of interest in STEM.**

In the next phase of his research the STAR Data Specialist will be:

- **investigating causation** by comparing STAR students to their peers before and after participating in STAR programs and
- **analyzing dosage** to determine if more STAR programming correlates with positive outcomes.

Beyond this, the STAR Data Specialist will analyze additional **course-taking, college success** and **survey** data to provide a more holistic picture on how STAR is helping students from populations underrepresented in STEM progress towards STEM college and career pathways.

Additional CPS Impact

Data Manager's Evolving Role

When The Biogen Foundation STAR Initiative & ICTS Data Manager (DM) position was initially created the vision for the CPS half of the position was much different than what it has evolved into. Initially, the CPS half of the Data Manager (DM) position was seen as an opportunity to provide the ICTS Data Office with entry level data support. While the STAR half of the position was focused on managing, measuring and reporting on the impact of student enrollment in STEM activities, the vision for the CPS half of the position was to provide support for state reporting, ad hoc report building, Student Resource Center support, and general data management.

During the first year of the DM position there was also a great deal of change in the ICTS Data Office. By spring 2021, the Data Office staff had all turned over. This created an opportunity for improvements in workflows and shifts in areas of responsibilities. Lines previously drawn between positions shifted to align better with new streamlined procedures and personal skill sets.

During the first 18 months of the existence of the DM position, the CPS affiliated duties and responsibilities of the position were naturally changing as the needs of the ICTS Data Office evolved. The work and responsibilities of The Biogen Foundation half of the position also

naturally impacted the direction and focus of the position, and most importantly, its capacity to support change and progress on multiple levels.

The CPS Data Office has historically been focused on core data management needs, and for many years CPS struggled with how to capture participation in, and measure the impact of, OST programs. This was not for lack of effort, but rather, lack of capacity to consistently prioritize this complex pool of data sources and points. The DM has now combined their CPS and STAR responsibilities to build systems, create procedures, and expand capacity to address long standing data management issues related to all OST programming -- including the impact that CPS students' engagement in STEM and other OST programming has on their progress as well as many district goals, objectives and outcomes.

Leveraging The Biogen Foundation STAR Products & Impact for CPS

It is clear that the research the STAR Data Specialists have conducted in less than two years is just the tip of the iceberg in terms of what we can learn about the impact of the STAR programs, and OST programs generally. Additionally, the STAR Data Specialist is providing valuable insights to CPS. The data sharing and analysis happening in STAR can help determine what kinds of support are

needed, and work best for students typically underrepresented in STEM college and career paths.

From a purely technical perspective, the impact on CPS's ability to capture, track and measure the impact of student enrollment in OST activities has been huge. All of the work of the DM in support of the Biogen STAR Initiative directly corresponds to CPS's non-STEM related OST data management needs. CPS has made great strides in many OST related areas as a direct result of the DM position and The Biogen Foundation STAR Initiative. These include, but are not limited to;

- OST program inventories
- OST data sharing agreement tracking
- Parental consent management
- CPS access to OST enrollment or "dosage" information
- OST Partner access to participating student data
- Storage & management of OST participation data by students over time
- Reporting out on OST participation over multiple years by;
 - Demographics
 - School enrollment (past and present)
 - Student performance
 - School attendance
 - English proficiency
 - Home language
 - Whether students are accessing additional school support
- Automation of data capturing and exchange
- De-Identification & aggregation to support public reporting

The work of The Biogen Foundation STAR Data specialist has had a direct impact, one for one, on the needs of CPS to capture all OST partner data. Every work product created for The Biogen Foundation 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.

Conclusion

In summary, it has been the collaborative commitment of The Biogen Foundation STAR Initiative and CPS to work as partners across sectors, and to combine financial and human resources to support the emergence of a new type of school district-based Data Manager. The STAR Initiative's need to collect, align, analyze and report on students' participation in STEM programming beyond the school day led to CPS building its capacity to do so. Additionally, the DM's evolving role and increased skills to design and connect systems and partners will allow for increasingly expansive student data to be documented, shared and interpreted for years to come.

If it was not for The Biogen Foundation STAR Initiative and the impetus to create a CPS data manager role focused on out-of-school-time and community partner data sharing, there might still be an absence of this resource within CPS. The new capacity within CPS has enabled CPS to realize the benefits of resources devoted to managing data capturing, sharing and reporting around community partners. These benefits serve as evidence of the strong need to maintain this new capacity and perhaps increase it further in years to come