

Science Learning and Planning

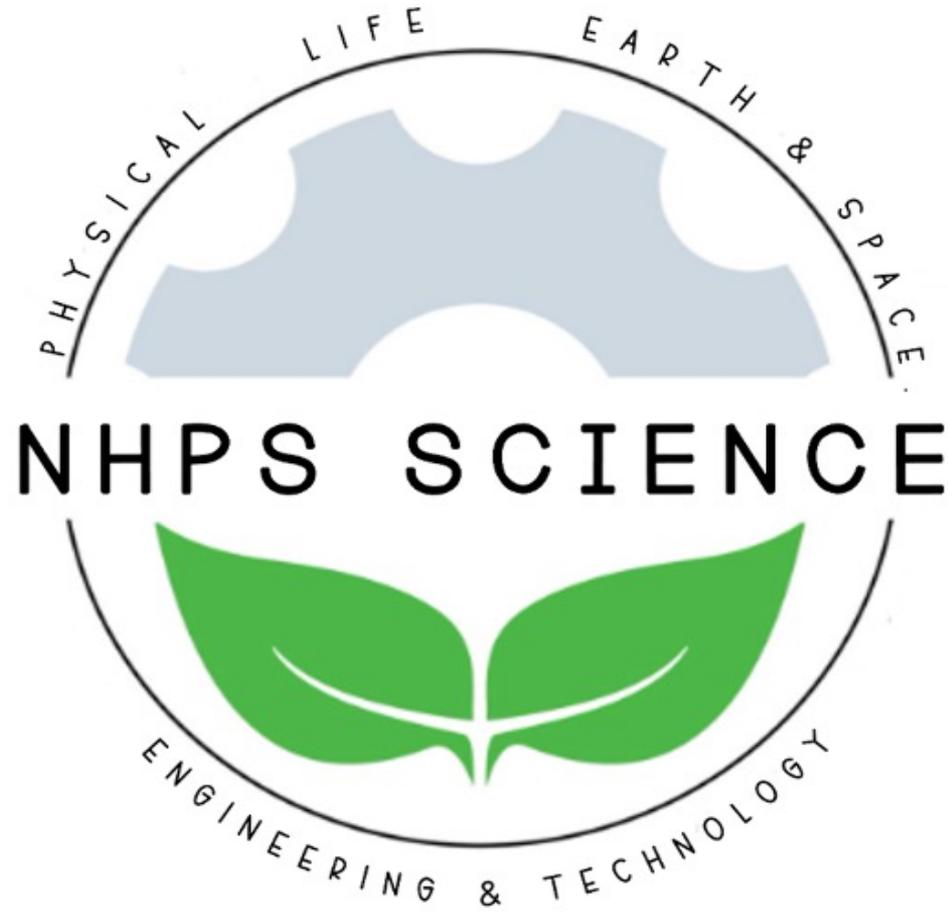
Keisha Redd-Hannans, Assistant Superintendent of Curriculum, Instruction, and Assessment
Robert McCain Supervisor of Science
Heather Toothaker, District Science Coach
Dr. Andrea Gomez, District STEM and Technology Coordinator

Teaching and Learning Committee Meeting
November 15, 2023

Building a World Class Science Program



NEW HAVEN PUBLIC SCHOOLS



If we provide greater consistency in implementation of high-leverage instructional practices then we will advance student learning

- Building sustainable capacity with building leaders, coaches, teachers
- Creating greater consistency in instructional practices
- Supporting leaders and teachers with high-quality professional learning

New Haven Website



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www.WeLikeScience.com

Implementation of Smithsonian Science K-5

- Unpacked, inventoried and labeled all Smithsonian materials at 28 schools (168 pallets)
- Presented 21 Afterschool Learning Academies for Teachers K-5 for four modules
- Conducted 34 in school coaching sessions at 28 schools on specific modules
- Conducted 12 Science Learning Walks in K-5 classrooms
- Created Smithsonian Implantation Rubric to assess use of the program

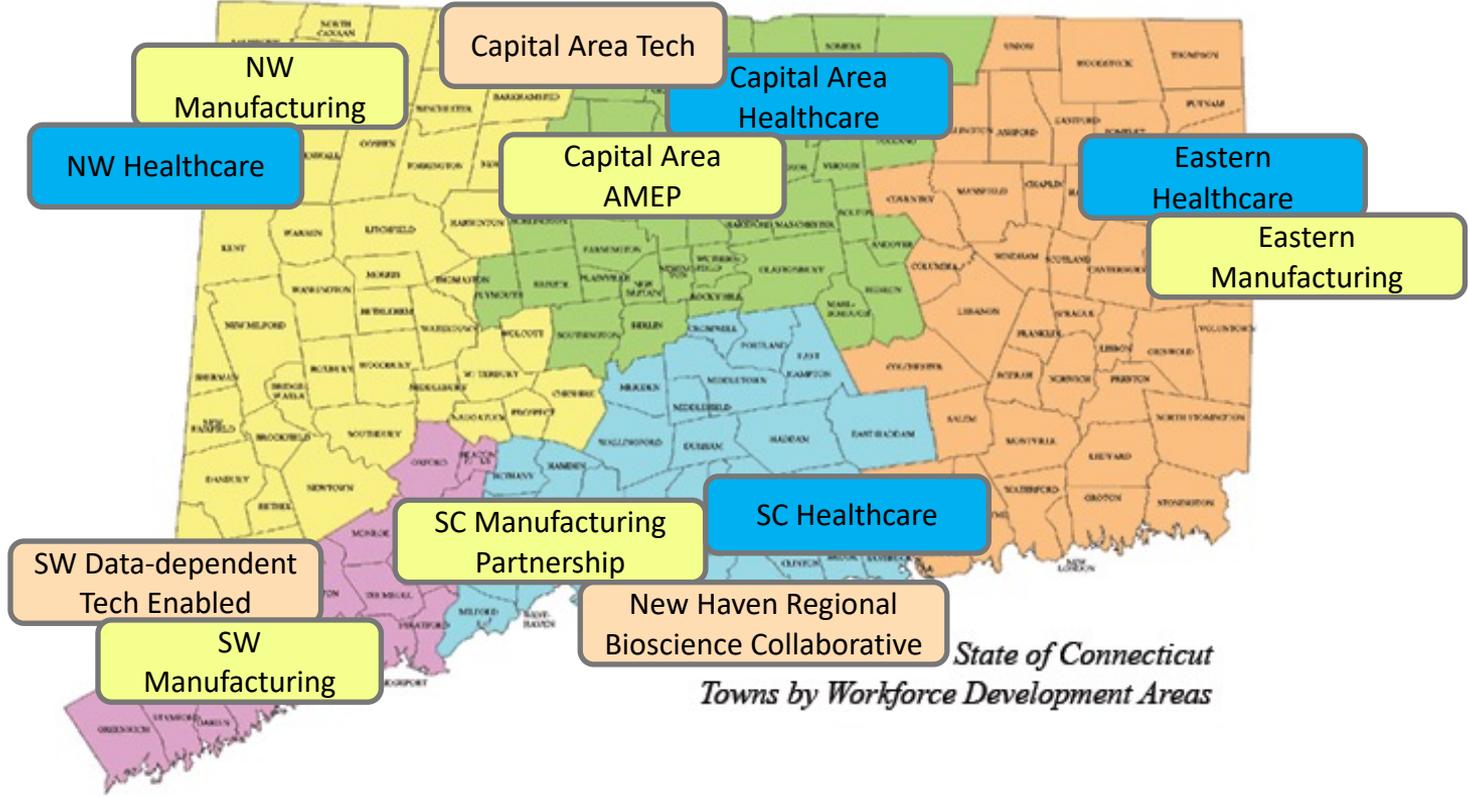
Planned Science Adoption for Grades 6-8

- Piloted three programs at 12 schools
- Created survey for teacher and student feedback about the program
- Committee selection for the Middle School Program from Smithsonian

Creation of Study Teams at Middle and High School

- Switched focus from Professional Development (PD) to Professional Learning (PL)
- 20 Study Teams were created mixing different schools and grade levels focused on a specific self-selected area of science
- Final Projects were presented in May about new learning acquired and how it impacts students

CT's Regional Sector Partnerships – South Central Science



Science Pathways 6-12



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Manufacturing, Robotics and Computer Science – It’s Your World, Take Control!

The Manufacturing, Robotics and Computer Science Pathway provides students with a fundamental understanding of energy transfer, the mechanical systems that make up robots, machine automation, and computer control systems. Courses within this pathway are student led, self-paced, and project based with the intent of leading students to develop innovative robotic solutions to open-ended engineering design problems.

Environmental Engineering – Be a Force for Nature in Our World!

The Environmental Engineering pathway focuses on the applied sciences to prepare students to plan, design, construct, implement technologies, and systems. These skills will prepare our students to improve and enhance the quality of the environment, protect public health and welfare. Students in this pathway will utilize skills developed in biology, chemistry and physics to study issues such as water quality, air and soil pollution control, and waste management.

BioScience - Heal the World, Fuel the World, and Feed the World!

Students pursuing the BioScience pathway will focus their study on the application of engineering and technology within the fields of biology and medicine. Within the BioScience pathway, students will explore cellular and biomolecular processes and how these processes can be used in technologies that impact our lives.

BioCity Academy Vision: BioCity will empower the Next Generation of Bioscience Leaders

Our vision is to create a dynamic collaborative platform that bridges the worlds of industry and higher education, providing high school students with a gateway to explore, engage, and excel in bioscience careers. Through strategic partnerships with leading industry experts and esteemed academic institutions, we aim to offer unparalleled opportunities for students to immerse themselves in the cutting-edge realms of bioscience. Our commitment is to foster a supportive environment where young minds can flourish, learn, and innovate, paving the way for the future of bioscience. We aspire to cultivate a community where curiosity, collaboration, and creativity converge, propelling students toward fulfilling and impactful careers in bioscience, ultimately contributing to the betterment of our global society.

Location: 101 College Street and Gateway Community College

Students: 15 students from the Junior Class in 2024

Schools: Career, Cross and Hillhouse

Higher Ed: SCSU – BioPath Program, Gateway STEM Program

Dual Credits: 40

Industry Partner: BioLabs

Begins: Summer 2024

Manufacturing Program



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Our vision is to establish a dynamic and innovative high school manufacturing program that serves as a launching pad for aspiring college engineers and/or skilled machinists. We are committed to providing a comprehensive educational experience that seamlessly integrates academic rigor, hands-on skills development, and real-world applications to prepare our students for successful futures in the manufacturing industry.

Two Pathways: College Track: Gateway Engineering Program and Workforce Pathway for Careers (Industry)

Location: Cross and Hillhouse Manufacturing Labs (under Construction till August 2024)

Current Students: 60 students in Sophomore and Freshman Classes

Higher Ed: College Track: Gateway Engineering Program (60 credits)

Duel Credits: Workforce Track: 24 credits with SCSU and Gateway

Industry Partner: New Haven Chamber of Commerce and Multiple Manufacturing Companies

BioScience Collaborative



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The NHPS Science Department is proud to announce our collaboration with leading BioScience companies based in New Haven, CT. This strategic partnership aims to foster an environment of innovation, research, and education. By leveraging the expertise and resources from these esteemed companies, we aspire to provide our students with unparalleled learning opportunities and offer our teachers the tools and professional development they need to stay at the forefront of scientific education. Together, we are committed to nurturing the next generation of scientists, researchers, and innovators, and ensuring that New Haven remains a hub of scientific excellence for years to come.

Goal - secure 50 volunteers	Goal - raise \$7500 and conduct successful kite event	Goal - raise at least \$30K in materials/funds	Goal - conduct at least 10 field trips in 2024	Goal - provide 28 classrooms with glassware and other supplies necessary to support curriculum	Goal - populate the website with all kits/career information/field trip information/other?
<u>Obtain Volunteer Database & Deploy Volunteers</u>	<u>Tetrahedron Kite Day</u>	<u>Obtain and deploy donations</u>	<u>Field Trips</u>	<u>Equipment and supplies</u>	<u>Welikescience website</u>

STEM Program



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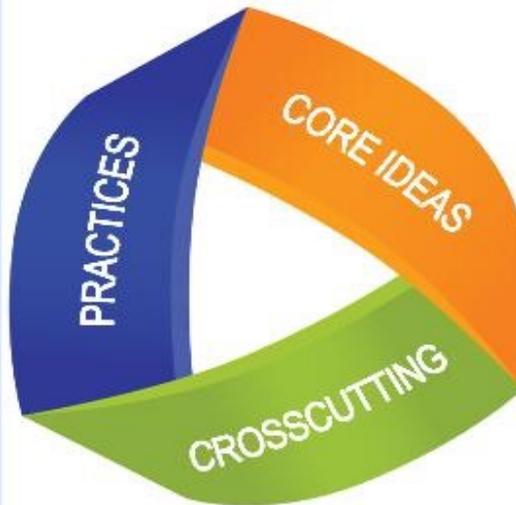
- **19 STEM teachers across 14 schools**
- **Introduction of an AI course at Hillhouse High School using NAO Robotics.**
- **Up to 7 - PLTW Schools for Middle School - Added 5 Schools for PLTW Middle School Program (along with King Robinson and ESUMS)**
- **Creation of a K-8 STEM curriculum that aligns with the ISTE, CSTA, and NGSS standards.**
- **Collaboration with SCSU, Arsome, and Prisms for expert guidance with VR/AR integration.**
- **Collaboration with Stiix to create custom STEM kits – K-5**
- **Creation of competitive middle school drone and robotics teams to foster skills in technology and teamwork.**
- **Launch of new drone courses at King Robinson, Barack Obama, Ross Woodward, and Celentano schools.**
- **Development of K-4 Makerspace Labs at Troup/Wexler schools.**
- **Acquisition of cutting-edge and innovative resources to enrich the STEM learning experience**

Three Dimensions of Science Learning

A Framework of Standards for Exploring the Natural World and Human-Designed World

What Students Do:

- Ask questions
- Design investigations
- Collect, analyze, and interpret data
- Develop and use models
- Construct evidence-based arguments
- Define a design problem
- Apply knowledge to engineer solutions to a problem



How Students Connect the Three Domains of Science:

- Patterns
- Cause and effect
- Scale, proportion, and quantity
- Systems and system models
- Energy and matter

What Students Know:

Disciplinary Core Ideas

Physical Science

- Matter and Its Interactions
- Motion and Stability; Forces and Interactions
- Energy
- Waves and Their Applications in Technologies for Information Transfer

Life Science

- From Molecules to Organisms: Structures and Processes
- Ecosystems: Interactions, Energy, and Dynamics
- Heredity: Inheritance and Variation of Traits
- Biological Evolution: Unity and Diversity

Earth Science

- Earth's Place in the Universe
- Earth's Systems
- Earth and Human Activity

Engineering, Technology, and Application of Science

- *Engineering Design*

NGSS Assessment Criteria for Grade 8



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Life Science NGSS Assessment – Grade 8

- Using evidence to argue that organisms are systems of cells and various factors affect their growth
- Using patterns to model the flow of energy and matter in organisms and through ecosystems
- Using models to describe how the structure and function of genes causes variations
- Using patterns in fossils data to compare organisms and infer evolutionary relationships
- Evaluating solutions that maintain biodiversity and stabilize ecosystems

Physical Science NGSS Assessment – Grade 8

- Developing models and analyzing data to describe atoms, molecules and chemical change
- Asking questions and investigating motion caused by contact and non-contact forces
- Using data and constructing arguments to describe kinetic and thermal energy changes in systems
- Developing and using models to describe how waves travel in patterns, transfer energy and interact
- Designing devices to optimize collisions, forces and energy transfer

Earth and Space Science NGSS – Grade 8

- Using evidence to model Earth and other objects with movements controlled by gravity
- Using rock strata evidence to explain Earth's geologic history
- Modeling the cycling of matter and energy to explain changes in Earth's surface features and climate
- Using evidence to describe how human activities are affected by Earth's resources
- Designing solutions to problems caused by using Earth's resources

Next Generation Science Standards Assessment



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NHPS - Two Year Comparison by Percentage – Cohort Driven Scores

Areas Tested: Physical Science/Life Science/Earth Space Science/Engineering

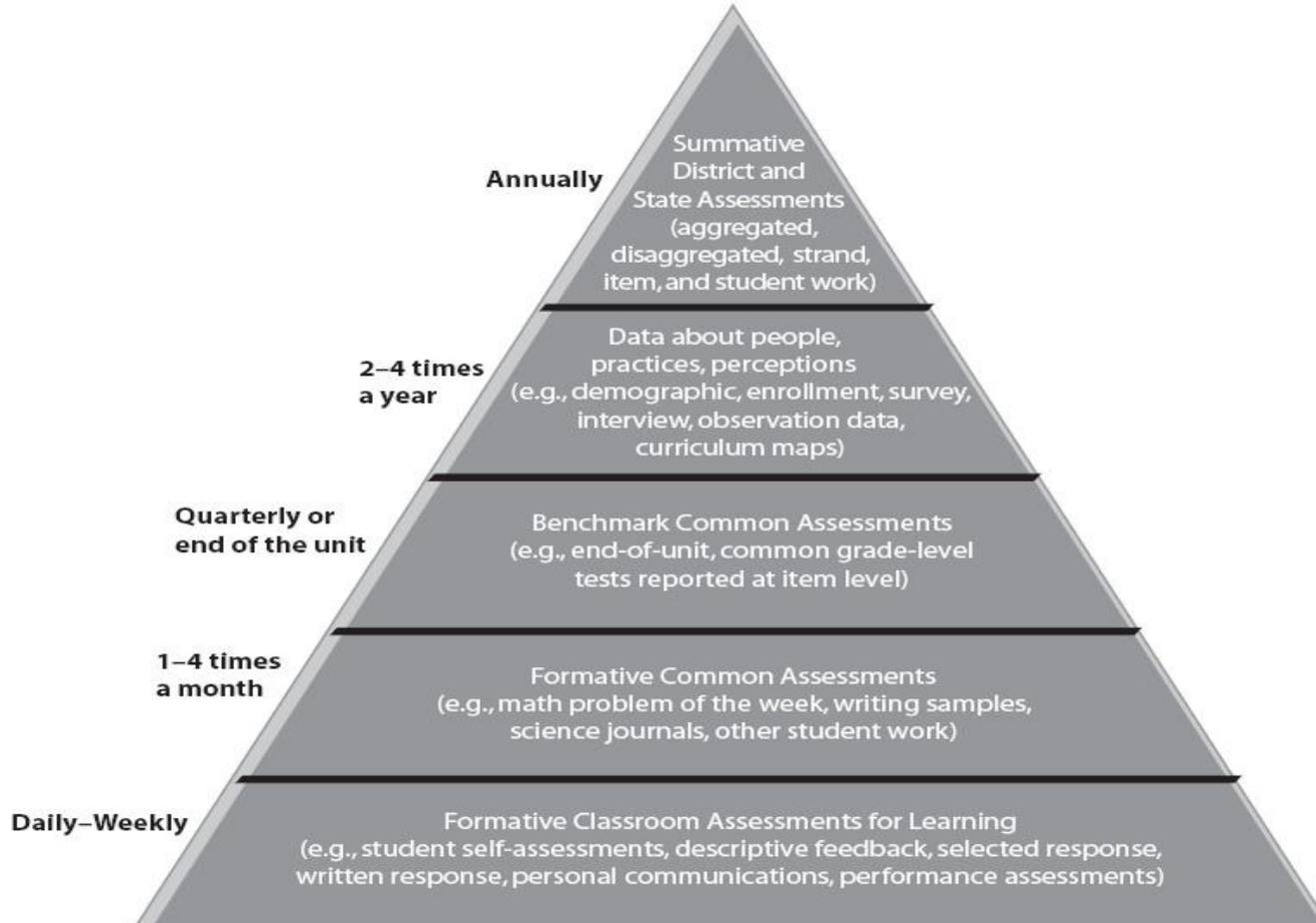
School	Level 1 Below Basic	Level 2 Basic	Level 3 Proficient	Level 4 Exceeds	Level 3 and 4 Prof/Exceeds
Grade 5 2023	46	32	18	4	22
Grade 5 2022	45	34	17	4	21
Grade 8 2023	50	28	20	2	22
Grade 8 2022	43	35	20	2	22
Grade 11 2023	41	36	20	2	22
Grade 11 2022	47	37	15	2	17

Science Data Pyramid



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THE DATA PYRAMID: RECOMMENDED



Inner Orbit Assessment



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<https://www.innerorbit.com/>

Plan for Increasing Assessment Scores – Moving Away from Cohort Driven Scores

1. Collaborative Inquire
2. Adoption of Inner Orbit Assessment Platform – Grade 3 – 11
3. Create multiple NGSS aligned CFA for each unit/module (Dipsticks)
4. Create Common Final Exams for Middle and High School
5. Consistent scheduled time devoted to Science in K-8 Schools
6. Ongoing and consistent Professional Learning Training for Teachers
7. Accountability – Learning Walks, Curriculum and Assessments
8. New science program adoption - Grades K-8
9. Adoption of BioZone Books for high school
10. High School Curriculum realignment
 - Integrated Science (Earth and Space Science) Curriculum Writing Team (Replaces PhyChem)
 - Biology Rewriting Chemistry Course
 - Chemistry Curriculum Writing Team
 - Physics Curriculum Writing Team
 - Expansion of Half Year courses with high student interest (i.e. - Rule the Road, Gastronomy, Green Building Design, Biotechnology, Biochemistry, Environmental Sciences, Solidworks, CAD)
8. Development of K-8 STEM Program

Teaching/Modeling Collaborative Inquiry: The Heart and Soul of DataWise



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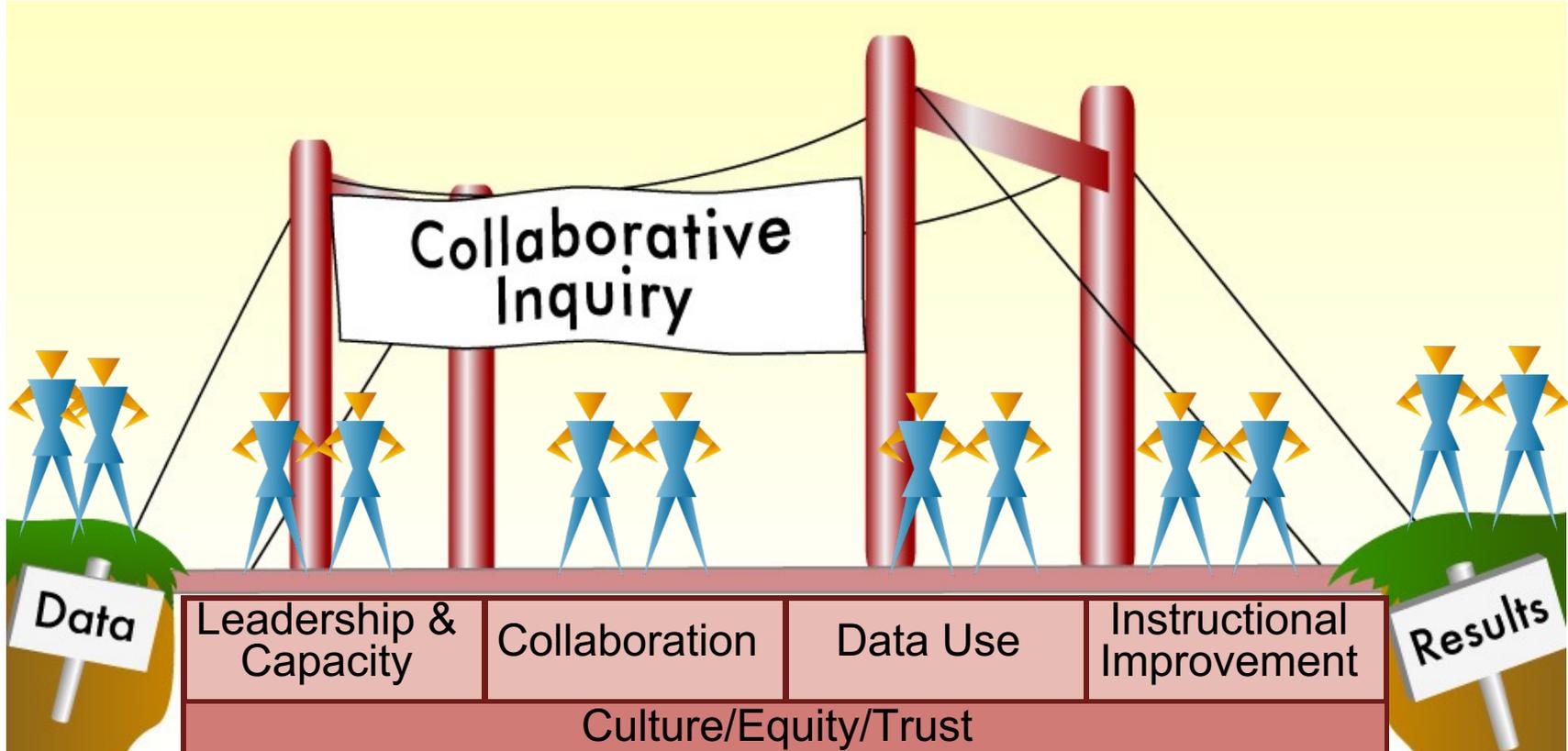
A process where teachers construct their understanding of student-learning problems and invent and test out solutions together through rigorous and frequent use of data and reflective dialogue. This leads to continuously improved instruction and student learning.

“Educators need time and support to learn new ways of working together for a shared purpose. We’ve designed this institute to create space for teams to learn effective collaborative data inquiry practices and make them their own.”

[Kathryn Boudett](#), Faculty Co-Chair of DataWise

Building the Bridge

Data and Results



Science Openings



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Currently, there are **69 Science Teacher** openings throughout the State of Connecticut

New Haven lost 1/3 of its science teachers in grades 6-12 since 2022 (44/132). As of today, we have **9 open science** positions

SCHOOL/LOCATION	GRADE	ASSIGNMENT
CONTE W.H.	7	SCIENCE
BETSY ROSS	8	SCIENCE
CELENTANO	7/8	SCIENCE
WEXLER GRANT	7/8	SCIENCE
HILL CENTRAL	7/8	SCIENCE
KING ROBINSON	7/8	SCIENCE
ROSS WOODWARD	7/8	SCIENCE
HILLHOUSE	BIO	SCIENCE
METRO	PHYSICS	SCIENCE

Teacher Professional Learning

- PL Days – Study Teams – Curriculum Writing
- Afterschool Learning Academies
- Success with Smithsonian PL during school day
- Job-embedded learning facilitated by coaches

Specialized Professional Learning

- Strategies to support multiple language learners
- Special education specific strategies and tools
- Supporting tutors and potentially summer learning
- Support with MLL students

Response to Observations (continued)



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Weekly Coaches' Meetings

- Program knowledge
- Professional Learning Segment
- Strategies to support teachers with planning
- Providing effective feedback and next steps to teachers

Supports and Learning for Leaders

- Program knowledge and instructional look fors
- Best practices for meeting growth goals
- Curriulum Leaders implementation

Response to Observations (continued)



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Priority Schools Support

- STEM Focus for Priority Schools
- Focus on instructional planning, co-teaching, and reflecting

Substitute Teacher

- Specific training and coaching for high-need schools
- Lesson plans created by Science Department for Subs

**Thank you for your time and
continued support!**

Questions?



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Title: What is the Current Status of Data Protocols in NHPS?

Presenter: Keisha Redd-Hannans

Date: November 15, 2023

Meeting: Teaching and Learning Committee Meeting

July 21, 2023

Together, Striving Towards the Next Chapter of Excellence

Goal



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To implement a research-based data protocol in all schools and Central Office to improve student outcomes, the quality of teaching, and operational efficiencies by August 2024

Alignment to District Priorities



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1.3: Assessment and Feedback: Utilize robust educational assessment and data systems for collection and disaggregation of data to improve instruction for all students . Build teacher capacity to monitor learning and provide regular, meaningful feedback to students.

5.2: Network Support: Continue, strengthen, and refine the School Support Network Model by adopting formal data cycles of inquiry

Where are we now?



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- Schools are implementing individual data protocols
- Professional learning sessions on research based data protocols last occurred for school leaders over 8 years ago
- Data team meetings are happening inconsistently (weekly, monthly, etc.) across the District

Where are we going?



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Implement a collaborative data inquiry protocol to support schools and departments in ensuring all students and staff thrive



How will we get there (strategies/actions)?



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- Members of the Office of Academics will attend the Data Wise Institute at Harvard University in January 2024
- Launch the District Wide Data Team in February 2024
- Department Heads and Principals will select to attend one of the 3-day New Haven Data Wise Institutes being held in March 2024 and May 2024 with a team
- Launch the Data Wise process in August 2024 in all departments and schools
- Provide job-embedded coaching from a certified Data Wise coach

How will we measure the impact of strategies?



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- Implementation of weekly data team meetings by schools and departments
- Observation of data team meetings utilizing the Data Wise 8-step process
- Improved student outcomes (academic and engagement)
- Improved operational efficiencies (survey data)

How will we respond (no impact from strategy)?



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- Provide additional training
- Assign certified district-level staff to support schools and departments
- Observe models of excellence
- Abort, if necessary

Next Level of Work



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- Discuss the Data Wise Process with the Teaching and Learning Committee - Oct 2023
- Present Agreement to the F&O and BOE for approval - Nov 2023
- Meet with Data Wise representatives to solidify plans for the New Haven Data Wise Institutes - Ongoing
- Launch the Data Wise Process in all schools - August 2024