

Science & Technology

Presentation to the Manhasset Board of Education
February 2, 2023
Dr. Teri McGrath, Coordinator

Presentation Overview

- District Goals
- New York State Science Learning Standards (NYSSLs)
- NYSSLs Alignment Goals
- Elementary Updates
- Secondary Updates
- Collaborations
- Looking forward



District Goals

Strengthen the quality of the relationships throughout the District so that each individual feels valued, connected, safe, and secure.

Improve the quality of learning spaces throughout the District to support the needs of our students, faculty, staff, and community members.



Strengthen academic pathways in which interests and passions are discovered and explored by each student.

Enhance professional growth plans for each individual in an effort to strengthen the learning environment.

NYSSLS

- New York State Science Learning Standards



3-Dimensional Instruction

Science and Engineering Practices

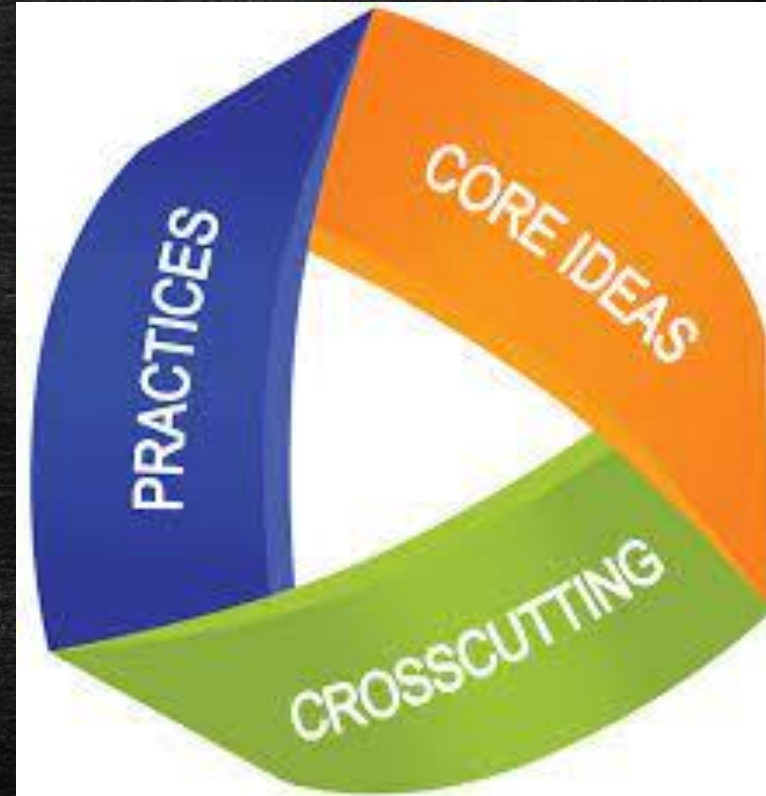
- SEPs

Crosscutting Concepts

- CCCs

Disciplinary Core Ideas

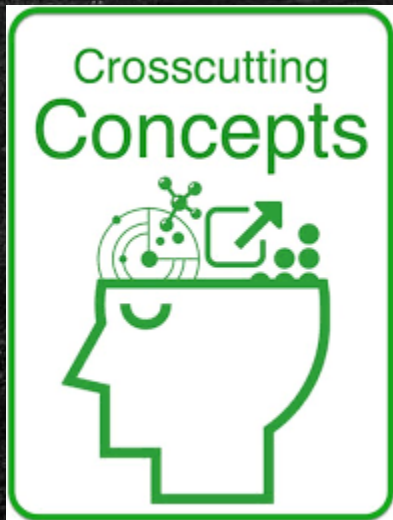
- DCIs



Science & Engineering Practices PreK-12

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematical and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Crosscutting Concepts



PreK-12

- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity
- Systems and System Models
- Energy and Matter
- Structure and Function
- Stability and Change

Disciplinary Core Ideas – Physical Science, PreK-12



- Structure and properties of matter
- Forces and motion
- Relationship between energy and forces
- Wave properties
- Types of interactions
- Electromagnetic radiation
- Chemical reactions
- Definitions of energy
- Conservation of energy and energy transfer
- Energy in chemical processes and everyday life
- Information technologies and instrumentation
- Nuclear processes (HS)

Forces-Progression

Kindergarten - Cause & Effect

- Pushes and pulls can have different strengths and directions
- Pushing and pulling on an object can change the speed or direction of its motion and can start or stop it
- SEPs: Planning and Carrying Out Investigations, Analyzing and Interpreting Data

Third Grade - Patterns, Cause & Effect

- Each force acts on one particular object and has both strength and direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.
- SEPs: Planning and Carrying Out Investigations, Asking Questions and Defining Problems

Forces - Progression

Seventh Grade - Cause & Effect, Systems & System Models, Stability & Change

- Newton's Third Law: for any pair of interacting objects, the force exerted by the first on the second is equal to the force that the second exerts on the first.
- The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change.
- SEPs: Asking Questions and Defining Problems, Planning and Carrying Out Investigations, Constructing Explanations and Defining Solutions, Engaging in Argument from Evidence

HS Physics (11th Grade) Models— Patterns, Cause & Effect, Systems & System

- Newton's Second Law accurately predicts changes in the motion of macroscopic objects.
- Momentum is defined for a particular time frame of reference; it is the mass times velocity of the object.
- SEPs: Planning and Carrying Out Investigations, Analyzing and Interpreting Data, Using Mathematical and Computational Thinking, Constructing Explanations and Designing Solutions

Disciplinary Core Ideas-Life Sciences, PreK-12



- Structure and Function
- Organization for matter and energy flow in organisms
- Cycles of matter and energy transfer in ecosystems
- Information processing
- Inheritance of traits
- Growth and development of organisms
- Interdependent relationships in ecosystems
- Biodiversity and humans
- Ecosystem dynamics, functioning, and resilience
- Social interactions and group behavior
- Evidence of common ancestry
- Adaptation
- Natural Selection

Disciplinary Core Ideas – Earth and Space Science, PreK-12

- The universe and its stars
- Earth and the solar system
- Weather and climate
- Natural hazards
- Biogeology
- Natural Resources
- Human impacts on Earth systems
- The history of Planet Earth



- Earth materials and systems
- Plate tectonics and large-scale system interactions
- The roles of water in Earth's surface processes
- Global climate change

Disciplinary Core Ideas – Engineering PreK-12



Engineering standards embedded throughout every science course at all grade levels

- Defining and delimiting engineering problems
- Developing possible solutions
- Optimizing the design solution

Science Education Will Involve Less	Science Education Will Involve More
1 Rote memorization of facts and terminology	Facts and terminology learned as needed while developing explanations and designing solutions supported by evidence based arguments and reasoning
2 Learning of ideas disconnected from questions about phenomena	Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned
3 Teachers providing information to the whole class	Students conducting investigations, solving problems, and engaging in discussions with teachers' guidance
4 Teachers posing questions with only one right answer	Students discussing open-ended questions that focus on the strength of the evidence used to generate claims
5 Students reading textbooks and answering questions at the end of the chapter	Students reading multiple sources, including science-related magazines, journal articles, and web-based resources
6 Students developing summaries of information pre-planned outcomes for "cookbook" laboratories or hands-on activities	Multiple investigations driven by students' questions with a range of possible outcomes that collectively lead to a deep understanding of established core scientific ideas
7 Worksheets	Students writing journals, reports, posters, media presentations that explain and argue
8 Oversimplification of activities for students who are perceived to be less able to do science and engineering	Providing supports so that all students can engage in sophisticated science and engineering practices

Elementary Updates

NYSSLS

- 6th grade curriculum writing project completed and fully NYSSLS aligned
- Vertically aligned with 7th grade
 - Implementation of 3 required labs
 - It's Alive?
 - All Mixed Up
 - Cool it!

State Assessment

- NO state assessment this year
- Implementation of 4 required labs
 - Grade 3, Circle of Life, Cloud in a Bottle
 - Grade 4, Light it Up!
 - Grade 5, What's in the Bag?



Elementary Updates

Project Lead the Way

- Original PLTW timeline of implementation complete
 - Grade 2: Properties of Matter
 - Grade 3: Forces and Interactions
 - Grade 4: Energy: Collisions



Project Lead the Way

- New this year, 5th grade Robotics and Automation
 - Incorporates NYSSLS 5-ESS3-1, protecting Earth's resources and environment
 - Level Up Village, Kenya collaboration with SS and ELA tie-in with research of environmental issue



https://drive.google.com/file/d/18B-vdkSP8o4d_bTIFFMlijcoF4AWyT-T/view?usp=sharing

Secondary Updates

NYSSLS Updates

- 7th grade curriculum writing project completed
- Vertical alignment with 6th grade
- One required lab
 - How's the Weather Up There?

Regents Classes

- Phenomena-based lessons and units
- Blending of old and new until full change in 24-25
- New exams in Biology and Earth and Space Science in June 25
- New exams in Chemistry and Physics in June 26



Secondary Updates



- Enrollment at 90 students
- 2 Regeneron STS Scholars
- Science Research Senior Symposium and Science Research EXPO in person
- Planned participation in a minimum of 8 different competitions

Science Research Program

Secondary Updates



- Sequence interrupted for realignment
 - This year all 10th and 11th grade students enrolled in Aerospace Engineering
 - Updating of microcontrollers for PLTW coding programs halfway completed

Engineering / PLTW

Secondary Updates

Engineering Club

- Incorporation of rotation of projects
 - Students will not repeat a project in their 4 years



Science Olympiad Teams

- Senior Division competition Saturday, 2/4
- Junior Division competition Saturday, 3/11
- 3 Teams for each division



Secondary Updates

Science Honor Society

- 47 Students inducted this year
 - 95 Total students
- Successful start to Peer Tutoring

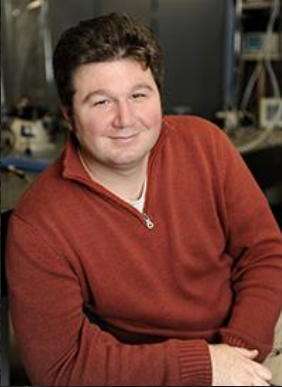


Green Club

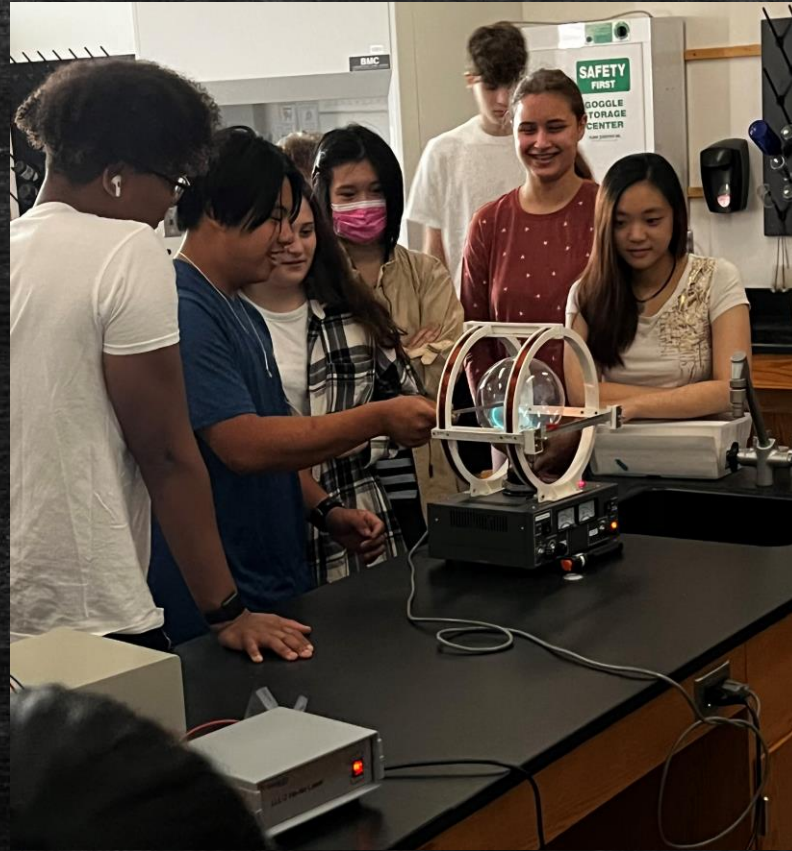
- Sands Point Hike
- Tote Bag Logo Contest



Collaboration with Adelphi Physics



- Adelphi Physics professor, Dr. Matthew Wright and students spent the day in Manhasset in the Spring, 2022
- Returning on June 2 to work with this year's students



Looking Forward

- 2023-2024



Elementary Proposals

NYSSLS Alignment Continues

- Curriculum Writing for Grade 4
 - Energy
 - Includes PLTW unit
 - Waves and Information
 - Structure, Function, Information Processing
 - Earth Systems
- NYS Science Assessment Returns in Grade 5

Expand PLTW

- Grade K plan to incorporate NYSSLS and PLTW
 - Pushes and Pulls
 - Animals, Plants, and Their Environment
 - Weather and Climate
- Grade 1 to incorporate PLTW unit
 - Light and Sound



Middle School Proposal

- Savvas Elevate Science Modules
 - Grades 6 and 7
 - NYSSLS aligned
 - Online platform



Secondary Proposals

High School Robotics Club

- Vex Robotics
 - Student centered
 - Adult "help" prohibited
 - Competitions allow multiple robots from each school
 - Longer build period prior to competition
 - Require less space

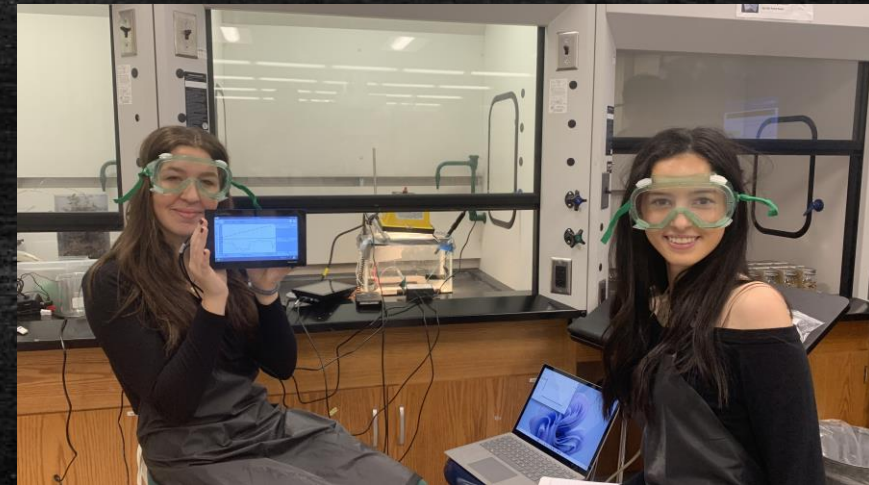
Competition Robot



VEX V5 Competition Super Kit

Science Research Program

- Curriculum writing to increase skills at the Introduction level
 - Graphing and statistics
 - Lab equipment use and understanding
 - Exposure to different sciences to assist in decision-making process for first project
- Proposed increase of 0.6 FTE to allow 2 full time research teachers to support program
- Expand equipment
 - Trinocular stereoscopes



Thank you for your support!

Dr. Teri McGrath
516-267-7560
teresa_mcgrath@manhassetchools.org