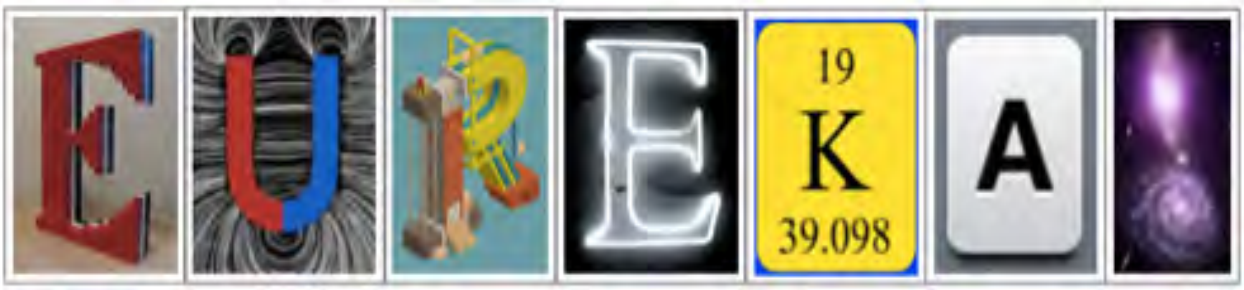

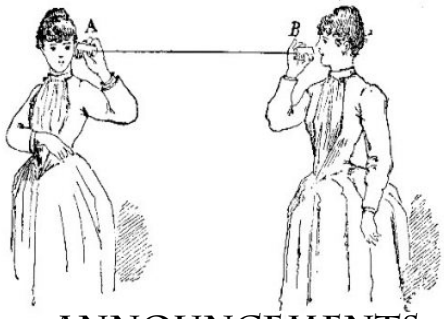

ANNOUNCEMENTS

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Rubber Band Car Challenge

District 75 staff and students are invited to participate in the design and construction of a rubber band powered car. The challenge will be held on February 29, 2016 at 400 1st Ave, New York, NY 100`0 1st Floor. For more information contact Denis Kogan at dkogan@schools.nyc.gov

Call for Submissions

We are welcoming all submissions that make original empirical contributions that will move the field of science and STEM education forward. Submissions may be focused on science education practice across formal education contexts as well as informal settings. Submissions typically focus on activities that use inquiry-based methodologies and hands-on investigations to support the development of student understanding of importnat scientific concepts. Please e-mail all submissions to **dkogan@schools.nyc.gov**

Part II: No Significant Difference

A Note from the Editor

When considering the process of learning and using learning aids, I stated that something so powerful such as animation is no more effective than static graphics [May 2015]. How is this possible? Well, for one thing, animations are fleeting so you might miss something as they go by. Plus, since the parts are animated for you, you don't have to mentally envision how the parts are moving and so you don't have to invest as much mental effort which would make it more memorable. In fact, sometimes static graphics perform better than animations. I think this points to a fundamental aspect of education; it doesn't matter what happens around the learner - we are not limited by the experiences we can give to students - what limits learning is what can happen inside the students head. That is where the important part of learning takes place.

No technology is inherently superior to any other. Researchers have spent so much time investigating whether one medium or technology was more effective than another that they failed to investigate exactly how to use the technology to promote meaningful thought processes. So the question really is, what experiences promote the kind of thinking that is required for learning?

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A Message from Cara Coffina, Coordinator of Applied Learning.

The Solvay Conference of 1927

Game-Based Learning and 17X

Alternate Assessment Curriculum Framework

Recently, that research is being conducted and we are finding out some pretty important stuff. It may sound obvious, but it turns out learning with words and pictures together, whether they are animation and narration or static pictures and text, works better than words alone (think Khan Academy). Also, we see that anything that is extraneous needs to be eliminated from a lesson. For example, on-screen text competes with visuals, so learners perform better when it is omitted than when it is present.

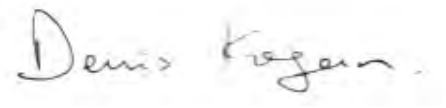
Now that we know how best to make educational videos and any experience can be simulated in a video setting, YouTube must be the platform that will revolutionize education. The number of educational videos on YouTube is increasing everyday. So why do we need teachers?

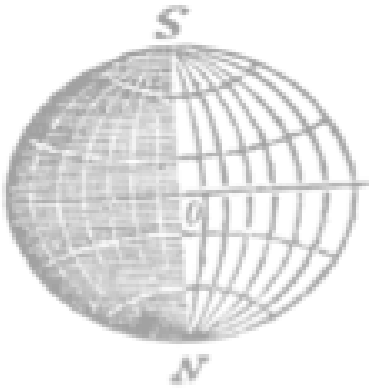
If you think that the fundamental job of a teacher is to trasmit information from their head to their students, then you're right, teachers are obsolete. I mean, you probably imagine a classroom where this teacher is spewing out facts at a pace that is appropriate for one student, too fast for half and too slow for the rest. Luckily, the fundamental role of a teacher is not to deliver information, rather it is to guide the social process of learning,

The job of the teacher is to inspire, to challenge, to excite their students to want to learn. Yes, they also explain and demonstrate and show things, but, fundamentally that is beside the point. The most important thing a teacher does is make every student feel important. To make them feel accountable for doing the work of learning.

All of this is not to say technology has had no impact on education. Students and teachers work and communicate via computers, and videos are used both inside and outside of classrooms. But all of this is best characterized as an evolution, not a revolution. The foundation of education is still based on the social interaction between teachers and students.

For as transformative as each new technology seems to be, like motion pictures or computers or Smartboards, what really matters is what happens inside the learners head. And making a learner think seems best achieved in a social environment with other learners and a caring teacher. [Part I: May 2015]





FROM THE DESK OF

Russell Shilling
Executive Director of STEM, Office of Innovation and Improvement

G.K. Chesterton captured the essence of early-childhood when he said, "Fairy tales say that apples were golden only to refresh the forgotten moment when we found that they were green." Every child is imbued with a sense of curiosity and wonder. They are born scientists, engineers, and creators ready to discover the world at every turn. The goal of education should be to sustain this engagement throughout a lifetime.

While working with Sesame Street on programs for military children, I was struck that most of our federal Science, Technology, Education, and Math (STEM) programs concentrated on encouraging interest in Middle and High School students. From an early learning perspective it makes more sense to engage children in STEM in pre-K. Instead of winning them back to STEM, what if we never lose them? This idea has become a priority for our STEM team at the U.S. Department of Education.

Unfortunately, we do not know as much as we need to about how to effectively integrate STEM into early learning. Most early learning research in STEM focuses on mathematics. Even here we need to know more. For example, The What Works Clearing House (WWC) has published an educator's practice guide, "Teaching Math to Young Children" for ages 3 – 6. The guide outlines five recommendations from a panel of early education experts on how to teach and integrate math instruction throughout the school day; it is a very useful report and a sorely needed resource. However, the research underlying these recommendations is based on minimal evidence as defined by the WWC. More research investment is needed, aimed at developing and validating best practices across the entire STEM spectrum, to better guide educators toward practices that we know work.

Work is underway at the U.S. Department of Education to identify best practices for introducing STEM in early learning. In 2015, our Ready to Learn grant program provided $25M to create innovative media aimed at promoting science and literacy to low-income children (pre-K-3). Meanwhile, the Institute of Education Sciences (IES) and the National Science Foundation (NSF) have funded research focused on a variety of STEM programs, including pre-K. We are excited to see how these varied investments develop. But, more needs to be done!

We need our partners in both the public and private sectors to take up the challenge and help us to answer these and other questions: What types of active learning strategies work best for young children? How do we encourage curiosity and creativity that lasts a lifetime? What roles do computer science and computational thinking play for young children? How do we best leverage technology in the classroom? Most importantly, how do we prepare educators?

Stay tuned! In the upcoming year, the U.S. Department of Education will help lead conversations for identifying what we know about best practices for teaching STEM to young children and to develop a research agenda for filling in the gaps where our knowledge is incomplete.

Many scientists and engineers today were inspired by the Space program when they were young children. How do we inspire this generation and the next? Every child regardless of socio-economic status, race, gender, urban, or rural upbringing, should understand the role STEM plays in the world and see themselves as an active part of that world. We need to identify the best ways to inspire and educate our youngest students in STEM and give them the critical skills they need to adapt and succeed throughout their lifetimes.

BUILDING A PVC GREENHOUSE AT 373R

Adding a greenhouse to an already exsisting school garden provides an opportunity to bring science, math, social studies, and language and visial arts to life through hands-on learning year-round.

Greenhouses provide for a longer growing season as plants inside are not subject to the same degree of temperature variation as plants grown in an outdoor garden. A greenhouse also keeps plants in isolation, locked safely away from the outside world where insects and other animals could damge them. In addition, greenhouses give gardeners the comfort of knowing that they don't have to race to school from home to cover their gardens or simply hope that their plants survive during periods of inclement weather.

At 373R students will have the opportunity to appreciate the wonder and power of nature as the core of an environmental education. Planting a seed teaches students about the need to protect our natural resources, since clean soil and water are necessary for the plants to grow. Children

learn that we need to preserve open land for food crops, trees and enjoying nature.

This new space will provide a wealth of opportunities for kids to get their hands dirty while learning lessons in many different areas of curriculum. Science teacher Mr. Miller and his students can study plant anatomy and botanical life science, and those are just the beginning. Young scientists can change variables in the garden (such as watering frequency or plant spacing), then collect data on plant growth, chart the research and write up their analyses and conclusions.

The project took a total of four visits from Denis Kogan, the District 75 Science Coach, to draw up, plan and work on along with students from Mr. Miller's science class. Mr. Kogan says, "This is more than just a greenhouse. Its value lays in its educational potental. One example is that it can easily be used as a planetarium to provide the school and its surrounding community a place where people can enjoy a guided journey of exploration through the vast cosmos to which we all belong."

Mr. Miller also adds valuable nutrition lessons on the importance and joys of eating fresh foods. Mr. Miller adds, "School gardens can take variety of forms, from the simplest containers outside a classroom to a multi-plot, in-ground garden featuring seating areas and a greenhouse. But the size of your garden should not limit its potential to contribute to the learning environment. The benefits are readily available to all, so go and plant that seed!"

We would like to extend a special thank you to Ms. Paulette Benevento, Principal of 373R for supporting this project.

COURTESY PAMELA FALLON

Special education students at 721Q John F. Kennedy Jr. School in Queens spent over a month collecting an estimated 800 milk cartons to create a Cecil the Lion tribute as part of the Made By Milk™ 2015 carton construction contest. Science teacher Jennifer Sharma and colleague Juli Tuifel, along with students in six science classes, worked to create this project while exploring units on recycling, the environment, conservation, and sustainability.

The Made By Milk™ contest encourages students to build strong bones with milk and flex their creative muscles by repurposing milk cartons.

Their story was recently featured in a Daily News article (http://goo.gl/WKfE0d).

The New York City Department of Education
STEM Framework

The NYC STEM Education Framework is a tool that provides a structured approach for schools seeking to organize and develop the implementation of a STEM initiative whose results are repeatable. It includes a readiness checklist of structures, criteria, and systems and is not intended to be judgmental or evaluative.

The architecture of the STEM Education Framework is based on four domains which are each subdivided into indicators with corresponding criteria.

Domain I: **School Vision and Structures for Success** articulates a coherent STEM vision that is clear to all school constituents and is successfully sustained by an innovative STEM culture, budget, and program evaluation system.

Domain II: **Curriculum, Instruction, and Assessment** encourages a transdisciplinary approach to curriculum and instruction that promotes student-centered inquiry, problem-based learning, and teacher collaboration.

Domain III: **Strategic Partnerships** engages community-based organizations (CBOs), higher education institutions, businesses, and other external partners who offer STEM education programs and support as a means of encouraging school communities (administrators, teachers, and students) and families in STEM learning.

Domain IV: **College and Career Readiness** prepares students for STEM post-secondary education and careers by providing equitable access to all students and provides STEM educational experiences, beginning in elementary school and continuing through middle and high school.

The Framework is designed to work alongside other data and qualitative tools to help schools develop a STEM culture that integrates well with a school's existing instructional mission and vision, while shifting the disciplinary paradigm from multidisciplinary and interdisciplinary toward instruction and learning that is ultimately transdisciplinary.

Q&A

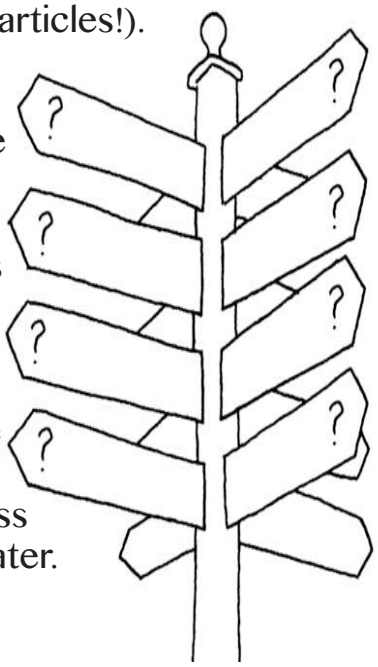
FROM THE STUDENT

"Why does hot air go up?"

One answer as to why hot air rises is because when you heat air (or any other gas for that matter), it expands. When the air expands, it becomes less dense than the air around it. The less dense hot air then floats in the more dense cold air much like wood floats on water because wood is less dense than water. This floating effect in a less dense medium is called a buoyant force or a displacement force.

Another answer has to do with the movement of particles. Most movement of particles (such as air) happens due to diffusion. If you put sugar or salt into water, it will eventually dissolve into the whole volume of water. In this example, it's because there is originally a different concentration at one point than another (that is, there's a lot of sugar sitting on the bottom of the cup, and none at the top). This creates a gradient, a difference in concentration in this case, which can do work (like move particles!).

Hot air rising happens for similar reasons. Hot air is less dense than cold air. When the air gets hot, its density decreases, and now there's more air molecules in the colder zone than in the hot zone. There are more complicated things happening, but for this simple reason alone, we might expect hot air to rise for the same reason that objects less dense than water will float in water.



FROM THE TEACHER

"What is hydroponics?"

The word, Hydroponic, comes from Latin and means working water. Simply put, it is the art of growing plants without soil.

When most people think of hydroponics, they think of plants grown with their roots suspended directly into water with no growing medium. This is just one type of hydroponic gardening known as N.F.T. (nutrient film technique). There are several variations of N.F.T. used around the world and it is a very popular method of growing hydroponically. What most people don't realize is that there are countless methods and variations of hydroponic gardening.

There are 6 basic types of hydroponic systems; Wick, Water Culture, Ebb and Flow (Flood & Drain), Drip (recovery or non-recovery), N.F.T. (Nutrient Film Technique) and Aeroponic. There are hundreds of variations on these basic types of systems, but all hydroponic methods are a variation (or combination) of these six.

Hydroponic systems usually consist of a few basic parts: a growing tray, a reservoir, a submersible pump to water the plants, a simple timer and an air pump and air stone to oxygenate the nutrient solution. Of course, light, is also required.

QUICKGUIDES

The vision for the City's public schools is embedded Four Pillars:

(1) to improve student achievement by providing high-quality instruction aligned to the Common Core State Standards;

(2) to restore dignity and respect to the craft of teaching and school leadership;

(3) to engage parents and families in every aspect of school life;

(4) and to create new collaborative and innovative models.

	"Education"	***"Learning"***
overall paradigm	delivery	discovery
social structure	hierarchy	community
context	classroom	world
environment	simulated	real
content	fixed	open
assignments	recipes	frameworks
activities	consumption & repetition	construction & creation
infrastructure	administrative focus	empowerment focus
assessment	teacher-driven	community-driven
process	standardized	personalized
motivation	extrinsic	intrinsic
expectation	grades & certification	skills & experience

TAKE THE CHALLENGE

District • 75

S·T·E·M

District 75 Rubber Band Racer Car Challenge

Design and construct a car that only uses the power of rubber bands to go really fast and really far.

Constraints:

- *The car can be powered by no more than 3 standard rubber bands (size 64).*
- *The car may not have any human energy inputs. (e.g., pushing).*
- *Wheels may be no larger than a CD in circumference.*
- *A maximum of 1 propeller can be used.*
- *Car must weigh no more than 1 lb.*

Take the Challenge on February 29, 2016 at 400 1st Ave, New York, NY 10010 1st Floor

For challenge inquiries contact Denis Kogan (dkogan@schools.nyc.gov)

The NYC DOE Sustainability Initiative

June 2015

DISTRICT 75

Schools Spotlight

The first annual District 75 STEM Fair took place on June 10, 2015 at the American Museum of Natural History. Participants were asked to present one project highlighting Science, Technology, Engineering and/or Math that will move the field of science and STEM education forward. Students presented exhibits on an array of topics from Aquaponics to video games, over 30 exhibits were on display, however, the projects highlighted in this newsletter will focus on sustainable initiatives. Please enjoy and congratulations to all the students who participated in the D75's first STEM Fair.

The Three Brave Goats

P4K, Brooklyn

Students: Anthony Flores, Nicky Qiu, Jakob Velez, Daniel Sotamba, Marc Wayne, Terry Won

Teacher: Mr. Alfredo De Leon

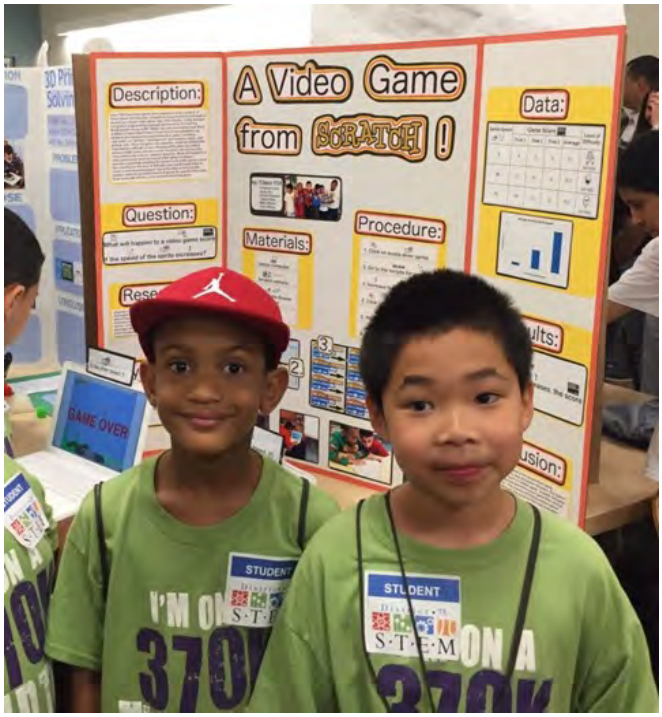
Last year students at P4K competed in the annual Made by Milk construction contest in which they constructed, The Three Brave Goats, based on the story 'Three Billy Goats'. The Made by Milk contest aims to encourage students to re-use their empty milk cartons to build a piece of art. Students chose to showcase this project for the STEM Fair because atudents collected almost 130,000 empty milk cartons from the cafeteria. During art period, students washed, dried, and assembled their project.

Aquaponics

P373K, Brooklyn

Teachers: Ms. Maura Flanagan, Ms. Elizabeth Sandoval-Lacy

Aquaponic is the marriage of aquaculture (raising fish) and hydroponics (the soil -less growing of plants) that grows fish and plants together in one integrated system. Students presented different growing methods and the science behind the nutrients and vitamins needed to grow plants, through Aquaponics. Students also, designed and built a shelfponics systems using fish to provide nutrients and vitamins. They tested different materials, such as oxygen pumps, tube size, and grow lights.



A Video Game from Scratch

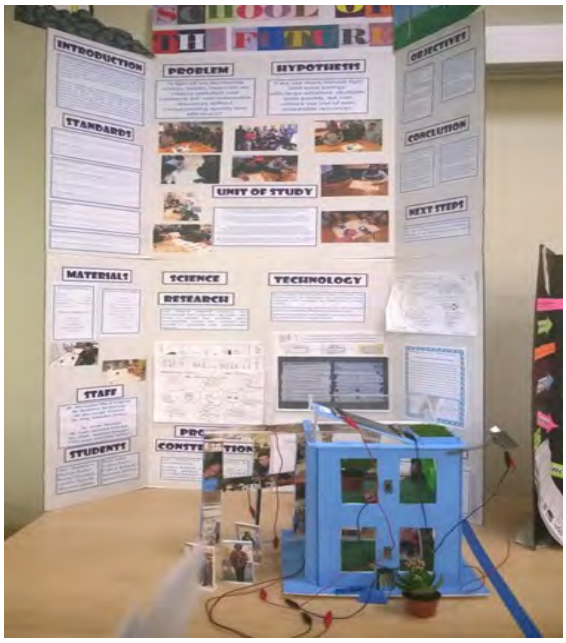
370K, Class Y58

Students: Anthony Flores, Nicky Qui, Jakob Velez, Daniel Sotamba, Marc Wayne, Terry Wong

Teacher: Ms. Krista Gerleit

The young minds in class Y58 at 370K loves video games and computers! In their project, 'A Video Game from Scratch', students incorporated both interests to develop an original video game. Using Scratch, a beginner programming language developed by the Lifelong Kindergarten Group at MIT Media Lab, and instructions from ScienceBuddies.org, students developed, programmed, and fine-tuned their own video game, *Age of the Sharks*.

Play Age of the Sharks online!



School of the Future

P12X @ Lewis and Clark School

Students: Felix Alejandro, Regina Darko, Robert DeJesus, Charlie Garcia, Siata Kake, Carolos Perez, Patrick Roberts, Javier Guity, Jessibel Silverio

Teachers: Ms. Sarah Buccleugh, Mr. Ben Badurina, Mr. Victor Abruzzese, Mr. Mauricio King

Through the use of media, computer technology, and hands-on activities, Mr. Badurina's Technology class focused on the big question, "Why is the conservation of nonrenewable resources important?" They explored issues surrounding the ever-increasing demand for energy, and ways that they could contribute to the conservation of non-renewable resources. In Mr. Abruzzese's after school program, with the assistance of Mr. King's Adaptive Design Art class, students planned and developed a green "school of the future," wiring the building with electricity obtained from solar and wind sources.
Students built a model of the "School for the Future", which included photos of each project team member along, with a imitation solar panel and roof top garden.

"A Living Model" Sustaining an Ecosystem in our School Garden

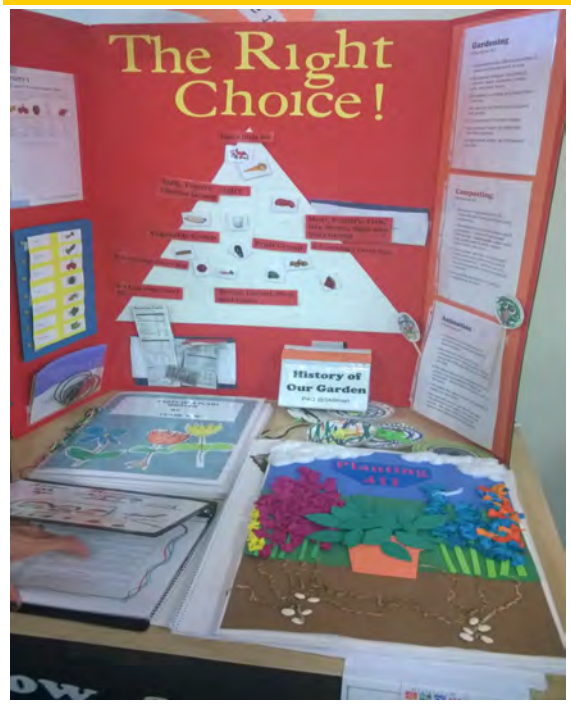
811X, Bronx

Class: Y09, Y14, Y16, Y23, Y25, Y30

Teachers: Mr. Spencer Leeds, Mr. Peter McCoy, Orlean Sorio

Six classes at 811 in the Bronx are participating in a long-term project focused on increasing the biodiversity within their school. Students worked together to construct a 'Living Model' of the garden which includes sub-irrigated beds. Their math course helped them determined the best design for the raise beds. Students then conducted experiments to test the impact of different soil mixtures on the growth rate of pollinator seedlings (sunflower seeds). The living garden model is being used to germinate seeds, and make observations on the growth rate of seedlings watered conventionally (by over-head method) versus seedlings hydrated by a sub-irrigated system.

Students are participating in lessons/activities to replicate the garden model experiment in the actual school garden. In successive lessons, students will observe, and record plant growth/health, to determine which method of hydrating the raised bed is best. Students are also learning how the garden provides a habitat for a variety of different animal species. Students are conducting habitat surveys to track, measure, and report on the biodiversity of the school garden – while exploring relationships between species and learning more about the important role of pollinators play within the garden environment.



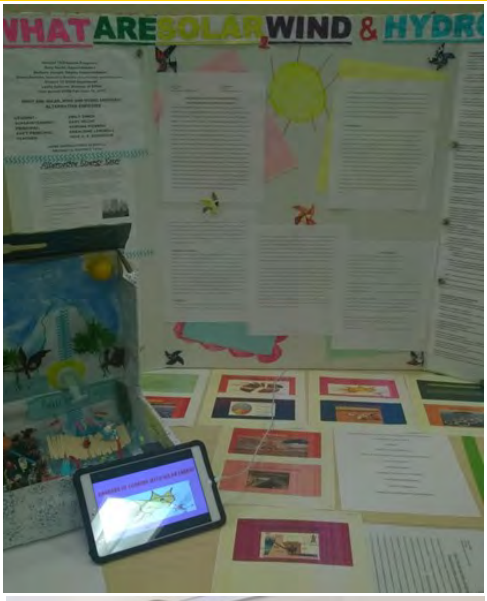
The Right Choice

P4Q @ Skillman

Class: Y-35

Class Y-35 at P4Q broke down why eating healthy is The Right Choice! Based on their research, students were able to prove that eating healthy is good for both the human body and the earth.

Students started their research within their community garden, where they planted a variety of plants and vegetables. From there they learned about composting and how the healthy food they eat and discard can then be used in their garden to help cultivate the plants and vegetable in their garden.



What Are Solar, Wind, And Hydro Energies?
Benefits Of Using Alternative Energies

Home Instructions Schools

Student: Emily Singh

Teacher: Ms. Gail A. Monsegue

A thematic approach to S.T.E.M. was conducted by Miss Emily Singh, a 3rd Grade Home Instruction student. All disciplines were engaged: **S**cience (the Scientific Method was used to conduct her research). English Language Arts (drafting, revising and publishing of essay). Mathematics (graphing and cost estimates). Social Studies (researched communities that provide the various sources of the energies, who is using the listed energies and who can benefit from solar, wind or hydro energies). Art: a diorama of a potential LEED or green city was constructed using recycled materials. Each of the energy sources were shown with examples of how each form of energy can benefit society: solar charging stations for technology and a solar car, wind turbine fields, a hydroelectric dam, a farm using a solar, rainwater collection pool, solar panels on a home and charging station, rain barrel, solar lights around the perimeter of the acreage, solar lampposts, a solar car, a suspension bridge and a bridge and tunnel for nature viewing and transportation near dam.

The Butterfly Life Cycle

P373R

Students: Michael Archangel, Dominick Boyce, Robert Cotto, Nicholas Fosdal, John Jude Gracian, Connor McNamara, Hailee Salce, Lianne Walsh

Teacher: Ms. Lauren Cunnigham

6th grade students at P373R in Staten Island explored at P373R in Staten Island learned that all butterflies go through a “complete metamorphosis”. Their vivid display described the four stages if life: egg, larva, pupa and adult. Their study showed that each stage has a different goal - for instance, caterpillars need to eat a lot and each caterpillar type likes only certain types of leaves while adults need to constantly reproduce. Students charted their observations and photographed each stage of the process for their exhibit. Students at P373R also maintain a school garden, where the butterflies released and currently reside.

Engineering: Recycle, Reuse, Repurpose

P368K

Students: Ramello Graves, Sakinah Jemison, Jonathan Sanchez, Angel Roper, Trevon Jones, Matthew Nunez, Jeremiah Mc Garrell

Teachers: Ms. Camille Horsford, Ms. Natacha Avril

Students created model cars using recyclable materials. They conducted trials with their models to collect data about distance and time to calculate speed. Their experiment has taught them that engineers apply scientific knowledge and engage in scientific inquiry when they design, build, and test their solutions. As young engineers, they now know how to apply their knowledge of properties of different materials (e.g., strength, weight,) to design the structure. They will pose questions about the strength of a material, gather evidence as they test the material, and make reasoned claims about the material based on their investigations.

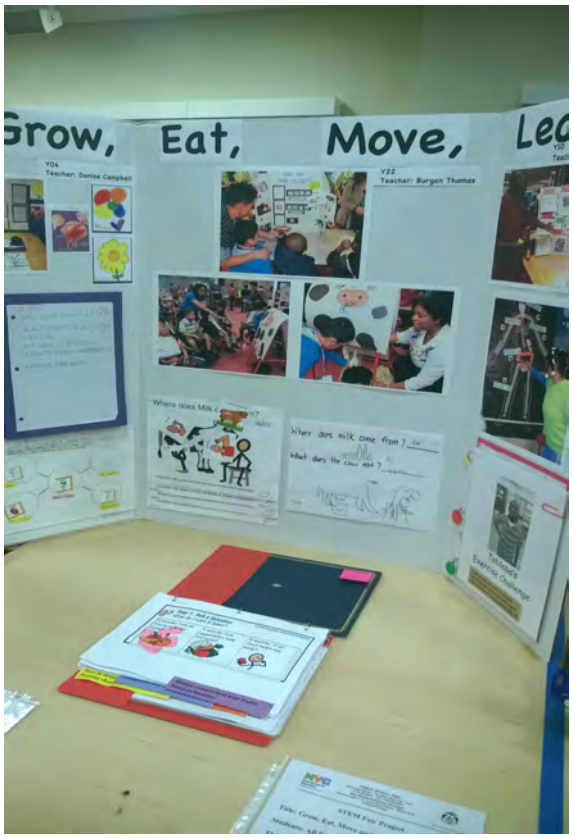
Exploring Science in the World Around US

PS 168X

Students: Jaszmin Caesar, Ryan Enamorado, Daniel Gonzales, Joshua Mercedes, Daniel Moreno, Jaylen Orlando, Curtis Patterson, Antonio Valle, Tamyia Bailey, Michael Delossantos, Malachi Edwards, David McArthur, Victor Pizarro, Nicholas Sanchez, Julian Santana, Christopher Suarez

Teacher: Mr. Todd Fiore, Ms. Lily Padia

The Weekly Science Club at P168x in the Bronx students learn that Science is everywhere! Each week they engage in scientific activities that are both cognitively challenging and accessible. Their presentation demonstrates various ways science impacts their daily life. Students looked at Robotics, cycles in nature, as well as force and gravity.



Grow, Eat, Move, Learn

P396K

Teachers: Ms. Denise Campbell, Mr. Burgan Thomas

The teachers of P396k developed a 3-month unit of study based on the healthy and life science units from the UNIQUE Learning System and combined it with content from the Eat, Play, Grow curriculum from the Children's Museum. Students had the opportunity to apply the content and skills learned from those sources into practical daily life skills, for example they grew various fruits and vegetables and made healthy diet choices that benefits movement and exercise. The culminating activity was an mini-museum with all students and staff participants, displaying and demonstrating their individual class focus of instruction.

Green Scene

P993Q

Teacher: Mr. Rob Roszkowski

The exhibit presented by the students of P993 displayed three videos that explain the past, present and future of sustainable practices at their school . Students learned that their school has incorporated recycling into their routine since 1996. In the first video, it shows students planting a garden, learning about trees and ways to recycle.

Today, the students from PS 993 at 499, 191, and 208 continue to practice recycling methods however, the present day video proves that they've also incorporated learning about animals, plants, energy, stopping pollution and saving the Earth.

Finally, students took a glimpse into what the earth's water supply may be like in the future. High School students at P993 learned about what's happening with water and the population of Earth. They looked as far back as 1804, when the population was 1 billion and predict that in 2042 the estimated population on earth will be nine billion. Concluding that as the earth's population grows, there is less water to be shared.

In conclusion, whether in the past, present or future, all of the kids in our school are working on saving the Earth.

District 75 is made up of 58 school organizations, home & hospital instruction, as well as vision and hearing services that provide educational and vocational programs for students with special needs.