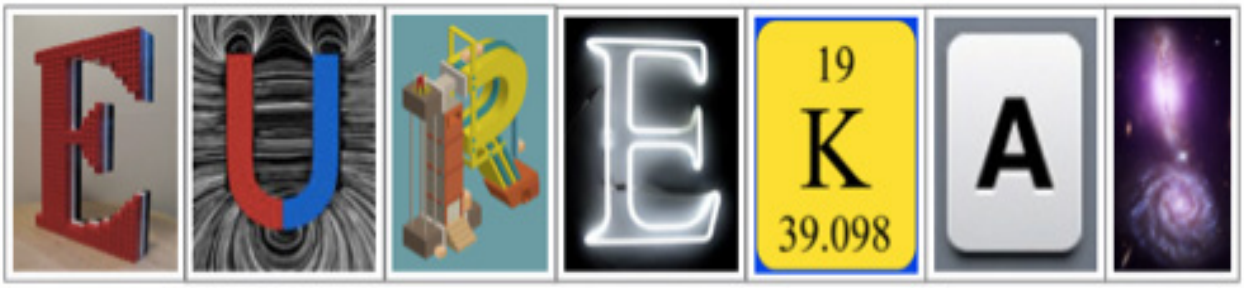

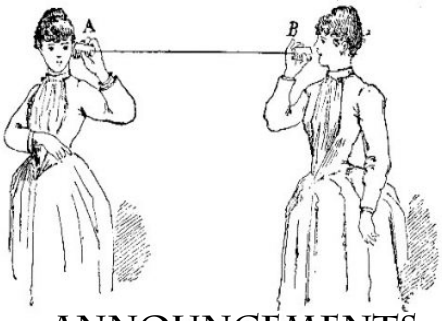

ANNOUNCEMENTS

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District 75 STEM Fair

The first annual District 75 STEM Fair will take place on June 10, 2015 at the American Museum of Natural History in the Davis Classrooms. Schools will be receiving ongoing correspondence and must call **212-769-5200** to register for the trip to AMNH.

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**

No Significant Difference

A Note from the Editor

In 1922, Thomas Edison declared, "The motion picture is destined to revolutionize our educational system and that in a few years, it will supplant largely, if not entirely, the use of textbooks." In the 1930's it was radio. The idea was you could beam experts directly into classrooms, improving the quality of education for more students at lower cost. That would mean we would require fewer skilled teachers, a theme common to all of the proposed educational revolutions, like that of educational television in the 1950's and 60's.

Studies were conducted to determine whether students perferred watching a lecture live or sitting in an adjacent room where the same lecture was broadcast via closed-circuit TV. What would you prefer?

In the 80's, there was no debating, computers were the revolutionary solution to our educational woes. They were audio-visual, interactive, and could be programmed to do almost anything you like. Their potential was obvious. Researchers suspected that if they can teach kids to program, then their procedural reasoning skills would also improve. So, how did it go? The students got better at programming, but their procedural reason remained largely unaffected.

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PREVIOUS ISSUE

A Message from Linda Curtis-Bey, Ed.D., Executive Director, STEM.

Vince Bertram's article, "STEM or STEAM? We're Missing the Point."

LEGO Education Robotics with WeDo kits and NXT kits at 176X

NYS Statewide Strategic Plan for Science and P-12 Science Learning Standards

Even by the 1990's we had not learned from the failure of our past predictions. And I quote, "The use of videodiscs in classroom instruction is increasing every year and promises to revolutionize what will happen in the classroom of tomorrow" (Semrau & Boyer, 1994). Videodiscs? You remember, those giant oversized CD things. Remember when they revolutionized education?

Nowadays, plenty of things are poised to revolutionize education. Like SmartBoards, smart phones, tablets and M.O.O.C.s (Massive Open Online Courses). And some believe we are getting closer to a universal teaching machine (a digital Aristotle). A computer so quick and well programmed, that it's basically like having your own personal tutor in a machine. Students could work through well structured lessons at their own pace, receiving immediate and personally tailored feedback, and all without the interference of a meddlesome and experienced teacher.

Do these claims sound familiar?

Over the past 100 years, a lot of areas of life have been revolutionized. But education is not one of them. By and large, students are still taught in groups by a single teacher. And that is not what a revolution looks like. Some might blame this state of affairs on the inertia of our education institutions. It's just too hard to get a huge bureaucracy to change. But I think the reason technology hasn't revolutionized education is something else. Something that goes to the very heart of what education is.

Let's consider the process of learning. Which learning aid do you think would be more effective, an animation with narration or a set of static pictures with text? Obviously an animation is better, and for decades educational research focused on questions like this. Does a video promote learning better than a book? Are live lectures more effective than televised lectures? Is animation better than static graphics?

In all well controlled studies, the result is no significant difference. That is, so long as the content is equivalent between the two treatments, the learning outcomes are the same with all different media.

I ask you, "How is this possible?" And will attempt to answer this question in the next issue.

Denis Kagan.

FROM THE DESK OF

Cara Coffina

Coordinator of Applied Learning

Have you ever been to a virtual block party? The students in "3-D World" are getting ready to plan their annual celebration with virtual games, barbeque, and even a bouncy castle. Sound interesting?...

3D World is a three-dimensional, online world designed for the learning and practice of social, communication, and life skills: from independent city travel, to banking and financial decision making, to setting up one's first apartment and hosting a party.

Each student and educator is represented in 3D World by an "avatar" – a male or female character that represents them in the virtual environment. Using this avatar, they can travel throughout virtual neighborhoods and interact with other students, teachers and coaches using both voice and text while completing targeted learning activities within this environment. Lessons include planning and taking part in social interactions with other students, practicing life skills such as shopping, banking and setting up an apartment, and even planning group events.

We love 3-D World and we think you should, too. Where else can you open a bank account, shop for groceries, furnish a brand new apartment, and plan a party all from the comfort of your classroom? Oh, and you get to design your very own avatar that is used to interact- using voice and text chat- with friends in classrooms all around the city. Want to join?

The 3D World Project is managed by Cara Coffina, Office of Applied Learning at District 75; and John Howard, Senior Virtual World Producer for LearningTimes.

yNEWSworthyNE

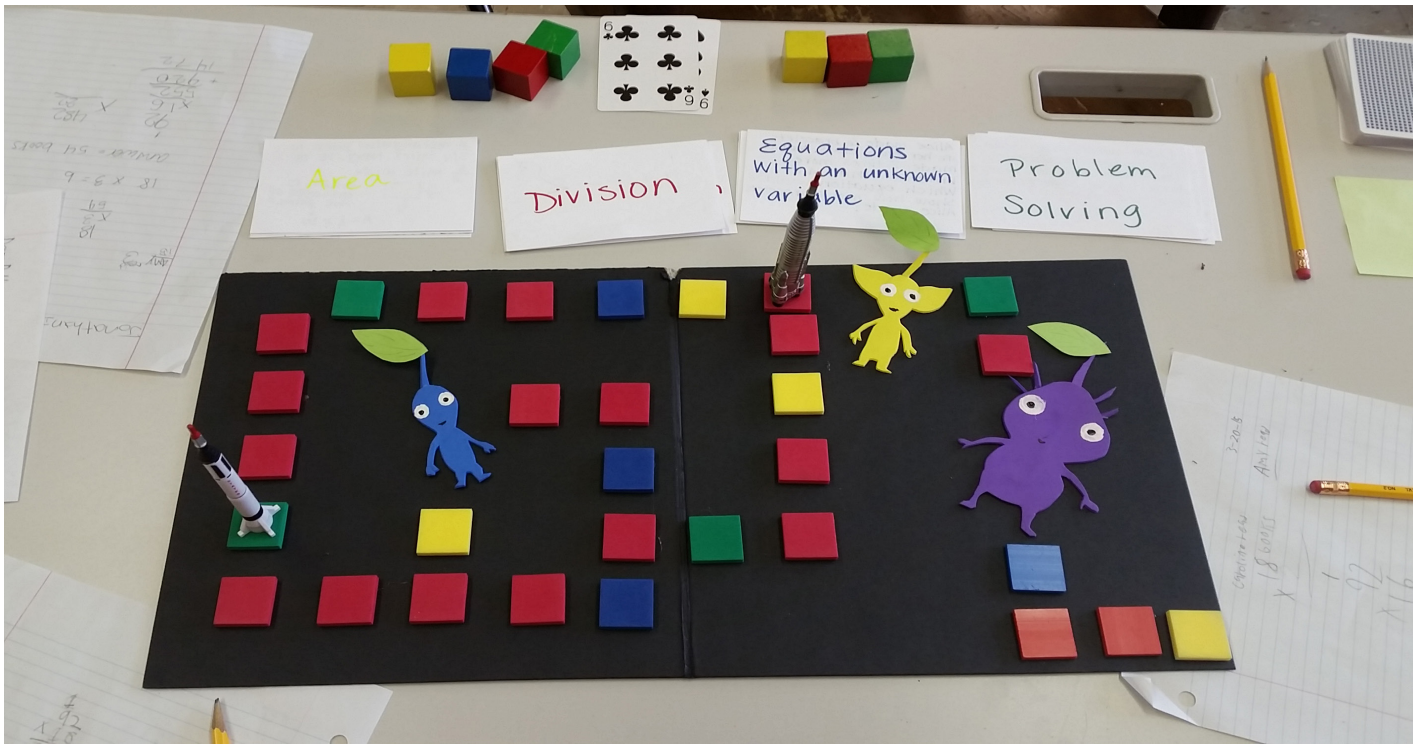
The most intelligent picture in the world? Here's a splendid colored version of a photo of the Solvay Conference 1927. The Solvay Conference, founded by the Belgian industrialist Ernest Solvay in 1912, was considered a turning point in the world of physics. Located in Brussels, the conferences were devoted to outstanding preeminent open problems in both physics and chemistry. The most famous conference was the October 1927 Fifth Solvay International Conference on Electrons and Photons, where the world's most notable physicists met to discuss the newly formulated quantum theory. The leading figures were Albert Einstein and Niels Bohr.

Einstein, disenchanted with Heisenberg's uncertainty principle, remarked "God does not play dice." Bohr replied, "Einstein, stop telling God what to do." Seventeen of the twenty-nine attendees were or became Nobel Prize winners, including Marie Curie, who alone among them, had won Nobel Prizes in two separate scientific disciplines.

This conference was also the culmination of the struggle between Einstein and the scientific realists, who wanted strict rules of scientific method as laid out by Charles Peirce and Karl Popper, versus Bohr and the instrumentalists, who wanted looser rules based on outcomes. Starting at this point, the instrumentalists won, instrumentalism having been seen as the norm ever since.

Back to front, left to right:
Back: Auguste Piccard, Émile Henriot, Paul Ehrenfest, Édouard Herzen, Théophile de Donder, Erwin Schrödinger, JE Verschaffelt, Wolfgang Pauli, Werner Heisenberg, Ralph Fowler, Léon Brillouin.
Middle: Peter Debye, Martin Knudsen, William Lawrence Bragg, Hendrik Anthony Kramers, Paul Dirac, Arthur Compton, Louis de Broglie, Max Born, Niels Bohr.
Front: Irving Langmuir, Max Planck, Marie Curie, Hendrik Lorentz, Albert Einstein, Paul Langevin, Charles-Eugène Guye, CTR Wilson, Owen Richardson.

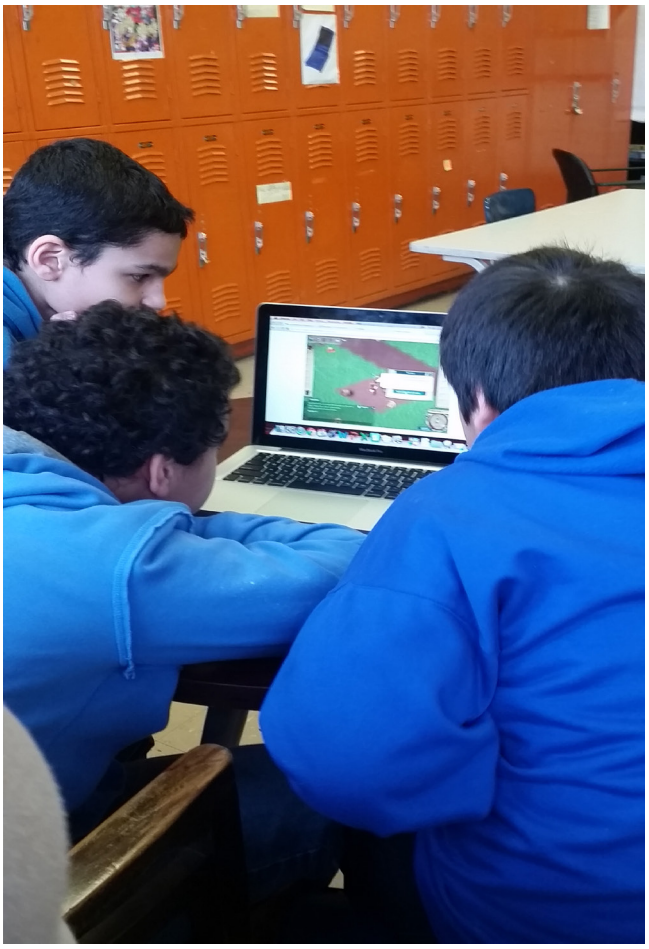
Photograph by Benjamin Couprie, Institut International de Physique de Solvay. The colorization photo by u/mygrapefruit.



Game-Based Learning in Action

Identifying games that can be used in education is complex as there is no uniform pedagogy within serious or educational games. The learning outcome is dependent upon an appropriate pedagogy and the underlying game mechanics and how the content is integrated into the game so the learning is intrinsic to play.

Ms. Tuskey at 17X participated in a Game-Based Learning STEM PD. Participants learned that when it comes to designing serious games there is a balance between learning what the game is designed to teach and learning the game. In addition, placing educational content inside a game does not guarantee that it will succeed in achieving a fun, motivating experience; meet educational goals; or be a classroom success. Ms. Tuskey was able to create an educational game using rigorously structured scenarios with a highly refined set of rules, challenges, and strategies which were carefully designed to develop specific competencies that can be directly transferred into



the real world.

How games assess an individual player is different from evaluating general effectiveness through control trials or focus groups. Teachers are expected to ensure their students achieve a certain mastery of facts or procedures. Regardless of what other tools are used. Also, teachers need to demonstrate that these skills, be they general skills such as problem solving, specific factual knowledge, or specific skills are transferable. Students need to recognize how to use the facts, procedures and processes learnt and practiced with the game outside of that arena.

If the need exists for explicitly ensuring learning goals have been reached there needs to be some form of testing (either internal to the game or externally through mediation) to ensure players have learnt what is intended. This highlights the need for the teacher to make explicit what has been learnt and mediate the learning process. This is tricky, and requires understanding the learner and game and how to manage reflection. An argument can be made that when using games for learning (be they serious or not), that it is the role of the teacher to put themselves forward and use the players experience to lead reflection - that the learning is stimulated by the game but occurs outside of it❑

Alternate Assessment Curriculum Framework

The D75 Alternate Assessment Curriculum Framework was developed in response to schools' requests for instructional expectations connected to the Common Core Learning Standards (CCLS) for students in Alternate Assessment classes. Groups of teachers, administrators, and district content area coaches gathered for four weeks during the summer of 2013, and participated in a collaborative process to create an Alternate Assessment Curriculum Framework. The process included a workshop at the beginning of each week to train the group in the leveled learner concept (Levels B, C, and D), resources available (developmental math skills progressions, Webb's Depth of Knowledge, Common Core Essential Elements and Alternate Achievement Descriptors for Mathematics from the State Members of the Dynamic Learning Maps Alternate Assessment Consortium and Edvantia, Inc.), and final product expectations. Subsequently, small groups collaborated to develop the leveled learning plans and activities, culminating performance tasks, and the introductory contexts for the different modules.

The structure of the framework provides four modules in ELA, Math, Science, and Social Studies created in grade bands (K-2, 3-5, 6-8, and High School). Four math modules have been developed as grade specific modules for K-8, while High School modules reflect specific conceptual categories.

A link to the framework can be found here: http://goo.gl/dRFBAb

WHO
WHAT
WHERE
WHEN
HOW

Q&A

FROM THE STUDENT

"How does a Refrigerator Keep Food Cold?"

When the temperature is above 40F, bacteria can grow in food and spoil it. Refrigerators cool things down so food won;t fo bad. What did people do before there were fridges like the ones we have? They packed food in snow and ice, put it underwater, or placed it in cool cellars.

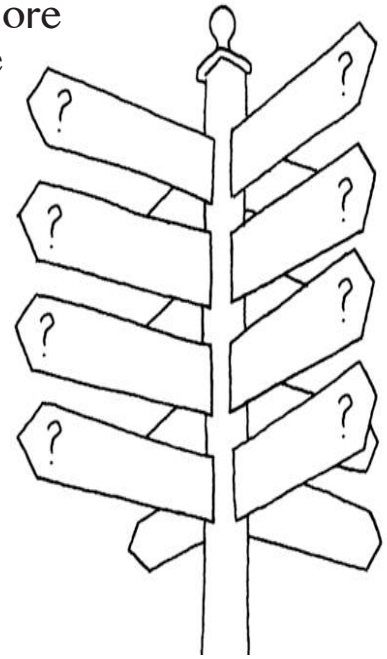
Today, cooling is more complicated. Inside a refrigerator are pipes filled with a fluid called a refrigerant. As this chemical passses through the pipes, it changes from a liquid to a gas and back to a liquid, over and over. The refrigerant becomes a gas at very low temperatures. As the liquid refrigerant circulates through the inside of the fridge, heat makes the liquid evaporate, or turn into gas. As the gas absorbs more and more heat, everything in the fridge - including food - gets cold. This happens when you sweat on a warm day. as the sweat evaporates, your skin chills.

FROM THE TEACHER

"How do Roller Coasters Work?"

The purpose of the coaster's initial ascent is to build up a sort of reservoir of potential energy. The concept of potential energy, often referred to as energy of position, is very simple: As the coaster gets higher in the air, gravity can pull it down a greater distance. You experience this phenomenon all the time - think about driving your car, riding your bike or pulling your sled to the top of a big hill. The potential energy you build going up the hill can be released as kinetic energy - the energy of motion that takes you down the hill.

Once you start cruising down that first hill, gravity takes over and all the built-up potential energy changes to kinetic energy. Gravity applies a constant downward force on the cars. The coaster tracks serve to channel this force - they control the way the coaster cars fall.



A coaster can't go up and down hills forever. Air resistance and the friction of the wheels against the track make the car lose energy and eventually slow down. That's why each hill is made smaller and smaller.

At its most basic level, this is all a roller coaster is -- a machine that uses gravity and inertia to send a train along a winding track.

QUICKGUIDES

The Framework for Teaching

Domain 1: Planning and Preparation	Domain 2: Classroom Environment	Domain 3: Instruction	Domain 4: Professional Responsibilities
1a Demonstrating Knowledge of Content and Pedagogy	2a Creating an Environment of Respect and Rapport	3a Communicating with Students	4a Reflecting on Teaching
1b Demonstrating Knowledge of Students	2b Establishing a Culture for Learning	3b Using Questioning and Discussion Techniques	4b Maintaining Accurate Records
1c Setting Instructional Outcomes	2c Managing Classroom Procedures	3c Engaging Students in Learning	4c Communicating with Families
1d Demonstrating Knowledge of Resources	2d Managing Student Behavior	3d Using Assessment in Instruction	4d Participating in the Professional Community
1e Designing Coherent Instruction	2e Organizing Physical Space	3e Demonstrating Flexibility and Responsiveness	4e Growing and Developing Professionally
1f Designing Student Assessments			4f Showing Professionalism

PARTS OF A MICROSCOPE – BRACE MAP

EYEPIECE

OPTIC TUBE

ARM

OBJECTIVES

STAGE

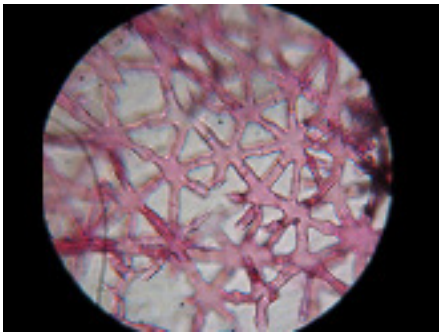
COARSE ADJUSTMENT

FINE ADJUSTMENT

CONDENSER

BASE

Compound microscopes are light illuminated. The image seen with this type of microscope is two dimensional. This microscope is the most commonly used. You can view individual cells, even living ones. It has high magnification. However, it has a low resolution.



Light Microscope Image