



iProduce: More vs. Less Learning from Thomas Edison

When Thomas Edison was asked how it felt to fail 10,000 times as he engaged his engineers in the quest to find the filament for the light bulb, he said, "Fail? I didn't fail once. I learned 10,000 times what didn't work. Now I must try the 10,001 test."

Inspired by Thomas Edison's life and works, Synapse's community of learners will *build-to-learn* simulations of Edison's inventions. Learning activities will highlight the essence of the Constructivist philosophy, the Helical Model, and emotional intelligence (EQ) competencies in the inventive process. There will be two parts to the science curriculum: BUILD (simulating Edison inventions) and DESIGN (integrating human-centered design). The module culminates in the Edison Interactive Students' Lab, which will be open to the community on March 9.



Synapse parents collaborate with Synapse teachers in test-building and designing Edison inventions.

IDEO, Synapse School & Inventive Learning

IDEO is excited to be participating in the Edison curriculum for Synapse. We (the IDEO team) look forward to collaborating with the teachers and the students. We also know that the

ambiguity and amorphousness of "design thinking" can feel uncomfortable. At Synapse, we will focus on iterative learning, collaboration, and experimentation.



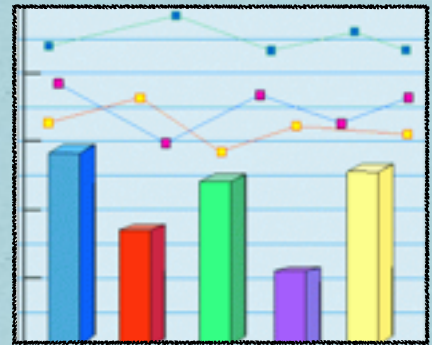
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SOCIAL STUDIES:
CIVIL WAR & THE INDUSTRIAL AGE



ENGLISH LANGUAGE ARTS:
INVESTIGATIVE JOURNALISM



MATHEMATICS:
STATISTICS & MEASUREMENT

"Genius is 1 percent inspiration and 99 percent perspiration" (Edison).

Inventor and businessman, Thomas Edison is one of the greatest American change makers in history. He was formally schooled for three months and when his teachers complained about his misbehavior, his mom, a former school teacher, decided to homeschool her son. His intensity, persistence, and ingenuity resulted in 1,093 patents. Edison did not create the first incandescent light bulb. His invention was the first to be used for universal domestic lighting.

If it hadn't been for my deafness I could not have enjoyed any good literature. (Edison, 15 years old)

Synapse students will immerse themselves in learning about electricity, lighting, sound, film camera, batteries, and simple machines. They will simulate both the inventions and the inventive process of Edison. Teachers will adapt activities to be developmentally appropriate. Students will learn: 1) Mechanical and electrical engineering applications of chemistry and physics; 2) The Edison process of experimentation and invention; 3) How failure builds knowledge; 4) Why

SCIENCE: APPLIED ENGINEERING

I built a telegraph wire between our houses ... separated by woods. The wire that was used for suspending stove pipes, the insulators were small bottles pegged on ten-penny nails driven into the trees. It worked fine. (Edison, 11 years old)

inventions need patents; 5) Commercializing inventions (building companies based on inventions); and 6) Documenting their learning in the form of scientific notebooks.

The "Imagine" phase of the Helical Model will be an integration of IDEO's "Human-Centered Design" process, also called "Design Thinking." The Synapse community is fortunate to have the participation of five IDEO

designers and engineers. They will guide the design process as students formulate projects/products inspired by their learnings from Thomas Edison and ideas relevant to the 21st century.

In this module, volunteer parents and Mark Mueller, a graduate school physics professor, will be assisting teachers in the engineering portions of their curriculum and teaching.

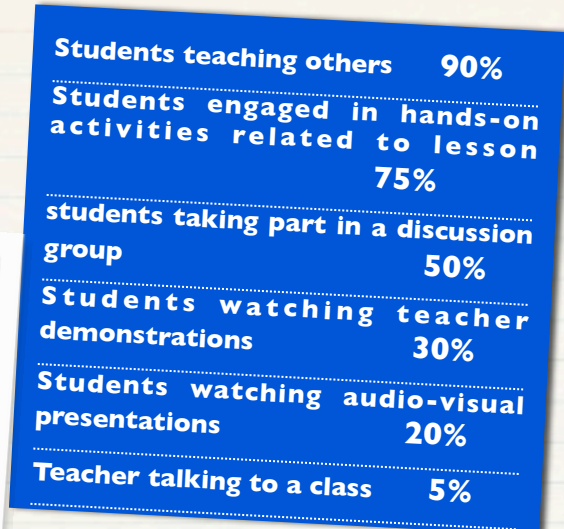
EDISON INTERACTIVE STUDENTS' LAB

Celebrate, synthesize, and demonstrate inventive learning of Thomas Edison and IDEO's human-centered design.

Inspired by the works of Thomas Edison and IDEO's "Design Thinking," Synapse students will share their learning and inventions with peers, families, friends, and community members.

In 2003, research was carried out at the United States National Learning Lab in Maine to assess the most effective ways for young people to learn. They were able to calculate the "Average Retention Rate." The top result was Students teaching others."

By transforming the school into an interactive lab, our students will have the opportunity to exercise this meaningful skill!



THE CIVIL WAR & THE U.S. INDUSTRIAL AGE



Haupt Railroad: The Civil War and American Political Economy.



How women's roles in the family changed with the rise of factories.

Moving onwards to the next era of US history, Synapse students will learn about the different facets of the US Civil War and the Industrial Age. Guided by the framework for the third module: "More vs. Less," students will learn about the dynamics and changes brought about the building of a transcontinental railroad system, the abolition of slavery, an expanding economy and new cities.

Synapse students will transfer what they learn from these pivotal historical events to present-day applications. By doing so, they will value history as a way of understanding the past and using what they learned to improve present-day challenges.

Middle school students will be creating card and board games based on the economic growth of factories. They will also integrate historical content in their programming class.

The social studies classes will provide the social, economic, and political context of the life and works of Thomas Edison and the stories for investigative journalism.

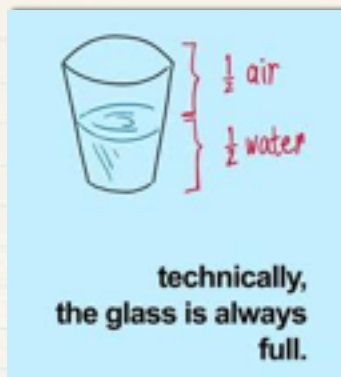
And by virtue of the power, and for the purpose aforesaid, I do order and declare that all persons held as slaves within said designated States, and parts of States, are, and henceforward shall be free; and that the Executive government of the United States, including the military and naval authorities thereof, will

recognize and maintain the freedom of said persons.

--January 1, 1863
Abraham Lincoln

[Emancipation Proclamation](#)

LEARNING OPTIMISM AND RESILIENCE



Teaching is the greatest act of optimism.
Colleen Willcox.

Optimism is rooted in the knowledge that we have the power to change, grow, and move forward. It is fostered by love and support from others, but

its power comes from a deep commitment to self and reaching out.

The Edison module offers an opportunity to practice optimism and perseverance. Simulating Edison's inventions can be daunting. There will be situations when, after all the work is done, the invention will not function as expected. Gifted students can be perfectionists. Iterations could be a challenge.

People with high optimism are able to motivate themselves when caught in a difficult situation, and find a new path.



Resilience is an active part of optimism. In science, "resilience" means the power of a substance to return to its original form after being twisted, stretched, or manipulated. In EQ terms, resilience helps us return to our original form with added knowledge, skills, and stamina.

Math as a tool and language for making sense of situations, information and events.


Synapse students will extend their math lessons in search of solutions to social and economic problems in the Industrial Age. They will integrate the theme “More vs. Less” in their formulation of problems.

Through their mathematical practice, the younger students will develop “number sense” and make sense of numerical information. The older students will learn to make connections within and among mathematical ideas and domains.


Students will also learn how to use algorithmic thinking and develop skills in estimation and computation, flexibility, and efficiency.

Tools will be made available to students so they can use these to

MATH: APPLICATIONS IN ECONOMICS, POPULATION



Real-world questions requiring mathematical strategies for answers. How many cars will need to be manufactured to generate revenues? What is the effectiveness of seat belts and why should you wear them?



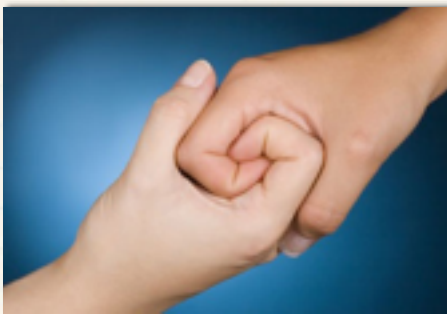
Our society is increasingly making use of ideas found in statistics and probability as it relates to business and life. These skills will provide students a greater understanding of the world today and the future.

solve problems and to examine mathematical ideas.

How can population growth affect the economics of a community? How can

one’s earned money in a bank grow each year or lifetime?

EMPATHY NOURISHES TEAM WORK



Empathy is the ability to understand the experience of the another.

(Ekman, 2012)

Silicon Valley is home to one of the most innovative professional environments. Technology companies are highly competitive and require professionals who can work productively with teams battling deadlines, goals, and market share. The future holds new opportunities,

new inventions, and more competition. Children will be working with teams of people with varied beliefs, talents, cultures, and personalities.

The Synapse community will practice empathy as a way to work productively and compassionately with one another. We will encourage the reciprocal flow of goodwill and kindness and discourage judgement. This is most important in situations when a member of our community is experiencing frustration and is unable to participate productively. In a reciprocal and empathic culture, every member of the team can flourish, offering authentic contributions.



The productivity of a team significantly depends upon the qualities of both empathy and authenticity that each member contributes to, and senses in, his or her fellows (Cunningham A, 2008).



ACTIVITIES

Level 1

Fact vs. opinion

How do you conduct interviews?

What are perspectives?

Level 2

How do journalists get their information?

What are newspapers?

Elements of news writing

Level 3

What is the role of the press in the world and in business?

How can investigative reporting benefit society?

Photojournalism-impact, use, rise of ... and life.

Level 4

How does a free press benefit society?

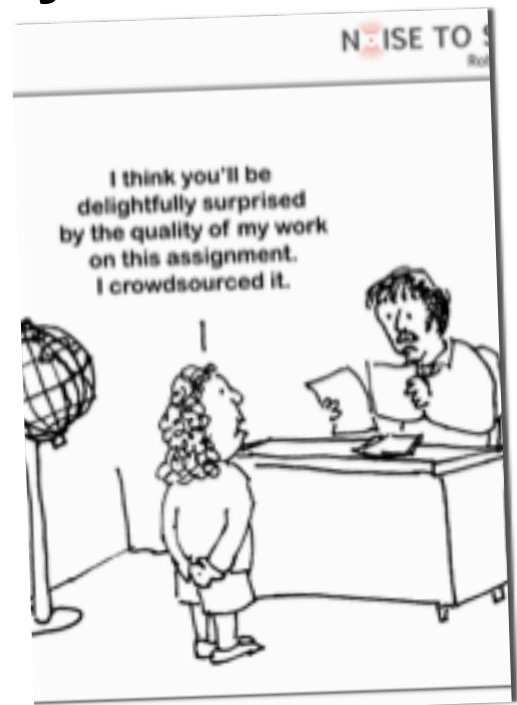
How did inventions in the industrial revolution alter the role of the press?

Level 5

How does journalism alter the ways of society?

How do you craft writing to generate a desired response?

LANGUAGE ARTS: INVESTIGATIVE JOURNALISM



INVESTIGATIVE JOURNALISM IS EQUIVALENT TO THEORETICAL RESEARCH IN SCIENCE. WITH ROOTS IN THE INDUSTRIAL REVOLUTION, THIS LITERARY GENRE EXPOSES PARADIGMS THAT CONCEAL AND PRESENTS NEW TRUTHS.

Synapse students will use the framework of investigative journalism to learn about events in the industrial age, the life and works of Thomas Edison, and apply what they learned to today's world. They will engage in reading and writing, discern facts from opinions and create conclusions from a critical synthesis of facts. Students will also access information from a variety of primary sources, including public records, interviews, and investigations into social and legal incidents and issues.

Driven by critical questions such as "Do Thomas Edison's iterations count as inventions?" (Level 4) and "How did Edison produce so many inventions?" (Level 1), students will discover the importance of media-led investigations in surfacing answers that transform the ways of the world.

PROCESS VS. PRODUCT

Throughout the module and in all subjects, learning will be focusing on the process, not just the product. Iteration in science, problem-solving strategies in math, digging and connecting the dots in social studies, and writing and rewriting in English language arts.

The curriculum is designed to engage students in a journey of understanding, making meaning and communicating findings and solutions. The process involves experimenting, reiteration, and failing, collecting and documenting data, social interactions, and making meaning through 21st century applications.

IDEO'S "DESIGN THINKING"

DISCOVERY

INTERPRETATION

IDEATION

EXPERIMENTATION

EVOLUTION

I have a challenge.

I learned something.

I see an opportunity.

I have an idea.

I tried something.

How do I approach it?

How do I interpret it?

What do I create?

How do I build it?

How do I evolve it?

Discovery builds a solid foundation for ideas. Creating meaningful solutions for people begins with a deep understanding of their needs. Discovery means opening up to new opportunities, and getting inspired for new ideas.

Interpretation transforms stories to meaningful insights. Observations, field visits, or just a simple conversation can be great inspiration--but finding meaning in that and turning it into actionable opportunities for design is not an easy task. It involves storytelling, sorting and condensing thoughts, until a compelling point of view and clear direction for ideation emerge.

Ideation means generating lots of ideas. Brainstorming encourages expansive thinking without constraints. Often it's the wild ideas that spark the thought for something visionary. With careful preparation and a set of rules to follow, a brainstorm session can yield thousands of fresh ideas.

Experimentation brings ideas to life. Building prototypes means making ideas tangible, learning while building them, and sharing them with other people. Even early and rough prototypes can evoke a direct response and help learn how to further improve and refine an idea.

Evolution is the concept over time. It involves planning next steps, communicating the idea to people who can help realize it, and documenting the process. Change often happens over time, and reminders of even subtle signs of progress are important.

<http://www.designthinkingforeducators.com/>

JANUARY

9

Volunteer Parent Engineer Support for Levels 1-3 begins
(schedules are determined with the teachers)

9-13

Parent Volunteers Sign Up

13 Imagine Science
1:30-4:30 PM

IDEO Team and teachers work on the projects and curriculum of "Imagine" phase

18

Evite for the Edison Interactive Students' Lab released to Synapse parents

18

Parents send Evites to friends & families with children to the March 9th event.

FEBRUARY

1

T shirt design finalized
(c/o art teacher)

15

Interactive Exhibit brochure draft completed
(c/o Debbie & Gigi)

20

Text for Exhibit Posters drafted by students/teachers

22

T-shirts Silkscreen c/o L4-L5

(historical tidbit: Did you know silkscreen was the precursor to the mimeograph machine Edison invented?)

24

Text for exhibit poster edited

29

Exhibit posters completed

MARCH

5-7

Preparations for Portfolio Day & Interactive Lab

8

10:45-12PM Peer-to-Peer Presentations/Interactions

2:00-3:15 PM Portfolio Day

3:30-4:00 PM Volunteer Parent Orientation for March 9 event assignments

9

9:00 AM - 12:00 PM Final Set Up

1:00 - 2:30 PM Students Practice their Presentations (Dress/Technical Rehearsals)

2:30-3:30 Snacks/ Recess

4:00-6:00 PM - Open to the Community

6:00-7:00 PM - Clean up