Thomas Edison: The Wizard of Menlo Park

School Show Study Guide

Wells Fargo Center for the Arts
Tuesday, November 4, 2014
THOMAS EDISON:
The Wizard of Menlo Park

STUDY GUIDE

Thomas Edison was arguably one of the most influential people in all of history. He is variously credited with leading the transition from the Age of Steam to the Age of Electricity, “inventing” the Twentieth Century and developing the modern research laboratory, a cornerstone of corporate structure. Seventy years after his death, he still holds the record for the greater number of US Patents ever awarded to an individual – 1,093. It’s hard to imagine a world without his gifts of electric light, recorded music and motion pictures. In Edison we find a true rags-to-riches story of a poor, self-taught boy who grew up to be the greatest inventor of his or any other age. In this assembly program about Edison’s life and work, students are presented with real-life lessons first-hand by one of America’s favorite sons.

THE FOUR BIG LESSONS OF EDISON

The life and inventions of Edison are presented in our presentation but an even greater effort has been made to present four lessons from the inventor’s life and work that the individual child can use over and over again:

The Value of Hard Work – Edison’s most famous quote is “Genius is one percent inspiration and ninety-nine percent perspiration.” This comes from a man who was known to sleep an average of four hours a night, surviving on short cat-naps throughout the day. He periodically worked for seventy-two hour stretches in order to perfect an invention. But unknown to most is his balancing ethic of playing hard. Edison employees were treated to impromptu sing-alongs, poetry contests and satirical writing to help break the tension of difficult work sessions. Edison was a great prankster. Each of his laboratories was equipped with a pipe organ for sing-alongs. Is it chance his greatest inventions all focused on leisure?

The Value of Mistakes – Edison contended there were no such things as mistakes as long as you learned from them. This has become a spirited chant in the presentation. The pressure placed on students to succeed often blinds them to what can be learned from the attempt, perhaps making them fearful of the attempt itself. As Edison said, “If I find 10,000 ways something won’t work, I haven’t failed. I am not discouraged, because every wrong attempt discarded is just one more step forward.” Childhood is filled with mistakes; it’s the child’s duty to accept the responsibility of finding a lesson from their failings.

The Value of Viewing a Problem from a Different Angle – Many children are familiar with young Edison’s being kicked out of school for asking too many questions. Education at the time was a matter of learning by rote. Anathema to a creative mind like Edison’s. Luckily today students are presented with different methods of achieving a task, ref. Multiplication tables vs. lattices. By looking at problems from a different angle, a child discovers the approach that parallels his talents. Another aspect of this lesson is Edison’s ability to “turn a liability into an asset.” Historians acknowledge this as perhaps the secret to Edison’s success. How could a man who was almost totally deaf perfect the phonograph? Edison found that by biting the sounding horn of his phonograph and “listening through his jawbone,” he could “hear” sound qualities undetectable to the human ear, improving the quality of his recordings. Edison’s resourcefulness made him a success!

The Value of Enjoying One’s Work – Edison truly found his calling. He had found something that he loved to do. Something he (and the world) found important. And something he could take pride in. (A modern HR person would say “Something you love. Something you’re good at. And something they’ll pay you for.”) Edison’s work always evolved out of what he loved to do. He loved inventing! As he said, “I always invent to obtain money to go on inventing.” From the age of seven on, Edison always had a laboratory in which to experiment. His final patents were awarded posthumously because he was inventing until days before his death!

Looking at all this from a different angle: if you’re truly doing work you enjoy, the line between work and play blurs and mistakes are just another part of the game!
A TIP FROM THE WIZARD

Edison prided himself as an inventor, not a scientist or a discoverer. A scientist performs an experiment to see what will happen. A discovery is often an unexpected outcome. An inventor seeks to solve a specific problem or fulfill a specific need!

“I find out what the world needs, then I go ahead and try to invent it… None of my inventions came out totally by accident. They came about by hard work.”

If your students are involved in creating their own inventions, one of their most important steps will be defining the problem or need they are trying to address. When the invention wheel seems out of kilter, try redefining the problem or need first!

PRACTICAL APPLICATIONS OF THE BIG FOUR LESSONS

One of the big four lessons we try to convey with THOMAS EDISON: INVENTOR, LECTURER & PRANKSTER is the ability to look at a problem from a whole new angle. Is there a problem in your classroom that the students can try to rephrase from a new angle?

EXAMPLE: Students are late entering class after recess.
OLD SOLUTION: Just go faster!
NEW ANGLE: Student lockers are too crowded to accommodate extra winter clothing.
NEW SOLUTION: Have students perform seasonal change-over several times a year.

Another lesson is enjoying your work. Explain to your students why you chose teaching as a career. What would they like to be and why?

INVENTIONS CAN BE FUN!

RUBE GOLDBERG (1883-1970) was a very popular sports and editorial cartoonist in the first half of the last century. His most famous creations were intricate inventions to accomplish simple tasks. His inventions were never practical, efficient or plausible but they were always a lot of fun. Modern college students still compete in “Goldberg Contests” to see who can invent the silliest and most complicated way to crack an egg!

SELF-OPERATING NAPKIN

As you raise spoon of soup (A) to your mouth it pulls the string (B), thereby jerking ladle (C) which throws cracker (D) past parrot (E). Parrot jumps after cracker and perch (F) tilts, upsetting seeds (G) into pail (H). Extra weight in pail pulls cord (I) which opens and lights automatic cigar lighter (J), setting off skyrocket (K) which causes sickle (L) to cut string (M) and allow pendulum with attached napkin to swing back and forth thereby wiping off your chin.

Have your class develop a silly invention to accomplish a simple task. A game many students enjoy is creating a machine using body movements of the whole class (Hint: start with a task and work backwards.)
**JUST SOME OF THOMAS EDISON’S 1,093 INVENTIONS**

<table>
<thead>
<tr>
<th>Telegraph innovations</th>
<th>Carbon transmitter</th>
<th>Dynamo generators</th>
<th>Magnetic ore separator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printing telegraph</td>
<td>Light bulb</td>
<td>Vacuum pumps</td>
<td>Mining equipment</td>
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<tr>
<td>(ie: Stock-ticker)</td>
<td>Light switches</td>
<td>Electric meters</td>
<td>Motion picture camera</td>
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<tr>
<td>Mimeograph machine</td>
<td>Light sockets</td>
<td>Fluoroscope</td>
<td>Miner’s lamps</td>
</tr>
<tr>
<td>Phonograph</td>
<td>Electric meters</td>
<td>Fluorescent lamp</td>
<td>Storage battery</td>
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<tr>
<td>Talking dolls</td>
<td>Insulated wire</td>
<td>Electric railway</td>
<td>Synthetic carbolic acid</td>
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</table>

**WHAT IF...?**

Imagine how many little ways the world would be different if Edison hadn’t invented recorded sound with his phonograph: no answering machines. None of your students would know what Louis Armstrong, The Beatles, or Martin Luther King sounded like. We’d still be watching silent movies. No muzak in elevators. By the time Britney Spears became a superstar she’d be middle-aged.

Ask your students to consider how the world would be different if there was no Light Bulb. How would this affect our daily routines? Architecture (buildings would be smaller to light interior rooms.)? All the machines that use bulbs – televisions, projectors, car headlights, refrigerators, light houses, airport runways, cameras, Easy-Bake ovens, Christmas trees, and Menorahs.

**WHAT DO YOU THINK?**

What do you think was the greatest invention ever invented and why? Was it the greatest invention for the whole world or just for you? Possibility: Gutenberg’s Printing Press. When the History Channel was choosing its most important of the millennium they chose Guttenberg. His printing press made it possible to disperse other’s knowledge and inventions throughout the world (*LIFE Magazine* chose Thomas Edison!)

**WHAT IF...?**

How might your everyday life be affected if a simple invention like the wheel had never been invented? Native American tribes lived for thousands of years without any knowledge of the wheel and yet many tribes were nomadic!

**ARE YOU AN INVENTOR?**

An invention doesn’t have to be a machine! Any new solution to a problem is an invention. Can you think of a problem that you’ve solved in a new way recently?

**THE TIME LINE**

Use the time line (following page) to discuss with your students what life was like before and after Edison’s life. Why do you think Edison is sometimes called “The Man Who Invented the 20th Century?”
WORLD EVENTS & OTHERS' INVENTIONS

Electric Telegraph 1837
Morse Code 1838
CA Gold Rush begins 1848
American Civil War 1861-1865
Transcontinental Railroad 1869
Telephone 1876
Typewriter 1873
Coca-cola 1886
Basketball 1891
Ellis Island opens 1892
Zipper 1893
Airplane 1903
Diesel Locomotive 1912
World War I 1914-1918
Women win right to vote 1920
Stock Market Crashes 1929
Television 1929

1825
Edison born in Milan OH Feb. 11, 1847

1850
Moves with family to Port Huron, MI 1854
Sells Candy & Newspapers On Train 1859-1862
Itinerant Telegrapher 1863-1869
Universal Stock Printer 1871
Quadruplex Telegraph 1874

1875
Opens Menlo Park Lab 1876
Phonograph 1877
Telephone Transmitter 1877
Light Bulb 1879
Lights Lower Manhattan 1882
Opens West Orange Lab 1887
Kinetoscope 1894

1900
"Edison's Folly" 1890-1900
Alkaline Battery 1900

1925
Fire Destroys much of West Orange Lab 1914
Congressional Medal of Honor 1928
President of Naval Consulting Board during WWI
Storage Battery 1910
50th Anniversary of Light Bulb Celebration by Henry Ford 1929
Edison Dies West Orange NJ October 18, 1931
ANCILLARY WORKSHEETS are attached for your class.

**K-2 Worksheets** consist of puzzles and illustration to remind the students of Edison’s inventions and philosophy. Answers to the puzzles are included somewhere in the worksheet.

**3-5 Worksheets** include exercises designed to help the students apply the presented lessons to their own life. There are very few right or wrong answers to these pages. Imagination is encouraged. The students’ responses provide springboards for classroom sharing discussion.

FOR FURTHER READING

**AGES 4-8** There are lots of introductory books on Edison at your Public Library


**AGES 9 – 12**


The Story of Thomas Alva Edison (Landmark Books) by Margaret Cousins; Random House (Juv); ISBN: 0394848837; Reissue edition (March 1997).

A Picture of Thomas Alva Edison (Picture Book Biography) by David A. Adler, etc al; Holiday House; ISBN: 0823414140; (April 1999).


**GROWN-UPS**


**FUN WEB SITES**

www.nps.gov/edis/home.htm  Edison National Historic Site
www.tomedison.org  Edison birthplace museum
www.thomasedison.com  Thomas Edison homepage
http://americanhistory.si.edu/edison/index.htm

The films *Young Tom Edison* with Mickey Rooney and *Edison the Man* with Spencer Tracy, while not very accurate historically, are very entertaining!
Thomas Alva Edison, “The Wizard of Menlo Park,” recently paid a visit to your school. Mr. Edison is known as the world’s greatest inventor. He holds the record for US patented inventions at 1,093. Mr. Edison told the students about his life of inventing and what his most famous inventions had taught him.

Mr. Edison recalled for his listeners his childhood in Michigan working on trains as a “candy butcher,” or newsboy, traveling the country as a “tramp” telegrapher and establishing himself as an inventor. His “rags-to-riches” story is a shining example of the American Dream. “Hard work” is what Mr. Edison credits for his success.

The inventor spent most of his adult life in nearby West Orange, NJ. There he built his second “invention factory.” Inventions such as the alkaline battery and the motion picture camera were developed there. Many students were surprised to learn that the very first movies were filmed in northern New Jersey!
I roamed the Midwest as tramp telegrapher for several years. This is the actual code that we used to send messages to other telegraphers!

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Use Morse Code to find out the first words ever to be recorded on a phonograph!

Write the alphabet letter under its Morse Code symbol

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A Tramp Telegrapher’s Morse Code

Use Morse Code to find out the first words ever to be recorded on a phonograph!

Write the alphabet letter under its Morse Code symbol

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The Amazing Incandescent Lamp (or The Light Bulb)

The light bulb may have been my most important invention. It changed the whole world!

When people first saw my light bulb they gave me the name “The Wizard of Menlo Park!”

NAME THREE WAYS TO USE LIGHT BULBS

1.
2.
3.

For example: A car’s headlights, movie projectors, E-Z Bake ovens!
“Genius is 1 percent inspiration and 99 percent perspiration!”

This is probably the most famous thing I ever said. But what does it mean?

<table>
<thead>
<tr>
<th>INSPIRATION = AN IDEA</th>
<th>PERSPIRATION = SWEAT</th>
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<tbody>
<tr>
<td>PERCENT MEANS “HOW MANY OUT OF 100 PARTS”</td>
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So, what that saying means is:

“It takes a lot more than just an idea to be a genius.
It takes a lot of hard work!”

THE WONDERFUL PHONOGRAPH (our first sound recorder)

“Of all my inventions, I liked the phonograph best. Life’s most soothing things are sweet music and a child’s goodnight.”

WHAT ARE YOUR FAVORITE TIMES TO LISTEN TO MUSIC?
An Edison Crossword Puzzle!

ACROSS

3. Where were the first movies made?
4. What lit city homes before electric light bulbs?
6. What was my favorite invention?
8. I was called “The __________ of Menlo Park.”
10. I was a “candy butcher” on a ___________________.
12. It’s not a ______________, as long as you learn from it!
13. What’s my last name?

DOWN

1. I am the world’s greatest _______________.
2. I worked as a “____________ telegrapher” for several years.
5. What’s my middle name?
6. I have more of these than anyone else in the world!
7. __________ = 1 percent inspiration + 99 percent perspiration.
8. ________ hard and play hard!
9. I put small phonographs into talking __________.
11. Telegraphers talk by using Morse __________.

Don’t be afraid to ask for help!

The Clues

ACROSS

3. ALVA
4. GAS
6. MISTAKE
8. TRAIN
10. CODE
12. DOLLS
13. EDISON

DOWN

1. ALVA
2. CODE
4. GENIUS
6. MISTAKE
7. PATENTS
8. TRAMP
9. THOMAS
11. NEW JERSEY

Possible Answers

ALVA  GAS  MISTAKE  TRAIN
CODE  GENIUS  PATENTS  TRAMP
DOLLS  INVENTOR  PHONOGRAPH  WIZARD
EDISON  NEW JERSEY  THOMAS  WORK