

Amazing Inventions and Marvelous Products: History, Economics, and Writing

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IMAGINE a field trip with your students to a science center or trade show where these amazing inventions and marvelous new products are on display:

MEGABOOK: The pop-up chapter book. It reads the story to you. It lasts for generations, and it never breaks. The crooks and good guys pop up. No batteries needed.

POWERBLASTER ULTIMATE SKATEBOARD: Grip on to one. Faster than a speeding bullet. Jet engines. 102 mph.

KITCHEN KING: The kitchen makes your food. Leave a note in the kitchen at night time to tell the kitchen what food you want. When you wake up it is all done.

RAINBOW SWEATER: It changes with the weather: Sunny = Orange, Windy = Pink, Cloudy = Green, Rain = Red, Thunder Storm = Blue, Snow = Yellow

These thought-provoking innovations (and many others) were proposed by students in kindergarten through the fourth grade in our various classes and writing workshops. Invited to think freely, students imagined items that were unique and revealed an awareness of social trends. Drawing on their experiences in a consumer society of products and purchases, these young inventors incorporated knowledge of the latest trends (in technological gadgets, toys, and clothing) that are part of daily life in the United States. This article describes three activities that teachers can use to initiate investigations in history and economics and to strengthen students' writing skills with the use of students' imaginary "inventions" and "products."

Begin by asking students to imagine items that they might like to invent for their own use. This activity might reveal what they think about new discoveries, inventions, and products. Then ask students if any new inventions have come into their lives recently. (You might be surprised at the answers they give). In the ensuing discussion, students venture beyond their own experiences to "identify and describe examples in which science and technology have changed the lives of people."¹

Second, as students consider who might use a product and why, they examine the social studies thematic strand **III PRODUCTION, DISTRIBUTION AND CONSUMPTION** and the distinction between

a person's "wants" and "needs."² For many students, the startling discovery is that what they really desire at birthdays, holidays, and ordinary occasions is not what they can purchase in stores, but what they can construct in their imaginations. Inventing new things not only acquaints students with their creative powers, but also affirms publicly that their ideas are important.

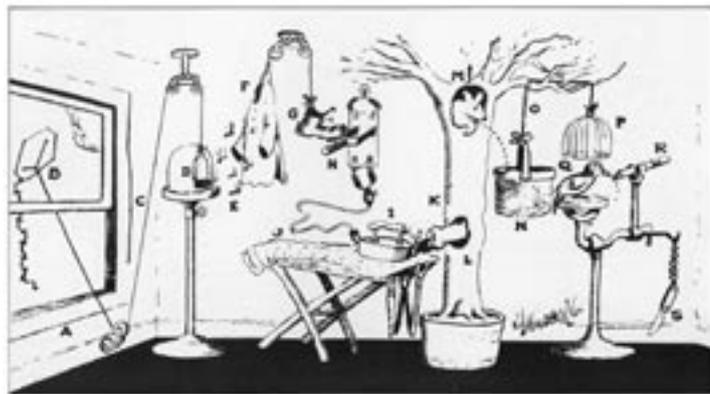
Third, after new products are envisioned, we ask students to compose commercial messages proclaiming the worthiness of their proposed product. Would these new items really sell? In their advertisements, students often adopt the style of some advertiser that they have seen on television. Students discuss persuasive techniques that adult writers use on television and in other media. Young writers ponder how to convince readers of the veracity of their claims by focusing on the power of words to motivate the consumer to buy. Students practice using language "effectively with a variety of audiences and for different purposes."³

Inventors and Innovators

Inventors envision new things that may change a whole society. There are many historical examples that will interest young students. Living in Renaissance Italy from 1452 to 1519, Leonardo da Vinci's interests ranged from anatomy and architecture to mathematics, hydraulics, and aerodynamics. A ceaseless curiosity powered him to imagine new possibilities. He designed flying machines, a parachute, and projects for moving water. "How can I make something I can fly in?" he asked, and then systematically sought answers through the scientific processes of investigation and experimentation.⁴

As a scientist, Leonardo filled notebooks with questions, designs, sketches, and the results of experiments. He wrote backwards (in mirrored script), perhaps to conceal his notes from other readers. Writing preserved his hypotheses and the results of experiments and investigations. Just as important, writing opened the door to his imagination and creativity. By posing questions to himself, Leonardo could reflect on his work and develop further insights, which would suggest new paths of exploration.⁵

The chemist and botanist George Washington Carver (1861-1943) devoted his life to improving the lives of others through invention and discovery. Born to parents who were slaves, Carver was living on his own as a teenager, learning to read, write, and paint while working as a farm hand and attending a one-room schoolhouse in Missouri. Although he was at first denied entry to one college because of his race, he persisted in pursuing higher education, graduating with distinction from Simpson College and Iowa State College of Agriculture and Mechanic Arts (Iowa State University today). He is best known for his association with the



A Rube Goldberg Pencil Sharpener.

Open window (A) and fly kite (B). String (C) lifts small door (D) allowing moths (E) to escape and eat red flannel shirt (F). As weight of shirt becomes less, shoe (G) steps on switch (H) which heats electric iron (I) and burns hole in pants (J). Smoke (K) enters hole in tree (L), smoking out opossum (M), which jumps into basket (N), pulling rope (O) and lifting cage (P), allowing woodpecker (Q) to chew wood from pencil (R), exposing lead. Emergency knife (S) is always handy in case opossum or the woodpecker gets sick and can't work.

A Famous "Inventor" of Doodles

Reuben Lucius Goldberg (Rube Goldberg, 1883-1970) was a Pulitzer Prize winning cartoonist, sculptor, and author. His father, a practical man, insisted he go to college to become an engineer. After graduating from University of California Berkeley, Rube went to work as an engineer with the City of San Francisco Water and Sewers Department. He continued drawing, and after six months convinced his father that he had to work as an artist.

Through his hilarious "inventions," Rube discovered difficult ways to achieve easy results. His drawings depict absurd machines functioning in extremely complex and roundabout ways to produce a simple end result. Although he may not have created any important, real machine, Rube created a useful term. The name "Rube Goldberg" has become associated with any convoluted system of achieving a basic task, such as a "Rube Goldberg" health care system. (www.rube-goldberg.com)

Tuskegee Institute in Alabama and for initiating crop rotation methods that prevented overuse of soil. He is also credited with discovering over 300 uses for the peanut (from cooking oil to printers ink) as well as identifying the advantages of planting soybeans, the roots of which improve poor soil by introducing nitrogen.⁶

Accurately researched, well-told biographies make children aware of how many of history's pioneering individuals had to struggle against racial discrimination, or gender barriers, or prevailing misconceptions about humankind and the world.⁷ There was Elijah McCoy, inventor of the automatic oil cup—essential to railroad trains—and dozens of other useful products; Mary Anning, the paleontologist who began her life's work as a twelve-year-old with the discovery of an ichthyosaur fossil on a beach near her home; and Jean-Francois Champollion, who labored decades to break the code of Egyptian hieroglyphics.⁷

Online resources can expand the stories of inventors. "A Science Odyssey" (www.pbs.org/wgbh/aso), associated with the PBS series "Nova," explores the development of technology in the 20th century.

Everyday People

Introduce the importance of inventors to our history by reading about the lives of ordinary people who take part in extraordinary times of technological change. One such historical moment was the building of the transcontinental railroad, the monumental engineering feat that linked the eastern and western United States by rail. In the fictional *Journal of Sean Sullivan: A Transcontinental Railroad Worker*, a young boy witnesses life at the railhead.⁸ *Ten Mile Day* and *Coolies* both tell the story from the perspective of Chinese immigrants who endured racism, hardship, and injustice while doing their job in a new land.⁹ The railroad's impact on native peoples, workers, settlers, and capitalist financiers is extensively documented on the web site for PBS's "American Experience" film, "Transcontinental Railroad" (www.pbs.org/wgbh/amex/tcrr).

Wide-Angle Lens

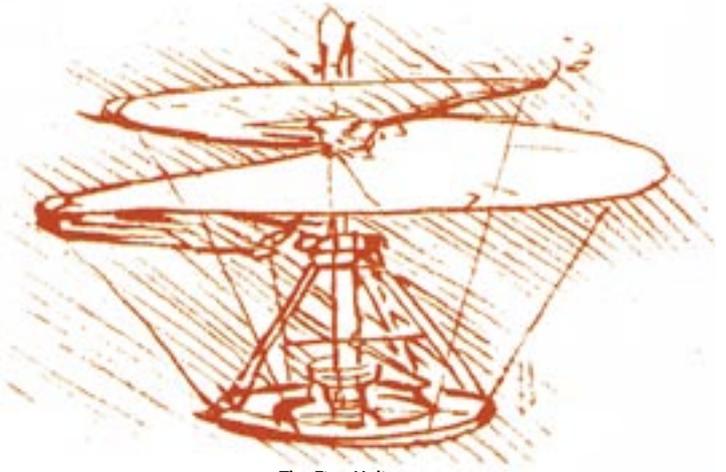
A multicultural perspective broadens children's understandings of how new ideas travel from one place to another. "Western science . . . successfully built upon the best ideas, data, and even equipment from other cultures," explains writer Dick Teresi in his new book, *Lost Discoveries*. The magnetic compass, paper, printing, and gunpowder were all first used in China, Teresi notes, while the "Incans of the Andes were the first to vulcanize rubber, and they discovered that quinine was an antidote for the malaria that spread among them."¹⁰

The scientific and technological achievements of non-European societies is neither well known nor widely taught. Native Americans first cultivated maize ("Indian corn"), many varieties of beans, hundreds of kinds of potatoes, sweet potatoes, tomatoes, chili peppers, pineapples, squashes, artichokes, cashews, peanuts, chocolate, coffee, vanilla, and other foodstuffs. They invented toboggans, moccasins, and snowshoes, and were the first to use rubber. Amazing engineering projects by ancient peoples in Asia, the Middle East, and South America resulted in the Great Wall of China, the Great Pyramids, and great cities built of stone in Mexico and Peru, respectively. The wheel was probably invented somewhere in Asia or Africa by innovators who needed a way to improve transportation and agriculture. People in various places adapt an invention to fit their specific work environment, and the adaptations themselves are often essential to success.

Sharing the stories of history's inventors and innovators connects students to humankind's relentless search for new knowledge. A ceaseless desire to know about their world led these individuals to imagine questions, answers, and possibilities far ahead of their time. Students, too, push the boundaries of current thinking as they imagine future inventions and products. They act as history-making innovators whose actions and contributions might affect many people throughout their lives. But to truly develop and explore their talents, students must think about the reasons for their innovations as they write about their creations.

A Renaissance Man

Leonardo da Vinci (1452-1519) was a great inventor, painter, sculptor, engineer, mathematician, and scientist. As a boy, he had little formal schooling. His father was not married to his mother, and he eventually had seventeen half brothers and sisters. As a young man, he worked as an apprentice to a well-known artist, whereupon his brilliant talents began to shine. His achievements in art and science astonished and sometimes frightened his peers. Several of his inventions were so far ahead of their time that they were re-invented by other people centuries later. His “working sketches” of these creations still fascinate us today. (*Museum of Science, Boston*. www.mos.org/leonardo)



The First Helicopter

Leonardo invented an “airscrew” which, if turned fast enough, would lift off the ground. Like many of his inventions, the airscrew was only a sketch. A human being is not powerful enough to make this machine work, but modern airplane propellers and helicopters are based on the principles first illuminated by Leonardo in this drawing. (Institut de France, Paris)

www.museumofscience.org/ / Manuscript B, folio 83v

Making and Marketing REVO Soda

“We are going to make our own soda!” Cheers of “Cool!” and “Yeah!” erupted from Ruth’s first graders when she announced their next class project: making soda pop using sarsaparilla flavoring, sugar, and carbon dioxide, and then marketing it. The fun of mixing and bottling was the only invitation students needed to begin discussing economic topics such as why individuals and companies make things to sell, and how advertisers use commercial ads and marketing statements to promote product sales. REVO Soda (a name that uses Ruth-Ellen Verock-O’Loughlin’s initials) created strong interest for making and advertising a product, and provoked students to ask thoughtful questions and think expansively.

Preparations for soda making began by students brainstorming as many possible flavors of soda as the class could imagine, including vanilla cream, orange, strawberry, sarsaparilla, and lime. Ruth had samples of seven flavors for taste-testing before students voted for which they most desired. The class chose “sarsaparilla,” not only because it tasted good, but also because it had a “cool name.”

Now the students were eager to investigate how soda companies market their products. Children brought soda bottles and cans from home so everyone could study them. They listed what soft drink labels include: brand names, slogans, pictures, volume (in fluid ounces), nutritional facts, lists of ingredients, corporate telephone numbers, bar codes—and occasionally offers of prizes and trips. Surprises might be hidden on the backside of the paper wrapped around a bottle or tucked under a bottle cap.

As they identified features of the labels, the children listed the differences between “needs” and “wants.” People need water or other liquids everyday to live, but many individuals in our society want to drink soda as their beverage of choice. These consumers disregard the unhealthy ingredients in most sodas in favor of what they consider a pleasurable experience.¹¹ The class discussed how the product identification strategies of soda companies enhance people’s desire for their product. The students then decided whether they wanted to use any of these product identification strategies to advertise their bottles of soda.

Ruth invited the students to use their plastic soda bottles (with the paper labels ripped off) as a blank canvas on which to create persuasive graphics and text. She asked: “What is going to make your soda stand out from everyone else’s? Catching someone’s eye requires designing a bottle label that is interesting because gaining people’s attention is the first step in making them choose your soda over another.” Students recalled features that they noticed about soda products in local stores or on television. Print and video ads aimed to make them feel good or attracted to a product. Students commented: “We can advertise with these ideas. Let’s change a few things to say what we want to say.” Some students proposed gimmicks and contests that would be more likely to persuade consumers to buy. Fiona wrote, “You might win a trip to Hawaii [if you buy my soda].”

One youngster promised astounding results from using his product: “This soda will make you jump over tall buildings.” Ruth invited anyone in the class to challenge the validity of such claims, asking the children themselves to play the role of government regulators who are responsible for the safety of food and truth in food advertising. “You can’t say that if it won’t happen” became the rule of the regulators. To avoid making a marketing promise that could not be kept, the class decided to rephrase the claim: “This soda won’t make you jump over tall buildings, but you will feel like you can.”

To add pizzazz to their product promotions, the students decided they wanted their photos on the bottles. Recalling the celebrity status of “Star Wars” characters and Michael Jordan, one child concluded, “I will be famous if my picture is on the label.” The students decided that each bottle of REVO Soda would have a digital photo of the whole class. Each of the children designed an individual message and slogan (on his or her bottle) to accompany the class photo.

Persuasive Tools

The bottles of soda had become “mini billboards” on which the children in Ruth’s class could try out different advertising and

marketing techniques. Each student's intent (making these product images appealing to readers) became visible through careful choice of brightly colored markers, colored pencils, and different colors of paper. Speech bubbles were attached to the bottles. Exclamation points appeared more than periods and capital letters were often used. These young product designers were engrossed in the challenge of using persuasive writing. In doing so, they learned how advertisers use words and symbols to entice readers to agree with a certain point of view or to motivate readers to do what a writer wants them to do.¹¹

Writing and discussing advertisements encouraged students to be thoughtful consumers—more aware of how products are sold via books, magazines, movies, videos, or computer games. Figuring out when information is being conveyed accurately and appropriately develops critical listening, viewing, and writing skills. Examining different product claims becomes a way for students to practice sifting through incoming messages and identifying some of them as untrue or filled with misinformation and other messages as more reliable.

Writers use persuasion for more than one purpose. Writers can try to convince readers to do something that is right for the individual and just for society. In less forthright ways, writers attempt to manipulate readers to do something that might not, in fact, be in the reader's interest or useful for society. Words and symbols may be used to present one's "point of view" thoughtfully and fairly, or to create a "product spin" for promotional purposes, or to deceive or mislead the reader entirely. After composing their own advertisements, students can more critically view product ads on television and in other media in terms of how different tools of persuasion are used in commercial messages.

- Slogans, mottoes, jingles, or symbols that deliver a product's pitch—"Just Do It," "Like a Rock," or the "Golden Arches"—often use phrases instead of sentences to achieve the maximum emotional impact in the fewest number of words.
- Memorable photos that emphasize a brand name—"The Gap" or "Ralph Lauren"—may have little to do with the product's overall usefulness or effectiveness.
- Different kinds and sizes of typeface, colors, and graphic design—such as when the letters of important words are capitalized and displayed running down or across the page—call attention to a message.

Conclusion

A great challenge when teaching history and social studies to young children is to establish meaningful connections between the events and people of the past and students' contemporary lives. Without such connections, students do not easily make sense of what happened long ago and far away. By creating their own imaginary inventions, students make a personal connection to notable moments of innovation in the past.

As students describe and promote their creations using the language of advertisers and salespersons, they become more conscious of the purpose of the promotional claims they are exposed to every day in the media. They can then act knowledgeably as consumers, regarding with skepticism less-than-sincere advertising claims. An "amazing inventions and marvelous products" activity can become an expansive form of social studies learning, uniting the history of inventions and inventors, the economics of needs and wants, and the tools of persuasive writing. The lesson promotes children's critical thinking, historical awareness, and social understanding. 📖

Notes

1. National Council for the Social Studies, *Expectations of Excellence: Curriculum Standards for Social Studies* (Washington, DC: NCSS, 1994), 67.
2. *Ibid.*, 65.
3. National Council of Teachers of English and International Reading Association, *Standards for the English Language Arts* (Urbana, IL: NCTE, 1996), 33.
4. Boston Museum of Science, *Museum of Science Exhibit Guide* (1997).
5. Janis Herbert, *Leonardo da Vinci: His Life and Ideas, 21 Activities* (Chicago, IL: Chicago Review, 1999).
6. Marilyn Nelson, *Carver: A Life in Poems* (Front Street Press, 2001). This book presents George Washington Carver's life in Verse. See also Louis Haber, *Black Pioneers of Science and Invention* (New York: Harcourt Brace, 1992), which discusses Carver and thirteen other African American inventors who did their work while facing intense racial discrimination.
7. Wendy Towle, *The Real McCoy: The Life of an African-American Inventor* (New York: Scholastic, 1995); Jeannine Atkins, *Mary Anning and the Sea Dragon* (New York: Farrar Straus & Giroux, 1999); James Rumford, *Seeker of Knowledge: The Man Who Deciphered Egyptian Hieroglyphs* (Boston, MA: Houghton Mifflin, 2001).
8. William Durbin, *The Journal of Sean Sullivan: A Transcontinental Railroad Worker* (New York: Scholastic, 1999).
9. Mary Ann Fraser, *Ten Mile Day: And the Building of the Transcontinental Railroad* (Scholastic's "My Name is America" series, New York: Holt, 1996) and Lee Yin, *Coolies* (New York: Philomel, 2001).
10. Dick Teresi, *Lost Discoveries: The Ancient Roots of Modern Science* (New York: Simon & Schuster, 2002), 7, 8.
11. For more on using writing to teach children about the purposes of communication, see Sharon A. Edwards, Robert W. Maloy, and Ruth-Ellen Verock-O'Loughlin, *Ways of Writing with Young Kids: Teaching Creativity and Conventions Unconventionally* (Boston, MA: Allyn & Bacon, 2003).

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