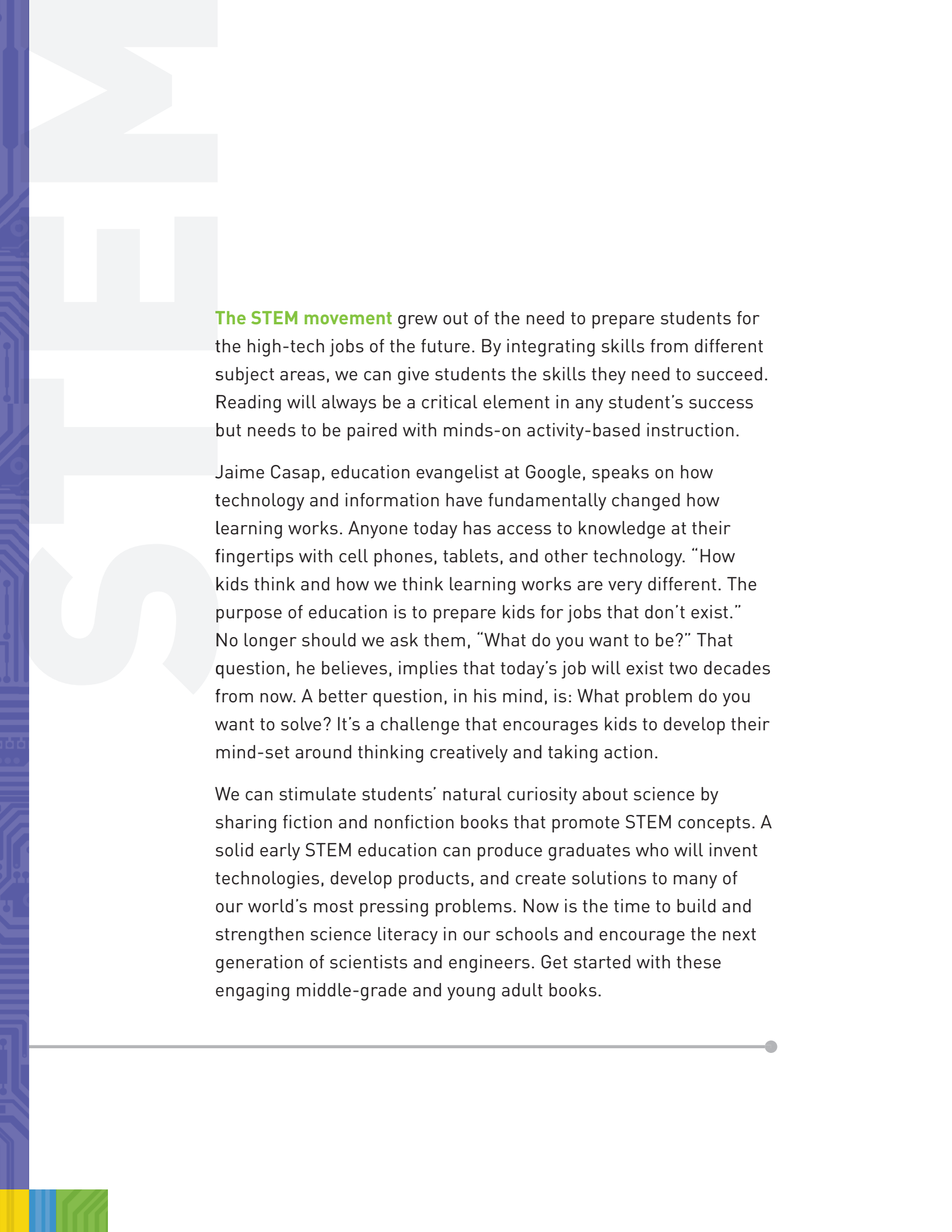


Science Technology Engineering Math

MIDDLE GRADE & YOUNG ADULT EDUCATORS' GUIDE

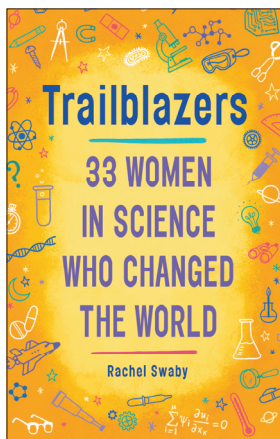
STEM is an integrated and creative approach to discovering and applying knowledge to solve problems in the real world. Fiction and nonfiction books that deliver background knowledge and model the potential uses of STEM provide context and inspiration to readers. Look inside this Educators' Guide for curriculum connections based on the Next Generation Science Standards that are designed to challenge students to go beyond their limits.



The STEM movement grew out of the need to prepare students for the high-tech jobs of the future. By integrating skills from different subject areas, we can give students the skills they need to succeed. Reading will always be a critical element in any student's success but needs to be paired with minds-on activity-based instruction.

Jaime Casap, education evangelist at Google, speaks on how technology and information have fundamentally changed how learning works. Anyone today has access to knowledge at their fingertips with cell phones, tablets, and other technology. "How kids think and how we think learning works are very different. The purpose of education is to prepare kids for jobs that don't exist." No longer should we ask them, "What do you want to be?" That question, he believes, implies that today's job will exist two decades from now. A better question, in his mind, is: What problem do you want to solve? It's a challenge that encourages kids to develop their mind-set around thinking creatively and taking action.

We can stimulate students' natural curiosity about science by sharing fiction and nonfiction books that promote STEM concepts. A solid early STEM education can produce graduates who will invent technologies, develop products, and create solutions to many of our world's most pressing problems. Now is the time to build and strengthen science literacy in our schools and encourage the next generation of scientists and engineers. Get started with these engaging middle-grade and young adult books.



TRAILBLAZERS: 33 Women in Science Who Changed the World

Rachel Swaby

Grades 5 & up

PB: 978-0-399-55418-6

HC: 978-0-399-55396-7

GLB: 978-0-399-55416-2

EL: 978-0-399-55417-9



A 2017 NSTA
Best STEM
Book

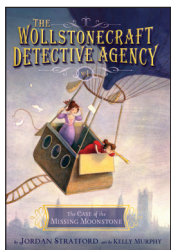


Florence Nightingale. Sally Ride. Ada Lovelace. These names and others are etched in history and included here as part of an awe-inspiring collection of profiles of 33 of the most influential women in science—women whose vision, creativity, passion, and dedication have changed the world.

CURRICULUM CONNECTIONS

- *Trailblazers* provides snapshots of incredible scientists. The book has been such a success that a second volume is in the planning stage. As a class, you are going to help choose who will be included. Decide on the criteria for inclusion (living, award winner, etc.), and compile your list along with the rationale for including each scientist in the second book. You can break off into smaller groups to complete the profiles, and publish your own class book.
- The women depicted in *Trailblazers* are serious, radical, confident, dominant, intelligent, and adventurous. These characteristics have helped them push into a traditionally male-dominated field and make amazing discoveries, despite the fact that their societies may not have thought this was an appropriate job for a woman. Pick one of the scientists from *Trailblazers* and discuss her contributions to her chosen field and any challenges she may have faced.

RELATED TITLE



THE CASE OF THE MISSING MOONSTONE (The Wollstonecraft Detective Agency, Book 1)

Jordan Stratford; Illustrated by Kelly Murphy

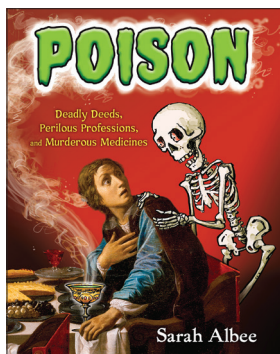
Grades 3–7

PB: 978-0-385-75443-9

HC: 978-0-385-75440-8

GLB: 978-0-385-75441-5

EL: 978-0-385-75442-2



POISON: Deadly Deeds, Perilous Professions, and Murderous Medicines

Sarah Albee

Grades 3–7

PB: 978-1-101-93223-0

GLB: 978-1-101-93224-7

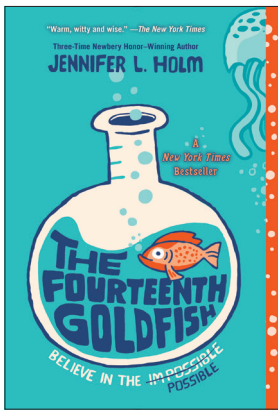
EL: 978-1-101-93225-4



Science geeks and armchair detectives will soak up this non-lethal, humorous account of the role poisons have played in human history.

CURRICULUM CONNECTIONS

- “Stalin may have been poisoned by warfarin, a medicine still in use today as a blood thinner for people with heart problems.” (p. 134) Warfarin was initially considered too potent for human use, but later research uncovered that it has blood-thinning effects. It is now the most widely used oral anticoagulant (medication used to prevent harmful blood clots from forming or growing larger) in the United States. Can you find any other substances that can be used as medicine, but can also be deadly to humans? Write a report about its discovery and uses.
- The damaging effects of environmental toxins and poisons can accumulate over time and eventually ruin your health. Inhalation of asbestos, coal dust, cotton fiber dust, and tobacco smoke can result in decreased lung function, cancer, and death. Should they be classified as poisons? Investigate what toxins/poisons you may encounter in your community. Develop a plan to educate those around you about the danger and what they can do to protect themselves.



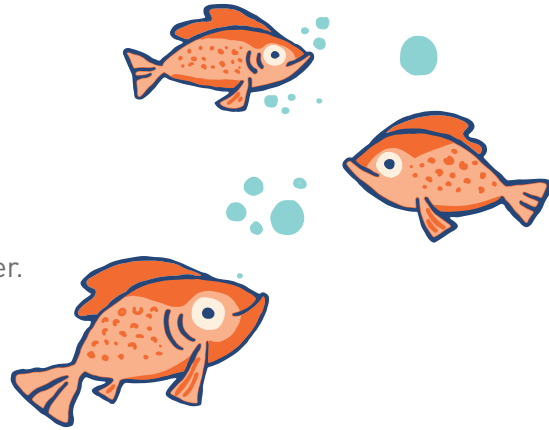
THE FOURTEENTH GOLDFISH

Jennifer L. Holm

Grades 3–7
PB: 978-0-375-87114-6
HC: 978-0-375-87064-4
GLB: 978-0-375-97064-1
EL: 978-0-307-97436-5

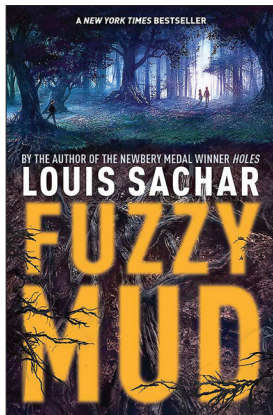


Galileo. Newton. Salk. Oppenheimer.
Science can change the world. . . .
But can it go too far?



CURRICULUM CONNECTIONS

- Grandpa Melvin has found the key to restoring youth in a mysterious, one-of-a-kind jellyfish he names *Turritopsis melvinus*. It's a subspecies of *Turritopsis nutricula*, the "immortal jellyfish" that ages in reverse. Investigate and then debate this unique creature. Is the *T. melvinus* real? Is the *T. nutricula*? And are they truly immortal?
- The author invokes scientists Marie Curie, Robert Oppenheimer, Isaac Newton, and Jonas Salk. Select any scientist (living or dead), and research his or her life and contributions. Develop a presentation that includes biographical information about the scientist, his or her discoveries, the impact the discoveries have had on the human race, and the effect of the discoveries on the scientist's life.



FUZZY MUD

Louis Sachar

Grades 5 & up
PB: 978-0-385-37022-6
HC: 978-0-385-74378-5
GLB: 978-0-375-99129-5
EL: 978-0-385-37021-9

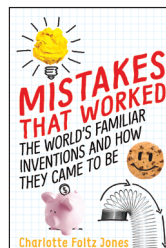


An imaginative and suspenseful story of the great lengths we'll go to for friendship and family, the mishaps and breakthroughs that are made in the name of science, and the wonders of mud . . . fuzzy mud.

CURRICULUM CONNECTIONS

- In the novel, fuzzy mud and the spread of bacteria set off a scare. In real life, plagues have caused similar fear—but they can also be fascinating. Research plagues at the library and on the Internet. Then use a Venn diagram or another graphic organizer to show how microbes and microorganisms can have both positive and negative effects on the human world. Use your notes to expand your writing into an essay.
- How do environmental and genetic factors influence the growth of organisms? Provide evidence to support your answer.

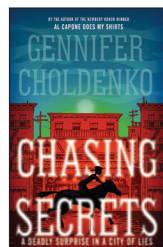
RELATED TITLES



MISTAKES THAT WORKED: 40 Familiar Inventions & How They Came to Be

Charlotte Foltz Jones;
Illustrated by John Obrien

Grades 3–7
PB: 978-0-385-32043-6
HC: 978-0-399-55202-1
EL: 978-0-399-55203-8



CHASING SECRETS

Gennifer Choldenko

Grades 5 & up
PB: 978-0-385-74254-2
HC: 978-0-385-74253-5
GLB: 978-0-375-99063-2
EL: 978-0-307-97577-5



THE MANY WORLDS OF ALBIE BRIGHT

Christopher Edge

Grades 4–7

HC: 978-1-5247-1357-7

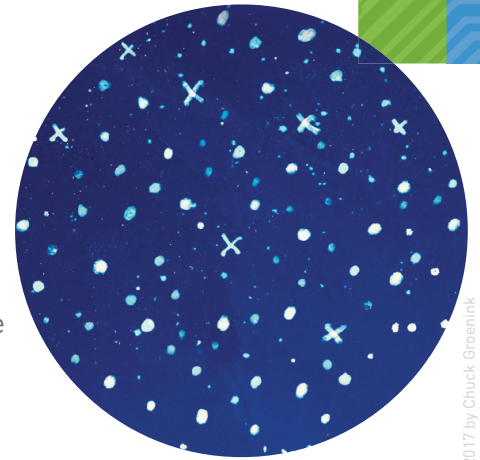
GLB: 978-1-5247-1359-1

EL: 978-1-5247-1358-4



Fun science meets humor and heart in this adventure about a boy who is searching for his mother . . . in a parallel universe.

Includes a friendly Q&A at the back of the book.



Art © 2017 by Chuck Groenink

CURRICULUM CONNECTIONS

- “People are saying Mum might even be given the Nobel Prize in Physics, even though she passed away.” [p. 161] The Statutes of the Nobel Foundation state: “Work produced by a person since deceased shall not be considered for an award. If, however, a prizewinner dies before he has received the prize, then the prize may be presented.” This change went into effect in 1974. Knowing this information, could Albie’s mum be considered for the Nobel Prize? Do you think the author was aware of the policy in the Statutes of the Nobel Foundation? What are the pros and cons of the rule?
- Austrian physicist Erwin Schrödinger’s feline paradox thought experiment, Schrödinger’s cat, has become a pop-culture staple, but it was his work in quantum mechanics that cemented his status within the world of physics. The act of opening the box allows a person to follow one of the possible future histories of the cat, including one in which the cat is both dead and alive. Research Schrödinger’s cat experiment and work in groups to come up with a clear, concise way to present the information.



SATELLITE

Nick Lake

Grades 7 & up

HC: 978-1-5247-1353-9

GLB: 978-1-5247-1354-6

EL: 978-1-5247-1355-3

Available October 2017



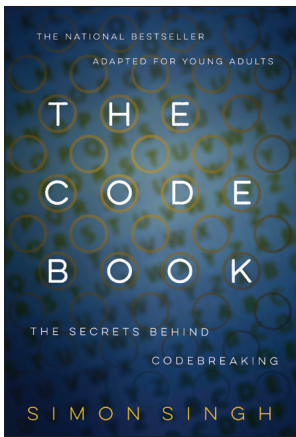
A teenage boy born in space makes his first trip to Earth in this engrossing sci-fi adventure for fans of *The Martian* from award-winning author Nick Lake.

CURRICULUM CONNECTIONS

- The medical problems that Leo, Orion, and Libra experience on Earth are rooted in having lived their whole lives in zero gravity on a space station known as *Moon 2*. What does it mean to have a zero gravity environment? Why is gravity important? Where and how can you experience zero gravity on Earth? Reread the effects of gravity on Leo’s, Orion’s, and Libra’s bodies, and then do some research on the side effects experienced by astronauts returning from the International Space Station beginning with the NASA website: NASA.gov/hrp/bodyinspace. Debate the scientific basis for Lake’s descriptions.
- Research NASA’s Weightless Wonder, more commonly known as the Vomit Comet. Are weightlessness and zero gravity the same? Explore zero gravity training. How does zero gravity actually work?



Art © 2017 by Jason Heatherly



THE CODE BOOK: The Secrets Behind Codebreaking

Simon Singh

Grades 7 & up
PB: 978-0-385-73062-4
EL: 978-0-375-89012-3



Unpack the science of secrecy and discover the methods behind cryptography—the encoding and decoding of information—in this clear and easy-to-understand young adult adaptation of the national bestseller. This is the perfect read for this age of WikiLeaks and other events that reveal the extent to which our technology is never quite as secure as we want to believe.

CURRICULUM CONNECTIONS

- Coded language has been used to safeguard and conceal important messages for thousands of years. In today's world, codes have been replaced by encryption. Encryption works by making information unreadable, even if it is accessed. Research emerging encryption methods, such as quantum key distribution, which might have viability now and in the future. What do you see as the future of encryption?
- Write a short message to a classmate. Encrypt your message using at least three different secret codes. Swap coded messages with another student. Challenge him or her to break your code and reveal your message, while you try to do the same!

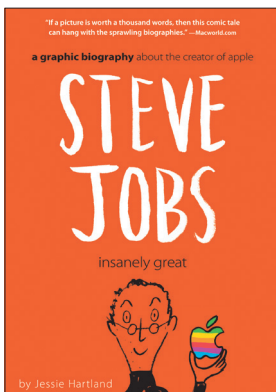
RELATED TITLE



THE DA VINCI CODE: The Young Adult Adaptation

Dan Brown

Grades 7 & up
HC: 978-1-5247-1582-3
GLB: 978-1-5247-1583-0
EL: 978-1-5247-1584-7



STEVE JOBS: Insanely Great

Jessie Hartland

Grades 7 & up
PB: 978-0-307-98298-8
HC: 978-0-307-98295-7 schwartz & wade books

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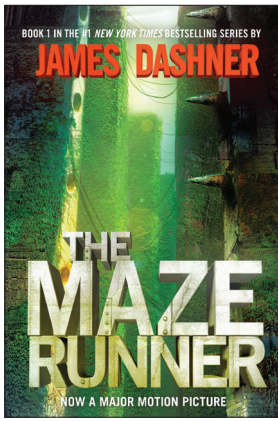
This graphic-novel biography of the Apple innovator's life will capture the imaginations of the legions of readers who live and breathe the technocentric world Jobs created.



Art © 2017 by Jessie Hartland

CURRICULUM CONNECTIONS

- Research the life of Steve Jobs. Is there anything in his early life that you think led him to become a pioneer of the personal-computer revolution? Highlight any particular achievements, and explain how you think they helped Jobs in his later life.
- Jobs used imagination and innovation to change the world of personal computers and handheld devices. While Jobs himself was not an engineer and could not write software code, his vision created a technological revolution. What kinds of scientists were needed to turn Jobs's vision into reality?



THE MAZE RUNNER

James Dashner

Grades 7 & up

PB: 978-0-385-73795-1

HC: 978-0-385-73794-4

EL: 978-0-375-89377-3



When Thomas wakes up in the lift, the only thing he can remember is his name. He's surrounded by strangers—boys whose memories are also gone. Outside the towering stone walls that surround the Glade is a limitless, ever-changing maze. It's the only way out—and no one's ever made it through alive.

CURRICULUM CONNECTIONS

- Information about life in the Glade is revealed very slowly. The Maze is chaotic and changes every night, making it nearly impossible to map and solve. What were the Creators hoping to accomplish with the experiment? Correlate the experiment with the scientific method. Do you think their actions are justified by the circumstances caused by the Flare? Explain and defend your position.
- The Glade/Maze setting has been contrived by scientists to test the kids who were placed there. The research team is seeking people with an immunity to a disease called the Flare that has killed most of humanity. Research sustainability and prepare to debate whether the area and resources of the Glade would be enough to support the population.

ALSO AVAILABLE

James Dashner

Grades 7 & up

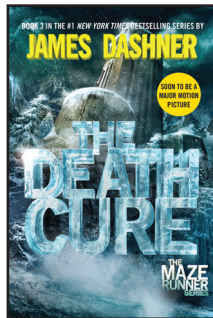


THE SCORCH TRIALS

PB: 978-0-385-73876-7

HC: 978-0-385-73875-0

EL: 978-0-375-89611-8

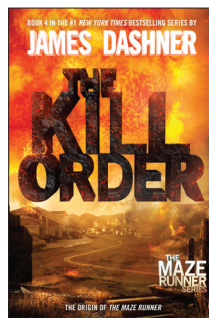


THE DEATH CURE

PB: 978-0-385-73878-1

HC: 978-0-385-73877-4

EL: 978-0-375-89612-5



THE KILL ORDER

PB: 978-0-385-74289-4

HC: 978-0-385-742887

EL: 978-0-307-97911-7



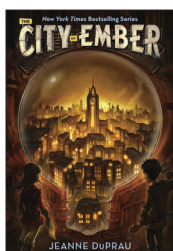
THE FEVER CODE

HC: 978-0-553-51309-7

GLB: 978-0-553-51310-3

EL: 978-0-553-51311-0

MORE STEM READS



THE CITY OF EMBER

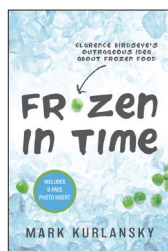
Jeanne DuPrau

Grades 3–7

PB: 978-0-375-82274-2

HC: 978-0-375-82273-5

EL: 978-0-375-89080-2



FROZEN IN TIME

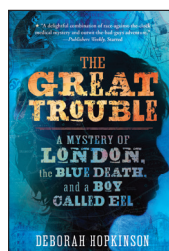
Mark Kurlansky

Grades 5 & up

PB: 978-0-385-37244-2

GLB: 978-0-375-99135-6

EL: 978-0-385-37243-5



THE GREAT TROUBLE

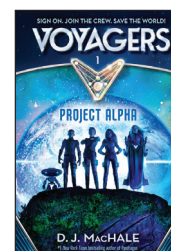
Deborah Hopkinson

Grades 5 & up

PB: 978-0-375-84308-2

HC: 978-0-375-84818-6

EL: 978-0-449-81819-0



VOYAGERS: PROJECT ALPHA

D. J. MacHale

Grades 3–7

HC: 978-0-385-38658-6

GLB: 978-0-385-38660-9

EL: 978-0-385-38659-3

INTERNET RESOURCES

For the resourceful educator, there's no shortage of exciting projects and activities for teaching STEM. These sites will guide you to use STEM lessons effectively in your classroom, help students to practice cross-disciplinary thinking, and build skills.

The Next Generation Science Standards (NGSS)

ngss.nsta.org

Become familiar with the NGSS and explore how to include them in your lesson plans.

The American Association for the Advancement of Science

ScienceNetLinks.com

This website provides K-12 lesson plans, a science history calendar to learn about important historical dates, and the latest science news.

National Geographic Society

nationalgeographic.org/education/stem-education/?ar_a=1

This website offers ideas, activities, lessons, and units that are connected to real-world applications.

PBS Learning Media

ny.pbslearningmedia.org

With more than 4,000 STEM resources available in its database, this website has a vast array of lesson plans, videos, and interactive resources to help you infuse both fun and rigor into your STEM classroom.

STEMfinity

STEMfinity.com/Free-STEM-Education-Resources

This site hosts free STEM resources to complement project-based learning for pre-K to 12.

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Prepared by Terrence Young, Jr., M.Ed., MLS, who has been a librarian and science educator for 40 years and gives presentations on STEM Literacy across the country.