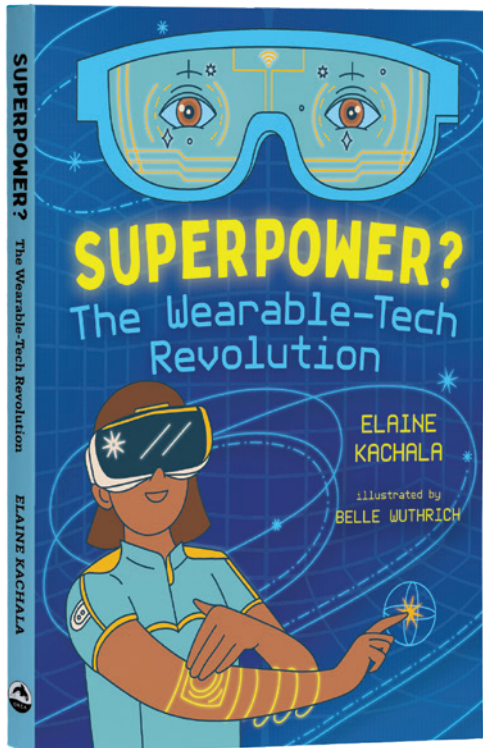


Discussion and Activity Guide for

SUPERPOWER?

The Wearable-Tech Revolution

Your guide to help with a classroom read independent reading, or book club!



Aligned to Common Core & National Generation Science Standards Grades 4-7

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Illustrated by Belle Wuthrich

THEMES:

Technology & Society / Wearable Computing / Inventions / Robotics / Responsible Design / Young Inventors / Human-Machine Evolution / STEAM / STEM

READING AGE: 9 to 12

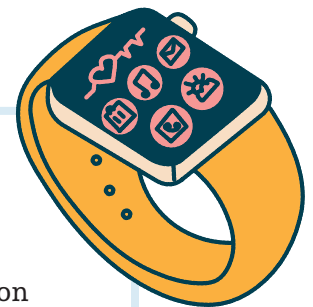
GRADE: 4 to 7

ABOUT THE BOOK:

Superpowers...or Super-Problems?

Imagine being able to run without getting tired. Or travel to the moon to look at Earth for science class. Wearable technology may soon give humans superpowers. Discover how technological innovation can help people survive, live better lives and thrive.

But what if technology helps some people but not others? What if super strength results in endless work? What if living in a virtual world affects our humanity? Can innovation go too far? Meet the inventors, designers, engineers, scientists and young people asking these questions and navigating the next tech frontier.



PRE-READING DISCUSSION QUESTIONS:

Use these questions to activate background knowledge and excite students about the subject of wearable technologies.

1. What do you think you already know about wearable technology? What are you curious about when it comes to wearable technology? What would you like to learn about wearable technology that you currently don't know?
2. Before you begin reading this book, write your personal opinions about wearables based on your own experiences. Consider one of the following questions:
 - > Just because we can wear technology on our bodies, should we?
 - > Do you think wearable technology is beneficial for all people?
 - > Should wearable technology be allowed at school?
3. You are about to read a book with many text features you can learn from. In what ways might a non-fiction author grab your attention to teach you something?

POST-READING DISCUSSION QUESTIONS:

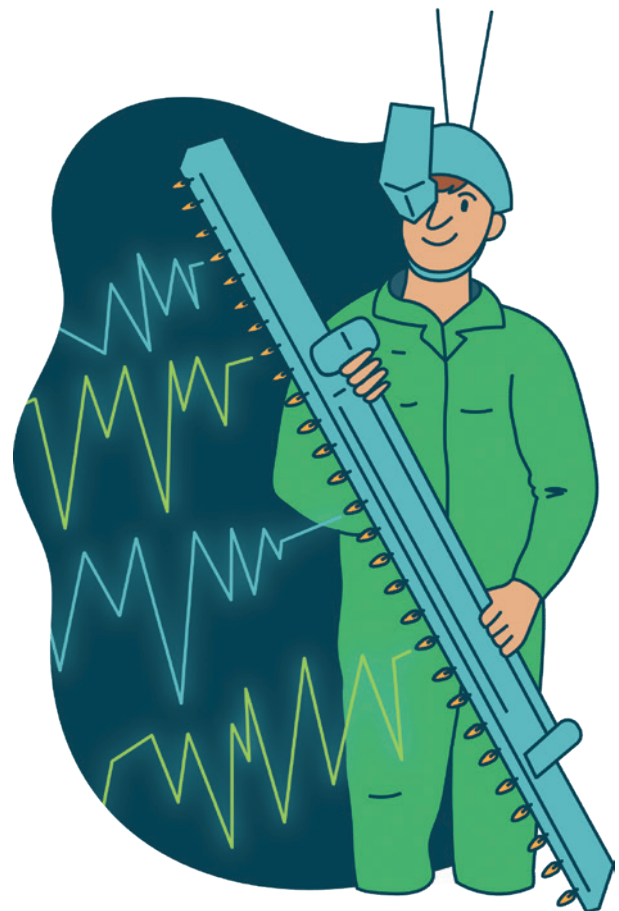
Use these questions to summarize the book's key ideas and allow students to reflect on what they learned.

1. Now that you have read this book, revisit your answer to Pre-Reading Discussion Question #2. Write your personal opinions about wearables based on your experiences and what you read. How have your opinions changed?
2. What is wearable technology? List its main features.
3. What are five new facts you discovered about wearable technology that surprised you? Why did those facts surprise you?
4. Some people think that wearables are helpful. Use evidence from the text to identify three ways that wearables help humans.
5. Some people think that wearables are not good for society. Use evidence from the text to list three ways that wearables might cause harm.

POST-READING ACTIVITIES:

Use these activities to build upon student's knowledge and extend learning.

1. After reading this book, what do you still wonder about wearable technology? Use reliable resources to find out more about this technology.
2. Get Brainstorming! Use activity on page 93 in the book (also available as free separate download) to create a wearable device using a step-by-step approach.
3. After you design your wearable technology, consider doing one of the following:
 - > Create an advertisement or commercial that could tell others about your invention.
 - > Design a logo and a digital campaign for your invention.
 - > Write a story of a character that uses your technology in a new/novel way.



CHAPTER 1 DISCUSSION QUESTIONS:

1. On page 6, the author writes that wearable technology is a computer. What does the author mean by this?
2. Study the timeline on page 12 and 13. Technological advancements impact the future in surprising ways. If Steve Mann hadn't invented HDR imaging in the 1990s, how might the future have looked different?
3. Define surveillance. Define sousveillance. How are they similar? How are they different?
4. What is an algorithm? How do algorithms make wearable technology possible?
5. What are sensors? What is their purpose in a wearable?
6. How can wearables help us think differently about how we live with machines?
7. How are the next generation of wearables changing?

CHAPTER 1 ACTIVITIES:

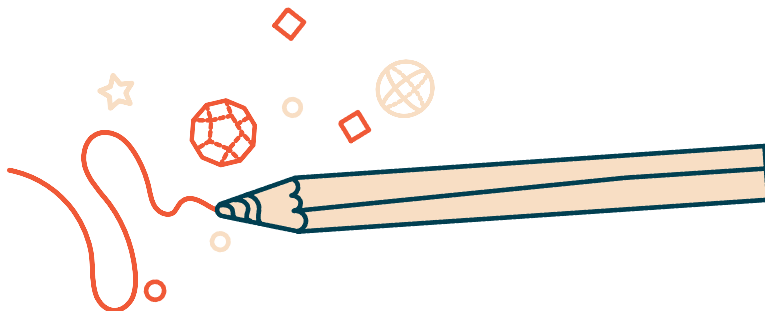
1. Imagine that you or your friend was a cyborg. Write a story that illustrates the pros and cons of being a cyborg.
2. Draw a picture of a cyborg superhero. Label the technologies present. Include your cyborg's strengths and weaknesses.
3. Steve Mann thinks a lot about how to create safe, secure designs, and how the technology will affect people. Write a letter to Mann or another inventor on how to make technology safer using the idea of humanistic intelligence.
4. Wearable technology uses sensors. Research how sensors can use light or sound waves. Draw an illustration of a sensor. Draw and explain how the energy of the waves affects the sensor.

CHAPTER 2 DISCUSSION QUESTIONS:

1. Explain the similarities between augmented reality, mixed reality and virtual reality. Explain the differences between augmented reality, mixed reality and virtual reality.
2. Use the glossary to define haptic. Would you find haptic technology useful?
3. How can virtual reality make new experiences feel safer?
4. On page 36, the author writes that wearables are getting smarter. What evidence does the author use to support this claim?
5. Examine the orange text boxes on page 39 and 40? What does the author want you to understand about privacy?
6. What do you think are the three most important wearable technologies that are changing how we live? Explain your reasoning.
7. Manmeet, the Trexo engineer/designer, said that he wants to make sure that all kids who want a Trexo can get one. He also said that it's important to realize that not all kids who can't walk want one. What do you think Manmeet means by this?

CHAPTER 2 ACTIVITIES:

1. Christina Mann, the young inventor, said "Step one in any invention is to define the problem by expanding your thinking about the situation." (page 22) Identify one problem that could possibly be addressed using wearable technology. Interview three people to get their perspectives on this problem. Explain how your outlook on the problem changed after interviewing three people.
2. What wearable technology from this chapter would you like to learn more about? Research that technology and create a presentation that teaches others about that technology.



CHAPTER 3 DISCUSSION QUESTIONS:

1. When describing human-machine symbiosis, the author says, “We’re collaborating as teammates!” What does she mean by this?
2. What is the main idea of the Tech_Byte box on page 47? Why is this important?
3. What is young inventor, Soumiya hoping to achieve with her research on BCIs?
4. The author writes about electroencephalography. The prefix “electro-” means electricity, the root “encephalo” means brain and the suffix “-graphy” means the process of writing or drawing. How do these parts help you to better understand the word’s meaning?
5. The “magic hat” is shown to improve self-esteem. Can you think of other uses for the magic hat that could help children?
6. What are scientist Brendan Allison’s two main concerns about BCIs?
7. What are the benefits of Dr. John Roger’s invention?

CHAPTER 3 ACTIVITIES:

1. Select one of the orange text boxes in this chapter (page 44, 50 or 57). Write whether you agree or disagree with the main idea. Use evidence from the text to support your explanation.
2. Richard Browning, the inventor of an exoskeleton, is always curious. Even as a child, he never stopped asking the question, “What if?” List several of your own “what if?” questions that are connected to wearable technology. Research to find out if there are other scientists and inventors asking the same questions you are asking.



CHAPTER 4 DISCUSSION QUESTIONS:

1. Why is Dr. Mary Lou Jepsen speaking out about her wearable MRI system?
2. Transhumanism is introduced on page 61. The prefix “trans-” means “across or beyond”, the root word is “human” and the suffix “-ism” means “belief in something.” How do these parts help you to better understand the word’s meaning?
3. Dr. Jeremy Bailenson says, “those of us designing social VR better get it right and fast.” Why do you think he makes this comment?
4. The author expresses concerns regarding virtual bodies and telepresence in a virtual world. What are five of these concerns?
5. Using information from the orange text box and illustration on page 65, explain why Riley’s bodyprint isn’t safe.
6. What did Dr. Jeremy Bailenson hope to achieve when he called top VR industry leaders together for a meeting in 2018?
7. What are researchers Jepsen, Bailenson and Abrash advocating for?
8. Science and technology have always shaped human civilization, but Klaus Schwab and other leaders think the Fourth Industrial Revolution (4IR) is different. Why do they think this?
9. In the photo caption about the World Economic Forum in 2016 (page 69), Amira Yahyaoui says, “the Fourth Industrial Revolution should be a revolution of values.” What does she mean by this statement?

CHAPTER 4 ACTIVITIES:

1. Compare the features of a Google cardboard with the newest generation of professional VR headsets.
2. Invite someone from a profession that uses VR to share their work with the class.
3. Historian Melvin Kranzberg said, “Technology’s not good, bad or neutral.” We shape technology, then it shapes us and on it goes. So we need to think carefully about what technology we put out there in the first place, because once it’s out there, we will use it. Research an example of a wearable or other technology that was intended to help people but has had negative impacts.

CHAPTER 5 DISCUSSION QUESTIONS:

1. Define values, principles and ethics. Why are values, principles and ethics important in designing technology for human use?
2. At the beginning of this chapter, the author mentions reasons why inventor's projects can go wrong. What are four reasons why this can happen? Which of these four reasons do you think could be most detrimental?
3. Manmeet Maggu explains the story behind the engineer's iron ring. What's the main idea behind this story? Why do engineers in Canada wear an iron ring?
4. Why do all creators of technology need a code of ethics?
5. Empathy is the first step in the design process. What do you think would happen to the user if designers and engineers skipped the first step?
6. Using the glossary, define the terms 'open-source' and 'data sets.' Then, briefly explain why these are important.
7. Why do diversity and inclusion make a difference when designing a wearable?
8. Brad Smith, president and vice-chair of Microsoft, says we must keep control of the computers we create. "It's up to us," he says. "Tech has no conscience, but people do—we do. And we must exercise our conscience. We must go to work every day and decide how tech will help everyone." Why does he make this comment?

CHAPTER 5 ACTIVITIES:

1. Imagine you're on a team that's designing a wearable. Develop a code of ethics that you would want everyone to follow. Use this book, *Superpower?*, and other trusted sources to help you.
2. Imagine you've been assigned to lead a team of designers making a new prosthetic limb. Make a list of people with different perspectives you would want to listen to in order to design the best prosthetic limb.



DISCUSSION AND ACTIVITY GUIDE CREATED BY KAROLINE JARR, PH.D.

Karoline is an education consultant specializing in STEM learning and evaluation. She has extensive experience developing and scaling hands-on STEM learning experiences as a national education leader, researcher and middle school science teacher.

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COMMON CORE STANDARDS

Grade 4: ELA.RI.4.1–5,7–9; RF.4.3; W.4.1–4,7–8; SL.4.1,2; L.4.4,5

Grade 5: ELA.RI.5.1–5,7–9; RF.5.3; W.5.1–4,7–8; SL.5.1,2; L.5.4,5

Grade 6: ELA.RI.6.1–9; W.6.1–4,7–8; SL.6.1,2; L.6.4,5; RST 6-8.1–7; WHST 6–8.1,2,7–9

Grade 7: ELA.RI.7.1–9; W.7.1–4,7–9; SL.7.1,2; L.7.4,5; RST 6-8.1–7; WHST 6–8.1,2,7–9

NEXT GENERATION SCIENCE STANDARDS

Grade 4 and 5: 4-PS4-1; 3-5-ETS1-1; 3-5-ETS1-2; 3-5-ETS1-3

Grade 6 and 7: MS-PS4-1; MS-ETS-1-1; MS-ETS-1-2; MS-ETS-1-3, MS-ETS-1-4

ABOUT THE AUTHOR:

Elaine Kachala is a health-policy researcher, writer and adviser. She has over 20 years of writing experience with health agencies. *Superpower? The Wearable-Tech Revolution* is her first book. She's curious and hopeful but can't help being a little worried about how wearables will impact our health, well-being and equity. With degrees in psychology and sociology from the University of Toronto and a master of environmental studies from York University, she brings a unique perspective to the topic. Elaine lives with her family in Toronto.

ABOUT THE ILLUSTRATOR:

Belle Wuthrich is an illustrator and designer specializing in books for young readers. Based in Vancouver, British Columbia, Belle has contributed to more than a dozen books for kids, a number of which have won awards or been republished internationally, including the Montaigne Medal Award-winning *Eyes and Spies: How You're Tracked and Why You Should Know* and the Silver Birch Award nominee *Eat Up: An Infographic Exploration of Food*.