



Teacher's Guide

Prepared by Courtney
Tricia Leysath for



Reading Is
Fundamental
RIF.org

ROBOT TEACHER'S GUIDE

Note to Educators

Robot encourages children to explore the fascinating world of robotic technology with a complete illustrated history that begins with the earliest automatons and continues through modern humanoid helpers. Young readers will be riveted by the bright graphics and stunning photography on every page. Students will be amazed to learn all the interesting tasks that robots can do: perform delicate surgical operations, help children with their homework, rescue survivors from disaster zones, or even just be our friends. Introducing students to the cutting-edge world of robotics will allow them to discover how science, technology, engineering, and mathematics can be combined to create robots that can enrich our lives both now and in the future.

Robot is divided into six themed sections. The first section, "The Rise of Robots," covers basic robot technology and types, the history of robotics, and robots in pop culture. "In the Home" is about how robots can entertain us, clean our homes, help with disabilities, or be our friends. "At Work" shows students how robots can save humans time and effort by carrying out dangerous, dull, or dirty work without ever getting tired. In section four, "Everyday Bots," students will discover how robots are becoming essential to humans in everyday life. "Going to Extremes" explains how robots can go where humans can't, from battling germs inside the human body to diving to remote depths in the ocean. The final section, "Hero Bots," tells how robots keep humans out of harm's way by going to dangerous places such as rubble-strewn disaster zones and the vastness of space.

The book includes many profiles of robots that have been released recently or are in development. Each robot's profile features a specification panel across the top of the page, which includes details about each robot's design, production, and capability. Most include a "How It Works" text box, as well as detailed diagrams and labeled photos of the robot in action. Interspersed among the robot profiles are two-page spreads that provide in-depth discussions of robot features such as legs, wheels and tracks, intelligence, programming, sensors, data, and movement. The book concludes with an extensive glossary and an index.

This book is recommended for children in grades 4–7.

Lesson Plan

For additional resources go to RIF's Literacy Central (www.rif.org/DK). There you'll find word lists, puzzles, games, and other resources.

Discussion Questions

Pre-Reading Questions

What is a robot? Does it have to look like a person? Why do engineers make robots?

Reading

Make the book available for students to read in the classroom. Once all students have had time to examine the book, discuss the post-reading questions below and give students the opportunity to look at the book again to answer them.



ROBOT TEACHER'S GUIDE

Discussion Questions

Post-Reading Questions

- 1** When you look at each robot profile, where do your eyes go first for information? Discuss how the design of the book, including different fonts and text sizes, sidebars, headings, use of color, and images, affects how you read the book and what information you identify as important.
(CCSS.ELA-LITERACY.RI.4.5, CCSS.ELA-LITERACY.RI.5.5, CCSS.ELA-LITERACY.RI.4.7, CCSS.ELA-LITERACY.RI.5.7, CCSS.ELA-LITERACY.RST.6-8.4, CCSS.ELA-LITERACY.RST.8.5)
- 2** The robot profiles in this book contain detailed specifications and explanations along with clear images of each robot. How do the written sections help you to understand how the robot works? What do the images add to your understanding of the robot's function?
(CCSS.ELA-LITERACY.RI.4.7, CCSS.ELA-LITERACY.RI.5.7, CCSS.ELA-LITERACY.RST.6-8.6)
- 3** How do science fiction books and movies help us to understand the social and ethical implications of technology as we move to a future with robots? Consider militarized robots, privacy, surveillance, etc. Refer to pages 22–23, "Robots in Culture."
(CCSS.ELA-LITERACY.RI.4.3, CCSS.ELA-LITERACY.RI.5.3, CCSS.ELA-LITERACY.RST.6-8.9)
- 4** Robots on land usually move using legs, wheels, or tracks. In what situations would each type of movement be most advantageous? Focusing on pages 34–35, find details from the book to support your answer.
(CCSS.ELA-LITERACY.RI.4.1, CCSS.ELA-LITERACY.RI.4.2, CCSS.ELA-LITERACY.RST.6-8.1, CCSS.ELA-LITERACY.RST.6-8.2)
- 5** Look at the section titled "Everyday Bots." Do you have any of these in your home? Which of these robots would you most like to have in your home? Why?
(CCSS.ELA-LITERACY.RI.4.1, CCSS.ELA-LITERACY.RI.5.1, CCSS.ELA-LITERACY.RI.4.3, CCSS.ELA-LITERACY.RI.5.3)
- 6** Discuss the difference between Robot Intelligence (pages 46–47) and Higher Intelligence (pages 74–75). Choose several robot profiles from the book. What type(s) of intelligence do they use to complete tasks?
(CCSS.ELA-LITERACY.RI.4.1, CCSS.ELA-LITERACY.RI.4.4, CCSS.ELA-LITERACY.RI.5.1, CCSS.ELA-LITERACY.RI.5.4, CCSS.ELA-LITERACY.RST.6-8.1, CCSS.ELA-LITERACY.RST.6-8.4)
- 7** Name some concepts in the book that were new to you. Explain these concepts, using vocabulary words and quotes from the book, and explain why these concepts are important to humans as we head into a future with more robots.
(CCSS.ELA-LITERACY.RI.4.1, CCSS.ELA-LITERACY.RI.4.4, CCSS.ELA-LITERACY.RI.5.1, CCSS.ELA-LITERACY.RI.5.4, CCSS.ELA-LITERACY.RST.6-8.1, CCSS.ELA-LITERACY.RST.6-8.4)
- 8** Look at pages 106–107, "Sensors and Data." Are any of the words unfamiliar to you? What are the meanings of the words? What are some different strategies you can use to determine the meaning of these words?
(CCSS.ELA-LITERACY.RI.4.4, CCSS.ELA-LITERACY.RI.5.4, CCSS.ELA-LITERACY.RST.6-8.4)
- 9** Why do robots sometimes travel to places before people do? What are some of the advantages and disadvantages? Find details from the book, focusing on the sections titled "Going to the Extremes" and "Hero Bots."
(CCSS.ELA-LITERACY.RI.4.1, CCSS.ELA-LITERACY.RI.4.2, CCSS.ELA-LITERACY.RST.6-8.1, CCSS.ELA-LITERACY.RST.6-8.2)



ROBOT TEACHER'S GUIDE

Cross-Curricular Activities (Review and Assessment)

1. Writing Activity: Robots of the Future

Defusing a bomb, cleaning nuclear hotspots, sewer patrol...It's obvious why robots are best suited for these missions, but what about a robotic pitcher on your favorite baseball team, a robotic best friend, a robotic teacher, or a robotic president? Do you think one or more of those would be a good idea? Why or why not? What qualities do humans have that you think could never be replaced by robots? Why? Have students write an age-appropriate opinion essay supporting their point of view. Essays should introduce the issue, support the claim with facts and details from the book, and provide a concluding statement.

(CCSS.ELA-LITERACY.W.4.1, CCSS.ELA-LITERACY.W.5.1, CCSS.ELA-LITERACY.W.6-8.1, CCSS.ELA-LITERACY.W.4.3, CCSS.ELA-LITERACY.W.5.3)

2. Research and Experiment: Build a Helping Hand

Using available digital resources and other books brought into the classroom, have students research and design a prosthetic hand and put it to the test using materials that can easily be found around the classroom and home. Divide the class into groups. Each group should decide the function they want their hand to perform and build a robot that performs that function. Examples might include grasping a pencil, pushing keys on a keyboard, or picking up a small object. Suggested materials include card stock, cardboard tubes, string/yarn, drinking straws, plastic gloves, balloons, various cutting tools and adhesives, empty cans, rubber bands, paper clips, etc.

Follow-up questions: Look at the other groups' designs. Are there other hands in the class designed to perform the same function? How does their design compare to yours? How could you improve your design? What are some of the challenges a robotics engineer would have to overcome to design a real prosthetic hand so a person could perform everyday tasks?

(CCSS.ELA-LITERACY.W.4.7, CCSS.ELA-LITERACY.W.5.7, CCSS.ELA-LITERACY.W.4.8, CCSS.ELA-LITERACY.W.5.8, CCSS.ELA-LITERACY.W.6-8.7, CCSS.ELA-LITERACY.W.6-8.8) (NGSS.3-5-ETS1-1, NGSS.3-5-ETS1-2, NGSS.3-5-ETS1-3, NGSS.MS-ETS1-1, NGSS.MS-ETS1-2, NGSS.MS-ETS1-3)

3. Problem-Solving Scenario: Robot Profile

Discuss with students what they have read or learned about robots helping people with disabilities. Individually or in small groups, using the digital resources available to you and other books brought into the classroom, have students design a robot to help with one type of disability. Have students create a "Robot Profile" poster modeled after the robot profiles found throughout the book. They should include a specification bar, a "How It Works" paragraph, a labeled diagram or illustration of the robot, as well as a second illustration of the human using or interacting with the robot.

CCSS.ELA-LITERACY.W.4.7, CCSS.ELA-LITERACY.W.4.8, CCSS.ELA-LITERACY.W.4.9, CCSS.ELA-LITERACY.W.5.7, CCSS.ELA-LITERACY.W.5.8, CCSS.ELA-LITERACY.W.5.9, CCSS.ELA-LITERACY.WHST.6-8.7, CCSS.ELA-LITERACY.WHST.6-8.8, CCSS.ELA-LITERACY.WHST.6-8.9) (NGSS.3-5-ETS1-1, NGSS.3-5-ETS1-2, NGSS.3-5-ETS1-3, NGSS.MS-ETS1-1, NGSS.MS-ETS1-2, NGSS.MS-ETS1-3)

4. Multimedia Presentation: Famous Robotics Engineers

Individually or in small groups, using the digital resources available to you and other books brought into the classroom, have students research a famous robotics engineer. Have students create a multimedia presentation that includes text, images, charts and graphs, video and audio clips, and/or other multimedia elements as appropriate, making sure all students have a chance to practice using digital tools. The presentation should include details about the chosen robotics engineer as well as their important robotic engineering accomplishment(s). Have each individual or group present their findings to the other students, making sure each student has a chance to practice speaking and listening and asking and answering questions.

(CCSS.ELA-LITERACY.W.4.2, CCSS.ELA-LITERACY.W.5.2, CCSS.ELA-LITERACY.W.6-8.2, CCSS.ELA-LITERACY.W.4.6, CCSS.ELA-LITERACY.W.5.6, CCSS.ELA-LITERACY.W.6-8.6, CCSS.ELA-LITERACY.W.4.7, CCSS.ELA-LITERACY.W.5.7, CCSS.ELA-LITERACY.W.6-8.7, CCSS.ELA-LITERACY.SL.4.4, CCSS.ELA-LITERACY.SL.5.4, CCSS.ELA-LITERACY.SL.6.4, CCSS.ELA-LITERACY.SL.7.4, CCSS.ELA-LITERACY.SL.4.5, CCSS.ELA-LITERACY.SL.5.5, CCSS.ELA-LITERACY.SL.6.5, CCSS.ELA-LITERACY.SL.7.5)



ROBOT TEACHER'S GUIDE

Cross-Curricular Activities (Review and Assessment)

1. Data-Gathering Activity: Cookie Assembly Line

Students will be making “chocolate chip cookies” using an assembly line. One group will act as robots and will work uninterrupted, and the other groups will have “human” interruptions.

Materials needed: timer, white paper, 3-inch cardboard circles (one per group), one pair of scissors (one per group), and crayons or colored pencils.

Show students a model cookie and discuss expectations for the end result: smooth edges, three inches in diameter, the cookie colored brown to the edges, and exactly eight chocolate chips. Divide students into groups of four. Have students create an assembly line where one student traces the circle, one cuts, one colors the cookie, and one colors the chocolate chips. Designate several groups of four students with the label, “Group Robot.” These groups will work uninterrupted. Designate other groups of four students with the label, “Group Human.” These groups will take mandatory bathroom, lunch, and shift change breaks but should have no other interruptions.

Before starting the timer, have students set up their assembly line. If there are any groups of three, let them know their fourth person was a “no show” at work today and they are still responsible for completing that part of the assembly line. If all groups have four students, immediately have one student leave one of the groups and “go home sick.” They can assist with timing and quality control. At the start, no group should have less than three students.

- 1) Start the timer.
- 2) Minute 3: Have all groups stop, except those designated as Group Robot, for a mandatory bathroom break.
- 3) Minute 4: Resume work.
- 4) Minute 5: In one or two of the human groups, have one worker “get injured.” They can only use their non-dominant hand for the remainder of the activity.
- 5) Minute 6: Have all groups stop, except Group Robot, for a “lunch break.”
- 6) Minute 7: In one or two of the human groups, have one worker “go home sick.”
- 7) Minute 8: Resume work.
- 8) Minute 10: Have all groups, except Group Robot, create a “shift change.” Each student has to change jobs within their group.
- 9) Minute 15: Everyone stops working. Perform quality control on the cookies.

Have students make a bar graph showing how many cookies each group made.

Follow up questions: Which group was most efficient? Why? Which group was least efficient? Why? What are the pros and cons of robots and humans in this sort of assembly line? What if the company wanted to change the shape of the cookie or the amount of chips? Which group could make the change more quickly?

(CCSS.ELA-LITERACY.RI.4.7, CCSS.ELA-LITERACY.RI.5.7, CCSS.ELA-LITERACY.RST.6-8.3, CCSS.ELA-LITERACY.6.8.7)



