Teacher's Guide: Zara's Robot Friend

A Story About Coding and Friendship
By Dallas W. Thompson, PhD

Overview

Zara's Robot Friend introduces young learners (ages 5-8) to fundamental robotics and engineering concepts through an engaging narrative about friendship, problem-solving, and perseverance. This guide provides educators with comprehensive lesson plans, discussion questions, and hands-on activities aligned with STEM learning objectives.

Learning Objectives

By the end of this unit, students will be able to:

- Identify basic components of a robot (sensors, motors, power source, controller)
- Understand the engineering design process (ask, imagine, plan, create, test, improve)
- Apply problem-solving strategies when facing challenges
- Recognize that mistakes are valuable learning opportunities
- Collaborate effectively with peers on engineering projects
- Demonstrate creativity in designing solutions to problems

Grade Level & Standards Alignment

Recommended Grades: K-3
Subject Areas: Science, Technology, Engineering, Mathematics, Social-Emotional Learning

NGSS Standards:

- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change
- K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function
- K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem

Common Core Connections:

- CCSS.ELA-LITERACY.RL.1.3: Describe characters, settings, and major events using key details
- CCSS.ELA-LITERACY.SL.1.1: Participate in collaborative conversations with diverse partners

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Lesson Plan 1: Introduction to Robotics (45 minutes)

Objectives

Students will identify what makes something a robot and recognize robots in everyday life.

Materials Needed

- Copy of “Zara’s Robot Friend”
- Chart paper and markers
- Pictures of various robots (toy robots, vacuum robots, assembly line robots)
- Pictures of non-robots that students might confuse (remote control car, computer, calculator)

Lesson Sequence

Warm-Up (10 minutes)

Begin by asking students: “What is a robot?” Record their ideas on chart paper without correcting misconceptions. Show pictures of various objects and have students vote on whether each is a robot. This reveals their prior knowledge and common misconceptions.

Read-Aloud (15 minutes)

Read “Zara’s Robot Friend” aloud to the class, pausing at key moments to ask predictive questions:

- “What do you think Zara will do next?”
- “How do you think the robot will help Zara?”
- “What problems might Zara face while building her robot?”

Discussion (10 minutes)

After reading, facilitate a discussion using these questions:

- What parts did Zara’s robot have?
- How did Zara’s robot move and sense things?
- What made Zara’s creation a robot instead of just a toy?
- How did Zara feel when things didn’t work the first time?

Activity (10 minutes)

Return to the chart paper from the warm-up. Now that students have heard the story, revisit their definitions of robots. Create a class definition together. Introduce the four key components every robot needs:

1. **Sensors** (to detect the environment)
2. **Controller/Brain** (to make decisions)
3. **Actuators/Motors** (to move or do things)
4. **Power Source** (battery or electricity)

Assessment

Students draw and label a simple robot showing at least three of the four key components.

Lesson Plan 2: The Engineering Design Process (60 minutes)

Objectives

Students will understand and apply the steps of the engineering design process.

Materials Needed

- Engineering Design Process poster or chart
- Building materials (cardboard, tape, straws, paper clips, rubber bands)
- Challenge cards (provided in separate resource)
- Student engineering journals (template provided)

Lesson Sequence

Introduction (10 minutes)

Explain that engineers follow a special process when they create things. Introduce the Engineering Design Process using child-friendly language:

1. **ASK:** What problem are we trying to solve?
2. **IMAGINE:** What are some possible solutions?
3. **PLAN:** Draw a picture of your idea
4. **CREATE:** Build your solution
5. **TEST:** Does it work?
6. **IMPROVE:** How can we make it better?

Connect back to “Zara’s Robot Friend” by identifying where Zara used each step in the story.

Modeling (15 minutes)

Present a simple challenge: “Design a device that can move a small ball from one side of the table to the other without using your hands.”

Model the engineering design process out loud:

- ASK: “I need to move a ball across the table…”
- IMAGINE: “I could use a ramp, or a tube, or a catapult…”
- PLAN: Sketch two ideas on the board
- CREATE: Build one simple solution using available materials
- TEST: Demonstrate whether it works
- IMPROVE: “What if I made the ramp steeper?”

Guided Practice (30 minutes)

Divide students into pairs or small groups. Give each group a challenge card (examples below) and building materials. Students work through the engineering design process, recording their work in engineering journals.

Sample Challenge Cards:

- Build a structure that can hold a book at least 6 inches off the table
- Create a device that can pick up a cotton ball without using your hands
- Design a bridge that can span a 12-inch gap and hold a toy car

Circulate and ask guiding questions:

- “What problem are you trying to solve?”
- “What have you tried so far?”
- “What could you change to make it work better?”

Reflection (5 minutes)

Gather as a class. Have 2-3 groups share their designs and explain what worked, what didn’t, and what they would change. Emphasize that engineers rarely get things right the first time—just like Zara!

Assessment

Review student engineering journals for evidence of following the design process steps.

Lesson Plan 3: Problem-Solving and Perseverance (45 minutes)

Objectives

Students will identify strategies for overcoming challenges and recognize that mistakes are part of learning.

Materials Needed

- Copy of “Zara’s Robot Friend”
- Problem-solving strategy cards
- Scenario cards
- Chart paper

Lesson Sequence

Review (10 minutes)

Reread the section of “Zara’s Robot Friend” where Zara encounters problems with her robot. Ask:

- How did Zara feel when her robot didn’t work?
- What did she do instead of giving up?
- Who helped her solve the problem?

Direct Instruction (15 minutes)

Introduce problem-solving strategies using child-friendly language:

1. **Try Again:** Sometimes we just need another attempt
2. **Ask for Help:** Talk to a teacher, friend, or expert
3. **Break It Down:** Solve one small part at a time
4. **Try Something Different:** Change your approach
5. **Take a Break:** Step away and come back with fresh eyes

Create anchor charts for each strategy with simple icons or drawings.

Role-Play Activity (15 minutes)

Distribute scenario cards to small groups. Each scenario presents a problem a student might face. Groups discuss which problem-solving strategy would work best and act out using that strategy.

Sample Scenarios:

- Your tower keeps falling down
- You can't figure out how to make your robot's arm move
- Your partner wants to build something different than you
- You've tried three times and nothing is working

Closure (5 minutes)

Create a class "Problem-Solving Pledge" that students can sign. Example: "When I face a challenge, I will try my best, ask for help when I need it, and remember that mistakes help me learn."

Assessment

Observe students during role-play for understanding of problem-solving strategies.

Discussion Questions by Chapter

Beginning (Zara Discovers Robotics)

- What makes Zara interested in robots?
- Have you ever wanted to build or create something? What was it?
- Why do you think Zara wants to make a robot friend?

Middle (Building and Testing)

- What materials does Zara use to build her robot?

- What problems does Zara encounter?
- How does Zara feel when things don't work the first time?
- Who helps Zara when she's stuck?

End (Success and Friendship)

- How does Zara finally solve her robot problems?
- What does Zara learn about building robots?
- What does Zara learn about friendship?
- How is building a robot like making a new friend?

Extension Activities

For Advanced Learners

1. **Research Project:** Students research a real robot (Mars rover, surgical robot, etc.) and present findings to the class
2. **Design Challenge:** Create a robot that could solve a specific problem in your school or community
3. **Coding Connection:** Use simple coding apps (Scratch Jr, Code.org) to program virtual robots

For Struggling Learners

1. **Simplified Building:** Provide pre-cut materials and step-by-step visual instructions
2. **Partner Support:** Pair with a peer mentor for building activities
3. **Visual Aids:** Use picture cards to sequence the engineering design process

Cross-Curricular Connections

Art: Design and draw your own robot friend. What special features would it have?

Writing: Write a letter to Zara giving her advice about building robots, or write your own story about building something.

Math: Measure and compare the heights of different robot designs. Graph class data about favorite robot features.

Social Studies: Explore how robots help people in different jobs (doctors, farmers, factory workers).

Vocabulary

Robot: A machine that can sense its environment and take actions based on what it senses

Sensor: A device that detects information from the environment (like eyes or ears)

Engineer: A person who designs and builds things to solve problems

Design: To plan and create something

Prototype: A first model of something that you test and improve

Program: Instructions that tell a robot what to do

Problem-Solving: Finding ways to overcome challenges

Perseverance: Continuing to try even when something is difficult

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Assessment Rubric

Engineering Design Project

Criteria	Emerging (1)	Developing (2)	Proficient (3)	Advanced (4)
Following Design Process	Completes 1-2 steps	Completes 3-4 steps	Completes all steps with guidance	Independently follows all steps
Problem-Solving	Gives up when facing challenges	Tries again once	Uses multiple strategies	Demonstrates creative problem-solving
Collaboration	Works alone or conflicts with partners	Participates but needs reminders	Works well with partners	Leads and supports team effectively
Understanding Concepts	Identifies 0-1 robot components	Identifies 2 robot components	Identifies 3-4 robot components	Explains how components work together

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Parent Communication Letter

Dear Families,

We are excited to begin our robotics and engineering unit using the book “Zara’s Robot Friend” by Dallas W. Thompson! Through this engaging story, students will learn about the engineering design process, problem-solving, and perseverance.

What We’ll Learn:

- Basic robotics concepts (sensors, motors, controllers)
- The engineering design process
- Problem-solving strategies
- The importance of learning from mistakes

How You Can Help at Home:

- Ask your child to explain what makes something a robot
- Point out robots you encounter in daily life (automatic doors, robotic vacuums, etc.)
- Encourage building and creating with household materials
- Praise effort and problem-solving, not just success

Optional Extension: If your child enjoys this unit, consider exploring these free resources:

- Code.org (free coding activities)
- PBS Kids' Design Squad (engineering challenges)
- Your local library's maker space or STEM programs

We look forward to sharing our robot creations with you!

Sincerely,
[Your Name]

Additional Resources

Books to Pair With This Unit:

- "Rosie Revere, Engineer" by Andrea Beaty
- "The Most Magnificent Thing" by Ashley Spires
- "Ada Twist, Scientist" by Andrea Beaty

Online Resources:

- PBS Kids Design Squad: pbskids.org/designsquad
- Code.org: code.org
- NASA Kids Club: nasa.gov/kidsclub

Hands-On Materials:

- LEGO Education sets
- Snap Circuits Jr.

- Dash and Dot robots
- Sphero robots

Conclusion

“Zara’s Robot Friend” provides an excellent springboard for introducing young learners to robotics, engineering, and computational thinking. By emphasizing the social-emotional aspects of problem-solving and perseverance, this unit helps students develop both technical skills and growth mindset.

Remember: The goal is not to create perfect robots, but to foster curiosity, creativity, and confidence in tackling challenges. Celebrate the process, not just the product!

About the Author

Dallas W. Thompson, PhD, is an author of science fiction, fantasy, philosophy, and children’s STEM literature. His children’s books aim to make complex STEM concepts accessible and engaging for young learners.

For more resources and books, visit: **dallaswthompson.com**
