

# Muse®

## Bot Talk

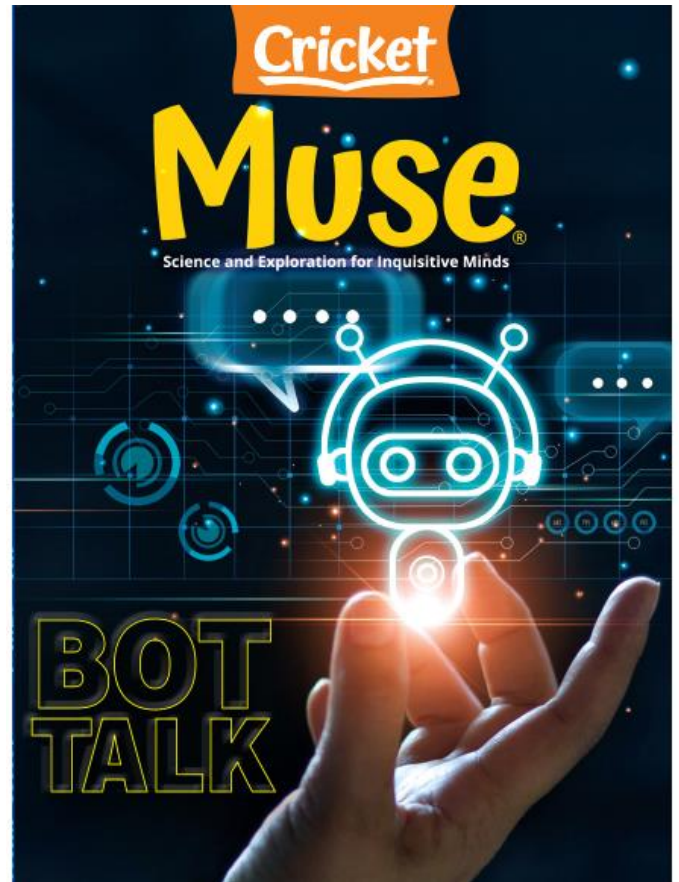
Advancements in technology are quickly changing the future of our educational system, military operations, space exploration, and our daily lives. This issue of MUSE examines how the greatest successes continue to be the result of humans and machines working together.

## CONVERSATION QUESTION

How is technology shaping our future?

## TEACHING OBJECTIVES

- Students will learn how Artificial Intelligence can be used as a learning tool in the classroom.
- Students will learn how humans work with technology to make discoveries in space.
- Students will learn how studying cockroach behaviors can help us build smarter machines for the field.
- Students will compare and contrast elements of technology.
- Students will sequence a process.
- Students will identify parts of an experiment.
- Students will view and analyze Global Maker Day activities.
- Students will practice using ordinal numbers.
- Students will write insect-themed similes.



In addition to supplemental materials focused on core STEM skills, this flexible teaching tool offers vocabulary-building activities, questions for discussion, and cross-curricular activities.

## SELECTIONS

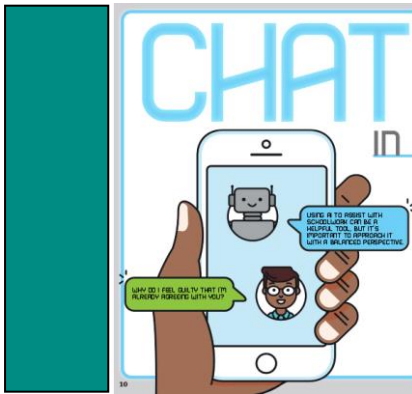
- **Chatbots in the Classroom**  
Expository Nonfiction
- **Under Construction**  
Realistic Fiction
- **Reaching like Roaches**  
Expository Nonfiction

# Muse® Teacher Guide: February 2024

## Chatbots in the Classroom

pp. 10–14, Expository Nonfiction

This article explores how Artificial Intelligence can be a helpful tool in the classroom, and why it does not come without concerns. Readers will learn how engineers and educators are working together to create the optimal technology and environment for the beneficial use of AI in our schools.



## RESOURCES

Compare and Contrast: High-Tech Tools

## OBJECTIVES

- Students will learn how artificial intelligence can be used as a learning tool in classrooms.
- Students will compare and contrast elements of technology.
- Students will view and analyze Global Maker Day activities.

## KEY VOCABULARY

- **hallucinations** (p. 12) results of a chatbot giving answers that are factually inaccurate, or of an AI content generator fabricating information but presenting it as truth
- **generate** (p. 13) create by means of a defined process
- **multimodal** (p. 14) having or using several modes, methods, or techniques

## ENGAGE

**Conversation Question:** How is technology shaping our future?

Engage the class in a discussion about Artificial Intelligence. Have students consider the applications, and the pros and cons of such technology. Pose the question, *Would the use of AI in schools benefit the educational system and the students?* Tally the results. Present the article, “Chatbots in the Classroom,” and repeat the question above after the reading. Did the tally totals change? Discuss.

## INTRODUCE VOCABULARY

Introduce this as a *Jeopardy!*-style learning activity. Provide the class with only the definitions of the key vocabulary terms. Inform students that they will revisit these definitions after reading and pose the proper question using words from the vocabulary-rich article. (What are hallucinations? What does *generate* mean? What is a multimodal?) Have them formulate 17 more answers needing questions, for a total of 20, and share with other classes as a post-reading activity.

## READ & DISCUSS

Reinforce comprehension of the concepts presented in the article by using the following questions to direct discussion.

1. Who is Mundo designed for?
2. What kind of content can ChatGPT produce?
3. What concerns do educators have about the ChatGPT technology?
4. Why is ChatGPT so prone to errors and hallucinations?
5. How can educators guide students on how to use AI tools productively and safely?
6. How might education change in the future because of AI?

## SKILL FOCUS: Compare and Contrast

**INSTRUCT:** Advise students to review the article and to study the different types of Artificial Intelligence technology. Distribute the *High-Tech Tools* graphic organizer, and tell the class that they will work with a partner and use information from the text, as well as their own critical thinking, to complete the chart. Have students answer the question in the **THINK TANK** independently using logical reasoning and details.

**ASSESS:** Reconvene and review the *High-Tech Tools* worksheet. Invite students to read their essay aloud.

## EXTEND

**STEM:** On page 11 of the article it states that Mundo was introduced to the world at Global Maker Day in October 2023. This is an annual online event that brings together makers, educators, and learners from around the world to explore the power of creativity, innovation, and problem solving. Show video clips to the class or allow them to use computer time to view a past workshop or demonstration. Have students share what they learned or how they were inspired.

# High-Tech Tools

**Compare and Contrast** Use information from the article to compare and contrast the technologies listed below.

Technologies	How are they similar?	How are they different?
ChatGPT and Google		
Mundo and ChatGPT		
Artificial Intelligence and Human Intelligence		

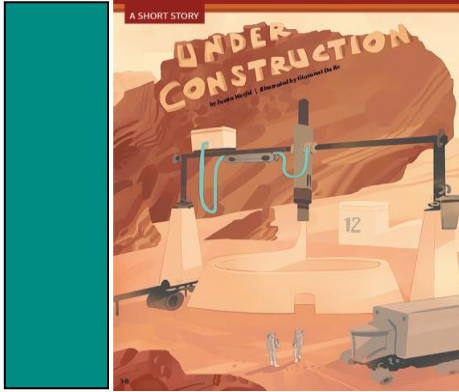
**THINK TANK:** Use information from the chart above to explain how chatbots can provide new ways to learn and create in the classroom. Include details and facts, as well as your own opinion.

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## Under Construction

pp. 38–41, Realistic Fiction

Current technology is used in a science fiction setting to imagine what might lie ahead in space exploration.



## RESOURCES

Sequencing a Process: Dramatic  
Discovery

## OBJECTIVES

- Students will learn how humans and technology work together to make discoveries in space.
- Students will sequence events.
- Students will practice using ordinal numbers.

## KEY VOCABULARY

- **extruding** (p. 40) thrusting out; forcing out or expelling
- **requisition** (p. 40) a demand or application, made usually with authority
- **vaulted** (p. 41) to leap vigorously

## ENGAGE

**Conversation Question:** How is technology shaping our future?

Have students share books and movies that contain discoveries in space. Discuss why both factual and nonfictional accounts of space are a topic that seemingly interests people of all genders, ethnicities, and socio-economics divides. Pose the questions: *What other topics have such universal appeal? Why?*

## INTRODUCE VOCABULARY

Display the following statements and underline the key vocabulary terms. Review how to infer the meanings of new words by using context clues and background knowledge. Then have partners work together to determine the meaning of each word. Reveal definitions.

- An active volcano extruding lava was responsible for the evacuations.
- Send a requisition to the office manager stating the supplies you need.
- The deer vaulted over the fence and took off for the forest.

## READ & DISCUSS

Pose the following questions to prompt meaningful discussion. Students should use complete sentences and details to answer each question.

1. Why is Irina frustrated at the beginning of the story?
2. How does Tomer suggest that they begin to solve the puzzle?
3. What is the advantage that a swarm has over an individual bot?
4. How did the robots get stuck?
5. What conclusion did Irina and Tomer reach when they examined the site?

## SKILL FOCUS: Sequence Events

**INSTRUCT:** Review the article and guide students to notice that there is a specific sequence of events that led to Tomer and Irina’s discovery. Distribute the *Dramatic Discovery* graphic organizer and instruct students to condense the process into four important steps that detail how the pair of space explorers found “the most important discovery in human history.”

**ASSESS:** Circulate as students are working and have them use the sequence organizer to retell the process in their own words.

## EXTEND

**Mathematics:** Read aloud the sentence from page 39, “She glanced for the thousandth time at her deskpad...” Explain an ordinal number as a number defining a thing’s position in a series. Have the students identify the ordinal number in the sentence (thousandth), noting that it is an exaggeration in this case. Use the simple game of “Guess Your Position” to practice using ordinal numbers. Students need to guess their position in a line of your choosing. (Ex: by birthday, by height, by shoe size, etc.) They must state their guess using the ordinal number.

## Dramatic Discovery

**Sequencing a Process** Reread the story and highlight sentences that detail how Irina and Tomer found “the most important discovery in human history.” Condense the process into four steps and explain each step in the correct order.

**First...**

**Next...**

**Then...**

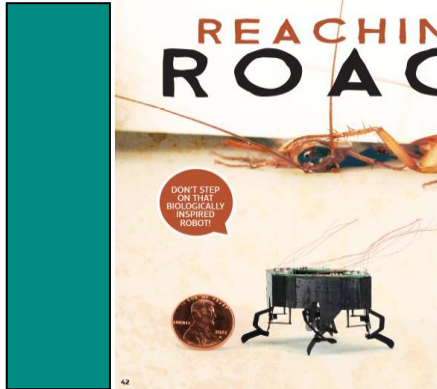
**Finally...**

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## Reaching like Roaches

pp. 42–45, Expository Nonfiction

Sometimes mechanical engineers study animals to design robots. This article examines the cockroach experiments that are leading to advancements in seek-and-rescue robot design.



## RESOURCES

Parts of an Experiment: Buggin' Out

## OBJECTIVES

- Students will learn how studying cockroach behaviors can help us build smarter machines for the field.
- Students will identify parts of an experiment.
- Students will write insect-themed similes.

## KEY VOCABULARY

- **nocturnal** (p. 43) occurring or active at night
- **crevice** (p. 43) a narrow opening resulting from a split or a crack

## ENGAGE

**Conversation Question:** How is technology shaping our future?

Tell students that in the article they will be reading, “Reaching like Roaches,” a team of scientists were surprised to find out that cockroaches are able to squish their bodies down by over 60%. Review how to calculate percentages by using the following formula:  $\text{part}/\text{total} = \text{percent}/100$ . Have students calculate the following answer: *If a cockroach is 7mm in height and squishes its body down 60%, how many mm smaller is it?* (Answer: 4.2 mm smaller)

## INTRODUCE VOCABULARY

Post the key terms and discuss the definitions. Then display the following questions and have students supply the correct answers.

1. Which animal is **NOT** **nocturnal**?  
a) owl   b) fox   c) koala   d) squirrel
2. Which would **NOT** fit in the **crevice** under the door?  
a) an envelope   b) a string   c) a foot   d) a paper clip

## READ & DISCUSS

Read the article aloud with the class. Have students reread the article in small groups to answer the questions below. Share responses.

1. List three negative aspects of cockroaches.
2. How could studying cockroaches have applications in search-and-rescue missions?
3. Why did Jayaram mark the test cockroaches with reflective paint?
4. How did Jayaram prove that cockroaches can squeeze through very tiny gaps?
5. What advantage do swarms have over one larger, more complex robot?

## SKILL FOCUS: Parts of an Experiment

**INSTRUCT:** The five key components of the scientific method are: question, hypothesis, experiment (procedure), observation, and conclusion. This method is important in obtaining new information and for finding out how things work. Present the *Buggin' Out* worksheet and tell students that they will need to label each sentence from the article as Procedure (P), Observation (O), or Conclusion (C).

**ASSESS:** Collect the worksheet to assess the students' ability to correctly identify the parts of an experiment. Remediate if necessary.

## EXTEND

**Language Arts:** Review with students that a simile is a type of figurative language that compares two different things using “like” or “as.” Post the first sentence of the article on the board and have students identify the simile. (“With its antennae flicking like whips, a cockroach probes the ground.”) Have students write three insect-themed similes using the same sentence frame: “With its (anatomical part) (verb), like (comparison) (noun), a(n) (insect name) (action).” Use proper tenses.



## Buggin' Out

**Parts of an Experiment** Use information from the article and your own critical thinking skills to determine if the sentence pertains to the procedure **(P)**, observation **(O)**, or conclusion **(C)**. Mark each sentence accordingly.

- \_\_\_\_\_ 1. Jayaram built clear plastic chambers with adjustable walls or ceilings.
- \_\_\_\_\_ 2. He watched through the plastic and recorded on high-speed video cameras.
- \_\_\_\_\_ 3. The cockroaches' shells and legs adapted as space declined and weight increased.
- \_\_\_\_\_ 4. With superhero-like power, the creature rose, slow and steady on its front legs.
- \_\_\_\_\_ 5. In following tests, Jayaram lowered the chamber's ceiling.
- \_\_\_\_\_ 6. Jayaram tried different materials and textures on the floor.
- \_\_\_\_\_ 7. Tests showed that it is possible for cockroaches to squeeze through very tiny gaps.
- \_\_\_\_\_ 8. Jayaram studied the video recordings with custom motion-tracking software.
- \_\_\_\_\_ 9. Jayaram placed a cockroach inside a clear plastic tube with a sliding plunger.
- \_\_\_\_\_ 10. The secret behind the cockroach's ability to squeeze through very tiny spaces lies in its ability to expand sideways.

