

Introduce a Microbe to the World!

Students collaborate to create and present their own public service announcement (PSA) that introduces a particular microbe to their community, including an evidence-based argument regarding the value of eradicating the microbe.

GRADES

6, 7, 8

SUBJECTS*Biology, Health***CONTENTS**

3 Activities

In collaboration with



ACTIVITY 1: RESEARCH A MICROBE AND DEVELOP AN ARGUMENT ABOUT ITS ERADICATION | 2 HRS

DIRECTIONS

This activity is part of the Misunderstood Microbes unit

1. Prepare students for their collaborative project work for the Misunderstood Microbes unit.

- Assign students to their project groups and focal microbe based on student input from the Harmful Microbes activity.

- Explain the goal for students' research on their microbe: to have all of the information they will need to decide if the microbe should be eradicated, with supporting evidence and reasoning. They will then use this information and argument to create their PSA, which is the final product for the unit.
 - Promote excitement and engagement about the final product by presenting the options that students will have for creating their PSA and aspects of the context (timing, audience, venue) for their final presentations.
 - Review the Misunderstood Microbes: [PSA Project Rubric](#) so students can ensure their PSA will meet the project and assessment goals.
- Walk through Part A of the Misunderstood Microbes [PSA Project Builder](#).
- Given the limited time that students have for conducting research, suggest that students split up the research task by working in pairs to complete different parts of the table in Part A.

2. Students research their focal microbe and its impacts on the body.

- Model how to use and navigate the provided links from the Centers for Disease Control and Prevention (CDC) at the top of the project builder:
 - [E. coli](#), [Botulism](#), [Measles](#), [Giardia](#), [Valley Fever](#) and [Ringworm](#)
 - Students will likely be able to get all of the information they need from the CDC, but, if needed, they can conduct further online research via the sites listed in the Resources section.
 - Encourage students not to dive too deeply into other online resources and limit their research to what they need to understand in order to decide if the microbe should be eradicated and create a PSA in support of their argument.
 - As needed, provide instruction about effective online research and online literacy.
- Circulate to support students' research process and use of Part A of the project builder.
- As students finish up their parts of the research, direct them to convene with their groups and share information.

3. Prompt groups to develop an evidence-based argument about the importance of eradication importance of their microbe.

- Students should follow the steps in Part B of the PSA Project Builder to develop their argument, drawing on their understanding of the body as a complex system.
- Circulate to help students develop their argument. Push their thinking by asking:
 - *Can you tell me more about that?*
 - *Can you say more about what is happening inside the body that we can't see?*
 - *What level of the body is being impacted by the microbe?*
 - *How does understanding your microbe's impact on the body help to demonstrate that the body is a complex system?*
- If different groups are working on the same microbe, consider having them convene to share their arguments. Encourage them to ask clarifying questions and press on other groups' thinking.

Informal Assessment

The Misunderstood Microbes PSA Project Builder can be used to assess group progress on their project work, as well as their understanding of their microbe. For individual-level assessment, at the end of the activity prompt students to complete a quick write in response to the following question:

Explain one way that your microbe impacts the human body at different levels of organization. Use at least two of the following terms in your explanation: cells, tissues, organ, system.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Research
- Writing

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
 - Media Literacy
 - Learning and Innovation Skills
 - Communication and Collaboration
 - Creativity and Innovation
 - Critical Thinking and Problem Solving
 - Life and Career Skills
 - Leadership and Responsibility
 - Productivity and Accountability
- Science and Engineering Practices
 - Engaging in argument from evidence
 - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- CCSS.ELA-Literacy.WHST.6-8.1.b:

Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

- CCSS.ELA-LITERACY.WHST.6-8.7:

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

NEXT GENERATION SCIENCE STANDARDS

- **Crosscutting Concept 4:**

Systems and system models

- **Crosscutting Concepts: Cause and Effect:**

- **LS1.A: Structure and Function:**

In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

- **MS. From Molecules to Organisms: Structures and Processes:**

MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

- **Science and Engineering Practice 7:**

Engaging in argument from evidence

- **Science and Engineering Practice 8:**

Obtaining, evaluating, and communicating information

Preparation

BACKGROUND & VOCABULARY

Background Information

Microbes are organisms that are too small to be seen by the human eye and include bacteria, archaea, protists, viruses, and fungi. Although some microbes cause disease, they are also crucial to the functioning of human bodies through processes such as digestion and aiding the immune system. The microbes found on a person's body are collectively known as a person's microbiome, especially those found in body organs and systems such as their skin, hair, and digestive system.

Most of microbes' interactions with humans are neutral or beneficial. However, they also can make us sick by acting as infectious agents. Microbes can cause disease through a variety of body organs and systems, which has cascading effects throughout the whole system and human body. Depending on the nature of their impacts on humans, the importance of eradicating particular microbes may vary.

Public Service Announcements (PSAs) are a way to communicate important information (often about a social issue or health concern) to a broad audience. A successful PSA is short, engaging, and contains a persuasive message for the viewer to act on in their everyday lives.

Prior Knowledge

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Recommended Prior Activities

- [Deep Dive into the Cell](#)
- [Harmful Microbes](#)
- [Helpful Microbes](#)
- [Introduction to Microbes and Human Body Systems](#)
- [Microbe Eradication Complications](#)
- [Microbes Across the Tree of Life](#)
- [The Interconnected Systems of the Human Body](#)

Vocabulary

Term **Part of Speech** **Definition**

ACTIVITY 2: CREATE A MICROBE PSA | 2
HRS

DIRECTIONS

This activity is a part of the [Misunderstood Microbes](#) unit.

1. Project groups determine the key design features for their PSA.

- Review the design features in Misunderstood Microbes: PSA Rubric so students can ensure that their PSA will meet the project and assessment goals.
- Direct students to revisit the design squares on the PSA Design Analyzer from the *Microbes in and on Humans* lesson, on which they recorded notes about the design elements of the sample PSAs.

- In their project groups, students should discuss their ideas about the key design features of the sample PSAs. Prompt groups to record the elements that they agree should be part of their PSA in the blank design square on Part C of the Misunderstood Microbes PSA Project Builder.
- As groups discuss, circulate to help them come to a consensus. Emphasize that the notes that go in the square should relate to the design of the PSA, rather than the content (which will be addressed in Step 2).

2. Project groups determine which information to include in their PSA.

- After groups decide on the design elements for their PSA, they should use the Storyboard Template in Part C of their project builder to compile the key information, timing, text/audio, and visuals for each section of their PSA.
- Review each group's storyboard before they move on to the creation of their PSA.

3. Project groups collaborate to create their PSA.

- Encourage group members to take on different roles as they create their PSA. Roles can include fact checker, actor/narrator, video producer, animator/illustrator.
- Given the limited time that students have to create their PSA, emphasize execution over perfection. Ensure that they address each part of the storyboard to create a narrative arc that fits the PSA genre.
- Introduce and provide access to the options available to students for creating their PSA, including but not limited to: online animation tools, short live action films, a visual poster, or collaborative presentation.

4. Focus group feedback and finalize PSAs.

- Provide time for groups to share their PSA with a "focus group" who can provide feedback on the clarity of their message.
- The PSA Rubric can be used to evaluate the PSA at this time.
- Give groups time to edit, revise, or polish their PSA.

Informal Assessment

Part C of the Misunderstood Microbes Project Builder can be used to assess group progress on PSA creation, as well as their understanding of their microbe. Consider providing students with a collaboration rubric (such as [this one](#) from the Buck Institute for Education), to assess themselves and/or peers on their collaboration skills.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Learning Objectives

Students will:

- Collaborate to create a PSA about their group's microbe and the importance of its eradication.

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Discussions
- Writing

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills

- Information Literacy
- Media Literacy
- Life and Career Skills
 - Leadership and Responsibility
 - Productivity and Accountability
- Science and Engineering Practices
 - Engaging in argument from evidence
 - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- **CCSS.ELA-LITERACY.SL.7.5:**

Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

- **Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12:**

Production and Distribution of Writing, WHST.6-8.4.

- **Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12:**

Production and Distribution of Writing, WHST.6-8.5.

- **Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12:**

Production and Distribution of Writing, WHST.6-8.6.

NEXT GENERATION SCIENCE STANDARDS

- **Crosscutting Concept 4:**

Systems and system models

- **Crosscutting Concepts: Cause and Effect:**

- **LS1.A: Structure and Function:**

In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

- **MS. From Molecules to Organisms: Structures and Processes:**

MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

- **Science and Engineering Practice 8:**

Obtaining, evaluating, and communicating information

Preparation

BACKGROUND & VOCABULARY

Background Information

Microbes are organisms that are too small to be seen by the human eye and include bacteria, archaea, protists, viruses, and fungi. Although some microbes cause disease, they are also crucial to the functioning of human bodies through processes such as digestion and aiding the immune system. The microbes found on a person's body are collectively known as a person's microbiome, especially those found in body organs and systems such as their skin, hair, and digestive system.

Most of microbes' interactions with humans are neutral or beneficial. However, they also can make us sick by acting as infectious agents. Microbes can cause disease through a variety of body organs and systems, which has cascading effects throughout the whole system and human body. Depending on the nature of their impacts on humans, the importance of eradicating particular microbes may vary.

Public service announcements (PSAs) are a way to communicate important information (often about a social issue or health concern) to a broad audience. A successful PSA is short, engaging, and contains a persuasive message for the viewer to act on in their everyday lives.

Prior Knowledge

["Relationship between structure and function","Human body organization as complex system","Systems thinking","Cause and effect"]

Recommended Prior Activities

- [Deep Dive into the Cell](#)
- [Harmful Microbes](#)
- [Helpful Microbes](#)

- [Introduction to Microbes and Human Body Systems](#)
- [Microbe Eradication Complications](#)
- [Microbes Across the Tree of Life](#)
- [Research a Microbe and Develop an Argument about its Eradication](#)
- [The Interconnected Systems of the Human Body](#)

Vocabulary

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ACTIVITY 3: MISUNDERSTOOD MICROBES PSA PRESENTATIONS | 1 HR

DIRECTIONS

1. Prepare for PSA presentations.

- Provide time for groups to finalize their PSAs.
- Explain the presentation format, which will vary depending on the type of PSA (online, poster, etc.), school context, audience, and venue for presentations.
 - Technology: Any technology involved in the PSA presentations (such as audio systems or projectors) should be tested by student groups ahead of time.
 - Student introductions: Even if the PSAs are digital, remind students to introduce themselves and their microbe before showing their PSA, and take questions from the audience after.

2. Facilitate PSA presentations.

- Welcome additional audience members and pass out copies of the Misunderstood Microbes PSA Presentation Audience Feedback form.
- After each group presentation, model how to ask appropriate questions that press the presenters' understanding about their microbe, particularly around how the microbe interacts with the systems of the human body.
- Prompt audience members to also ask questions.

3. Reflect on the Misunderstood Microbes unit.

- Collectively revisit the class *Know and Need to Know* chart; students can likely now answer many of the questions that they had at the beginning of the unit.
- Ask students to respond individually to some of the following prompts:
 - *What will you remember about creating your PSA? Why?*
 - *What would you change about this unit and the project? What would you keep the same?*
 - *How was your experience of working with your group in this unit?*
 - *How did your group work well together? What could your group have done better?*
 - *What is the most important thing you learned during the Misunderstood Microbes unit?*
- Use a collaboration rubric (such as [this one](#) from the Buck Institute for Education) for students to assess themselves and/or peers on their collaboration skills.

Tip

Step 2: Consider requiring each student to ask at least one question of another group.

Rubric

Use the PSA Rubric to assess students' understanding of the key concepts of the *Misunderstood Microbes* unit via their group's PSA and presentations. Additionally, the audience feedback forms, student responses to the final reflection questions, and/or the collaboration rubric can all be used to inform your final assessment of each student's individual understanding and contribution to the project.

Extending the Learning

To further the impacts of PSAs, consider having groups present their PSA to a relevant audience in the community (such as food prep workers for *E. coli*/botulism, parents for measles, lifeguards for *Giardia*). Another option is to digitally record and upload their PSAs onto an internet platform to share their messages with a wider audience.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Discussions
- Reflection

Skills Summary

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National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS
& LITERACY

- **CCSS.ELA-LITERACY.SL.7.4:**

Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

- **CCSS.ELA-LITERACY.WHST.6-8.6:**

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

NEXT GENERATION SCIENCE STANDARDS

- **MS. From Molecules to Organisms: Structures and Processes:**

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- **Science and Engineering Practice 7:**

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Prior Knowledge

["Relationship between structure and function", "Human body organization as complex system", "Systems thinking", "Cause and effect"]

Recommended Prior Activities

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- [Deep Dive into the Cell](#)
- [Harmful Microbes](#)
- [Helpful Microbes](#)
- [Introduction to Microbes and Human Body Systems](#)
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Vocabulary

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Informal Assessment

Group PSAs and presentations can be used to assess student understanding of the key concepts of the *Misunderstood Microbes* unit. Additionally, the audience feedback forms, student responses to the final reflection questions, and/or the collaboration rubric, can all be used to inform final assessment of each student's individual understanding and contribution to the project.

