Understanding Microbes and Antibiotic Use

Year 4 Lesson Plan

- Year 4 Lesson Plans covering five lessons
- Templates for activities
- Additional resources
- Activities and outcomes link to the Australian Curriculum (Version 8.4)

Unit: Understanding microbes and antibiotic use
Year level: Year 4
Lessons: 5
Links to Australian curriculum: Science | Health and Physical Education | English *(see details below)*

Key Learning Outcomes

- Understand the differences between bacteria and viruses.
- Understand the different types of diseases that are caused by viruses and bacteria.
- Understand that antibiotics are used to some treat bacterial infections.
- What antibiotic resistance is and why it is important.
- Understand that misuse and overuse of antibiotics can lead to antibiotic resistance.

Rationale

This lesson plan aligns with the Australian Science curriculum. Understanding micro-organisms (microbes) is an important component of science education as microbes play an important role in the health of humans and animals. Harmful microbes such as viruses and certain types of bacteria can make us unwell. While doctors can prescribe a type of antimicrobial (antibiotics) to help prevent and treat bacterial infections, the overuse and misuse of antibiotics has meant that the bacteria are increasingly becoming resistant to antibiotics which is a concern for now and the future. Health and Physical Education streams such as 'Personal, social and community health' are relevant to this, as human behaviour plays a role in preventing and/or managing antimicrobial resistance. Understanding hygiene, how to prevent illness from infection and how to properly use antibiotics are all important aspects of personal and community safety and wellbeing.

Australian Curriculum Outcomes

Learning Area	Learning Outcome(s)
Health and Physical Education	**Personal, Social and Community Health / *Being healthy, safe and active:*** Identify and practise strategies to promote health, safety and wellbeing (ACPPS036)
Science	**Science as a Human Endeavour / *Nature of development of science:*** Science involves making predictions and describing patterns and relationships (ACSHE061) **Science as a Human Endeavour / *Use and influence of science:*** Science knowledge helps people understand the effect of their actions (ACSHE062)

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	Science Inquiry Skills / *Questioning and predicting:* With guidance, identify questions in familiar texts that can be investigated scientifically and make predictions based on prior knowledge (ACSIS064) **Science Inquiry Skills: *Planning and conducting:*** With guidance, plan and conduct scientific investigations to find answers to questions, considering the safe use of appropriate materials and equipment (ACSIS065) **Science Inquiry Skills/ *Processing and analysing data and information:*** Compare results with predictions, suggesting possible reactions for findings (ACSIS216)
English	**Literacy / *Interacting with others:*** Interpret ideas and information in spoken texts and listen for key points in order to carry out tasks and use information to share and extend ideas and information (ACELY1687)

Resources

Activity resources

- Make bacteria example **Page 8**
- Virus vs Bacteria chart **Page 9**
- Growing bacteria experiment **Page 10**
- Persuasive letter and recommendations regarding antimicrobial resistance **Page 11**

Teacher to provide:

- Pom Poms
- Pipe cleaner
- Computer/Internet

Additonal Resources

- 'Bugs' by Teachers TV (13min 49sec)
  https://www.stem.org.uk/resources/elibrary/resource/30639/bugs
- 'Viruses vs. Bacteria – what are the differences?' by Smile and Learn (5 min 33sec)
  https://www.youtube.com/watch?v=mQZDyLtCu5E
- 'Awareness of Antimicrobial Resistance (AMR)' animation by Health Education England (1min 49sec)
  https://www.youtube.com/watch?v=oMnU6g2djm4
- 'The relative size of particles', on the Visual Capitalist. Design by Harrison Schell.
- Antimicrobial Programs Education Resources, SA Health

Lesson 1: Bacteria

Overview

This lesson introduces students to bacteria.

Discussion/Engagement

Bacteria are amongst the smallest living things in the world, made up of just one cell they are so small that we need a microscope in order to see them. Bacteria can be found everywhere, including in the air, on our skin, in the ground, in our bodies, and in nature.

Most bacteria are not dangerous, though there are some kinds of bacteria that can make us sick. Bacteria that make us sick are called pathogens**.** Pathogens can cause diseases in many living things, including animals and plants. Our bodies can fight off pathogens with our immune system, but in the process we can get sick. We can prevent pathogens from entering our bodies by washing our hands.

Activities

1. **Watch** 'Bugs' by Teachers TV (13min 49sec)
   https://www.stem.org.uk/resources/elibrary/resource/30639/bugs

2. To give the students an idea of the size of bacteria and viruses compared to a grain of salt and human hair, show them this image 'The relative size of particles' via the Visual Capitalist by Harrison Schell.

3. **Make** Bacteria. Refer to guide on **Page 8.**
   - Firstly, look up bacteria structure on the internet or show the class an example and note the key elements and shapes.
4. Using pipe cleaners and pom poms construct some bacteria.

Post Activity Discussion/Engagement

Compare bacteria within the class. Do they look the same or are they different? Were different colours used? Shapes? Size? Do you think bacteria differ like this in real life?

Lesson 2: Bacteria Vs Virus – what is the difference?

Overview

Bacteria and viruses not only look different but also function differently. Viruses require a host (humans or animals!) to survive whilst bacteria do not. Antibiotics are designed to kill bacteria but are not effective against viral infections. Some examples of viral infections include: COVID-19, cold and flu, chickenpox and measles. Some bacterial infections include: cellulitis, tetanus, bacterial pneumonia and meningitis.

Discussion/Engagement

Discuss with students what they know about bacteria and viruses. Are there similarities between them? Are there differences? This could involve not only appearance but also how they behave.

Activities

1. Watch: Viruses vs Bacteria – what are the differences? by Smile and Learn (5min 33sec)
https://www.youtube.com/watch?v=mQZDyLtCu5E

4. Recall differences and similarities between viruses and bacteria and write them on the Virus vs Bacteria chart on **Page 9.**

Lesson 3: Conducting research

Overview

Increase student understanding by getting to them to do some online research using the internet.

Discussion/Engagement

Research the types of microbes (e.g., bacteria, viruses, fungi), and antibiotics. Get students to formulate three to four questions they want answers to before researching.

Some questions/issues to research might be:

- What are bacteria?
- What is a virus?
- What illnesses do bacteria and viruses cause?
- What is the difference between bacteria and a virus?
- What is an antibiotic and how does an antibiotic work?
- What is antibiotic resistance?

Activity

1. **Create** a poster

Using the information students found from their research, get the students to create a poster with imagery highlighting what they discovered. This could be hand drawn or made in creative program such as Canva.

Lesson 4: Bugs, antibiotics, and resistance

Overview

Learn what 'Superbugs' are and how some have begun to overpower antibiotics. Find out how we can prevent antimicrobial resistance.

Discussion/Engagement

- Has the class heard the term 'superbugs' before? What does it mean and refer to?
- What do antibiotics do?
- What impact have antibiotics had on controlling disease?
- What is antibiotic resistance?

Activities

1. **Watch:** 'Antibiotic Resistance and the rise of superbugs' by "Be Smart", https://www.youtube.com/watch?v=fyRyZ1zKtyA (7:23min)

2. **Experiment: Bacteria growth** (See details on **Page 10**). Note: results will take one week.

Discuss safety matters prior to experiment. Experiment involves food, cutting plus the outcome of the experiment involves mould. Do not open the zip bags after the experiment is complete - dispose carefully.

Lesson 5: Why antibiotics are used, when they are used, and why misuse is a problem

Overview

Antibiotics are sometimes used to treat bacterial infections and should only be used if prescribed by your doctor. Having green snot does not mean you need antibiotics! Using too many or not using the correct amount of antibiotics can lead to something called 'antimicrobial resistance'. This is where the 'bugs' have changed or grown stronger and cannot be killed by the antibiotics. This means that the antibiotics may not work when you need them again.

Discussion/Engagement

- **Watch:** 'Awareness of Antimicrobial Resistance (AMR)' animation by Health Education England (1min 49sec) https://www.youtube.com/watch?v=oMnU6g2djm4

- **Review what the students have learnt over the past 4 lessons.**
  - Do they understand the differences between bacteria and viruses?
  - Do they understand when antibiotics should be used?
  - Can they explain antimicrobial resistance?

Activities

1. **Write** a persuasive letter and recommendations regarding antimicrobial resistance (see **Page 11**)

2. **Check on the bacterial growth experiment (details page 10).**

- What can the students see?
- Are there differences?

3. Antimicrobial Awareness Week (AAW) is held in November each year. Return to this link in October 2022 for activities and competitions.

Make Bacteria

Using pipe cleaner's and pom poms, build your own bacteria.

Compare the bacteria within the classroom.
How do they differ? What types of bacteria are they?

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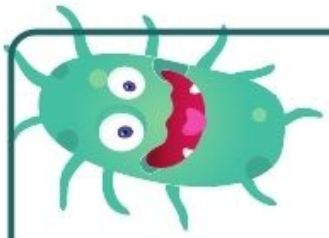

Bacteria

Viruses

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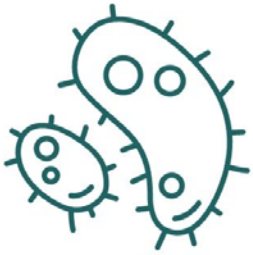
Bacterial Growth Experiment

Bacteria is everywhere and this experiment will show you how bacteria grows and how different locations can affect growth. Allow a week for the bacteria to grow and then compare your results.



You will need:

- 1 Potato per experiment chopped into 4 pieces
- Gloves
- 4 zip lock bags (small) per experiment
- Black marker

NOTE: This experiment can be done individually or in groups of 4 with each student working with one piece of the potato. Please discuss experiment safety points prior to lesson.

Step 1. The teacher will wash their hands, and wear gloves to cut the potatoes into 4 equal parts for students.

Step 2. Each group will have x4 zip lock bags. Label each bag with the following:

1. Control
2. Hands
3. Outside (you can be more specific i.e. vegetable garden, dirt, creek)
4. Bathroom sink, OR choose another location in the school i.e. work tables, door handle etc. and label the bag as per the location.

Step 3. Wearing gloves, rub the potato on the chosen surface. For 'control' the potato goes straight in the bag. For the bag labelled, 'hands' (remove gloves) and rub potato over hands. Once rubbed on the surface place the potato in each bag. Choose the surface for the remaining two and place in bags.

Step 4. Make sure the bag's are zipped tight and place in a cool, dark cupboard for one week.

One week later

Step 5. Remove the bags from the cupboard and observe BUT do not remove from the bags.
- What can you see? What differences are there between the potato pieces?
- Which potato has the most growth on it and which has the least? Why?
- What colours can you see? If you can see black, white and green this is showing bacteria and mould.
- The 'control' potato is important as it shows the comparison to the others.
- Can you explain why they look different?

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Name:

Letter to Antimicrobial Resistance Commitee

Congratulations. You have been invited to be a member of a newly created Antimicrobial Resistance Committee. Send the Committee a letter explaining why action against antimicrobial resistance needs to be taken and include 5 recommendations on how to do it.

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