

<h2 style="margin: 0;">Lesson Plan</h2>	
<p>Description</p> <p>In this three-part lesson, students will learn how scientific research is conducted and why scientific integrity is important in determining what sources of information we can trust. They will understand what can happen when a lack of scientific integrity leads to misconduct and explore scientific integrity with a real-world example of how we develop and test new vaccines. Students will also learn the different parts of a research study and the signs of trustworthy research. They will be introduced to some trusted sources of health information as they learn about the agencies that oversee health research. They will learn about the importance of understanding history and increasing diversity in science as they explore the contributions of scientists from different communities and backgrounds. They will also explore the intersection of science and social issues as they learn how to have discussions about scientific literacy. Each learning objective is followed up by an online game or hands-on activity to reinforce the concepts.</p>	<p>Materials</p> <ul style="list-style-type: none"> A computer or laptop for each student OR classroom projector to work through as a class The E-lesson file - available online Washable Paint (approximately palm full amount required for each person doing the experiment) Dish soap (small amount required for each person doing the experiment) Sink(s) for applying paint and washing hands
<p>Big Ideas</p> <p>Module 1: Research integrity and the scientific method</p> <ul style="list-style-type: none"> Scientific research is a systematic way of gaining scientific knowledge Research is an amazing tool that teaches us new things, and makes our daily lives better, easier, and healthier 	<p>Specific Expectations</p> <p>A1.1 Formulate relevant scientific questions about observed relationships, ideas, problems or issues, make informed predictions and or formulate educated hypothesis to focus inquiries or research</p> <p>A1.5 Conduct inquiries, controlling relevant variables, adapting or extending procedures as required</p>

- 6 principles of scientific integrity and definitions: respect, honesty, transparency, rigor, accountability and reproducibility

Module 2: Research and Real-Life Part I

- Types of research misconduct, definitions, and applications: fabrication, falsification, plagiarism, breach of duty of care and misrepresentation
- Scientific integrity in the real world: development of medications and vaccines
- Different parts of a research study and the information they give: Introduction, method, results, discussion, conclusion, authors, location of publication, peer-review

Module 3: Research and Real-Life Part II

- Canadian agencies that monitor health and science research
- Exploring historical instances of lack of integrity and respect in research
- Recognizing the contribution of scientists from diverse backgrounds and understanding the importance of their place in science
- How to have respectful and effective conversations about science literacy and share the power of information

A1.9 Analyse the information gathered from research sources for logic, accuracy, reliability, adequacy and bias

A1.10 Draw conclusions based on inquiry results and research findings, and justify their conclusions with reference to scientific knowledge

A2.2 Describe the contributions of scientists, including Canadians to fields under study

Introduction

Scientists follow the scientific method and scientific integrity to learn new information that we can apply in our daily lives. It’s important for us all to know what this method involves and what scientific integrity looks like, so we know how to interact with the information that comes at us. Understanding scientific integrity gives us a foundational awareness of how scientific information is obtained and can help us distinguish reliable versus unreliable information.

<p>Action</p> <ol style="list-style-type: none"> 1. Decide whether there is capacity for students to work through lesson on individual devices/in pairs or whether lesson will be done as a class 2. Decide whether there is capacity for every student to do the handwashing experiment, or whether just the teacher or a couple students will demonstrate. 	
<p>Consolidation/Extension</p> <p>Further discussions can be had about the importance of health equity and the consequences of lack of research integrity in the real world. Students can discuss/write about the importance of access to good health information and diverse science professionals. Students can practice having respectful discussions about scientific literacy by using what they have learned to answer questions like:</p> <p>“How do scientists make sure their results and conclusions are accurate?”</p> <p>“How do scientists prove vaccines work?”</p> <p>“How can you tell a study can be trusted?”</p> <p>“What are the consequences faced by different groups when there is a lack of integrity in research?”</p>	
<p>Accommodations/Modifications</p> <ul style="list-style-type: none"> • If internet connection is a concern: Click on the button to download lesson so it can be used offline • In the top right corner, there is a tab labelled “captions” where transcripts of each voiceover can be found • When playing the YouTube videos, captions can be activated by clicking the “cc” button in the bottom right corner 	<p>Assessment</p> <p>Students can be graded on their scores on the games and activities. Students can also submit a written response or essay to the activity questions after the science history and diversity exhibit. Students can submit a scientific report outlining their handwashing experiment.</p>
<p>Additional Resources</p> <p>Feedback survey https://survey.alchemer.com/s3/7094497/IPF-Teacher-Student-Evaluation</p>	