WORKSHOP overview

UNDERSTANDING SCIENCE: INVESTIGATING VACCINES AND VIRUSES WITH THE SCIENTIFIC METHOD

This workshop and Covid-19:
Covid-19 is obviously a prominent issue for everyone right now. This workshop is general in nature and doesn't directly discuss Covid-19, but we do hope it gives students improved confidence to understand and engage with information they may come across in day-to-day discussion.

This workshop isn't a substitute for educating participants about the latest, current health advice. We will provide links to the current advice from the Australian and Victorian Health Departments, and the WHO. These references are also included in the accompanying resource kits.

Subject	Science	Suitable for Years 9 & 10
IRL Hub Presenter	Alanta Colley	
Topic/ Unit Summary	**Understanding How Science Works (Victorian Curriculum)** **Science Understanding & Science Inquiry Skills (Australian Curriculum)** **Science (NSW Curriculum)** Being able to understand and apply scientific approaches is key to understanding the world. As the values and needs of society change, science can help solve relevant problems – but only with robust and data driven investigation and experimentation. Alanta is a comedian, science communicator and storyteller from Melbourne with first class Honours in History, and a Masters degree in International Public Health. Alanta has worked for the United Nations in Cambodia, as well as in health education in Timor Leste, Kenya and Uganda; mostly focused on HIV and malaria prevention programs. As a comedian, she's toured nationally with her science comedy debate series 'Sci Fight', and performed her comedy shows (which predominantly covers bees, parasites, and poo) at comedy festivals across Australia. Alanta was a recipient of the 'Inspiring Australia' Science Arts Grant in 2019, and is a regular guest on ABC radio. In this workshop, using the history of viruses and vaccines as a case study, Alanta gives students the chance to understand the importance of developing hypotheses, gathering and analysing data, and how results from experiments can be effectively communicated. Viruses are much older than humans are; at 1.5 billion years ago they evolved; when humans are a spritely 2-6 million years old. In fact; about 8% of human DNA comes from viruses! But what are they? Are they living or dead? Are they all bad? And how do they work? The second part of this workshop will challenge students to gather data and build hypothoses as they take on the role of contract tracer. In the first part of this workshop, Alanta covers some of the basics about what a virus is; how it works, and how it ends up in a cell in the human body. It also explores why some viruses spread quickly around the world, while others appear and disappear just as quickly. The workshop will quickly cover some examples of viruses that have come and gone in human history, and why they spread or didn't spread. This will include looking at the different routes of transmission; such as oral/faecal, contaminated food, animal to human and airborne. We	

WORKSHOP overview

UNDERSTANDING SCIENCE: INVESTIGATING VACCINES AND VIRUSES WITH THE SCIENTIFIC METHOD

	understand how human behaviour impacts the spread of a virus. Briefly, Alanta will explain what a vaccine is and what the medical establishment needs a vaccine to do before they can give the green light for millions of doses to be shipped around the world. **INVESTIGATIVE ACTIVITY** The second part of the workshop looks at how we respond to a virus that causes harm. How does the global medical community discover we have a new virus? Why is it important to know where a new virus came from? In this part of the workshop, Alanta will give small groups of students a simple case study. Using a variety of provided sources, students will be asked to look at the effects of a new virus causing people's hair to turn pink (*Capilli Rubesco Virus*). Students will have to identify, investigate, and analyse data and its reliability to find 'patient zero'. Alanta will then bring the students back to discuss the different methods and results students have used. An extended version of this exercise will be provided as an additional resource for teachers to use in more detail with their classes following the workshop.
Resources	**IRL Hub Workshop** • Pre-workshop notes summarising some of the key concepts of the workshop with references for further reading • A pre-recorded video of a performance by the Presenter • Summary notes from the presentation • Zoom Video Conferencing • Suggested extension activity for contact tracing

WORKSHOP overview

UNDERSTANDING SCIENCE: INVESTIGATING VACCINES AND VIRUSES WITH THE SCIENTIFIC METHOD

Targeted Outcomes VIC, NSW & Australian Curriculum	**Victorian Curriculum (Level 9 Science)** **Science Understanding** **Science as a human endeavour** • Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community (VCSSU114) • Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries (VCSSU115) • The values and needs of contemporary society can influence the focus of scientific research (VCSSU116) **Science Inquiry Skills** **Questioning and predicting** • Formulate questions or hypotheses that can be investigated scientifically, including identification of independent, dependent and controlled variables (VCSIS134) • Independently plan, select and use appropriate investigation types, including fieldwork and laboratory experimentation, to collect reliable data, assess risk and address ethical issues associated with these investigation types (VCSIS135) • Select and use appropriate equipment and technologies to systematically collect and record accurate and reliable data, and use repeat trials to improve accuracy, precision and reliability (VCSIS136) **Analysing and evaluating** • Analyse patterns and trends in data, including describing relationships between variables, identifying inconsistencies in data and sources of uncertainty, and drawing conclusions that are consistent with evidence (VCSIS138) • Use knowledge of scientific concepts to evaluate investigation conclusions, including assessing the approaches used to solve problems, critically analysing the validity of information obtained from primary and secondary sources, suggesting possible alternative explanations and describing specific ways to improve the quality of data (VCSIS139) **Recording and processing** • Construct and use a range of representations, including graphs, keys, models and formulas, to record and summarise data from students' own investigations and secondary sources, to represent qualitative and quantitative patterns or relationships, and distinguish between discrete and continuous data (VCSIS137) (via extension work using suggested activities) **Communicating** • Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (VCSIS140) **Victorian Curriculum (Level 10 Science)** **Science Understanding** **Science as a human endeavour** • Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community (VCSSU114)

- Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries (VCSSU115)
- The values and needs of contemporary society can influence the focus of scientific research (VCSSU116)

Biological sciences

- Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (VCSSU121)

Science Inquiry Skills

Questioning and predicting

- Formulate questions or hypotheses that can be investigated scientifically, including identification of independent, dependent and controlled variables (VCSIS134)

Planning and conducting

- Independently plan, select and use appropriate investigation types, including fieldwork and laboratory experimentation, to collect reliable data, assess risk and address ethical issues associated with these investigation types (VCSIS135)
- Select and use appropriate equipment and technologies to systematically collect and record accurate and reliable data, and use repeat trials to improve accuracy, precision and reliability (VCSIS136)

Recording and processing

- Construct and use a range of representations, including graphs, keys, models and formulas, to record and summarise data from students' own investigations and secondary sources, to represent qualitative and quantitative patterns or relationships, and distinguish between discrete and continuous data (VCSIS137)

Analysing and evaluating

- Analyse patterns and trends in data, including describing relationships between variables, identifying inconsistencies in data and sources of uncertainty, and drawing conclusions that are consistent with evidence (VCSIS138)
- Use knowledge of scientific concepts to evaluate investigation conclusions, including assessing the approaches used to solve problems, critically analysing the validity of information obtained from primary and secondary sources, suggesting possible alternative explanations and describing specific ways to improve the quality of data (VCSIS139)

Communicating

- Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (VCSIS140)

Australian Curriculum (Year 9 Science)

Science Understanding

- Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (ACSSU176)

Science as a Human Endeavour

Use and influence of science

- People use scientific knowledge to evaluate whether they accept claims, explanations or predictions, and advances in science can affect people's lives, including generating new career opportunities (ACSHE160)

Science Inquiry Skills
Questioning and predicting

- Formulate questions or hypotheses that can be investigated scientifically (ACSIS164)

Planning and conducting

- Plan, select and use appropriate investigation types, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSIS165)

Processing and analysing data and information

- Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS169)
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS170)

Evaluating

- Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (ACSIS171)
- Critically analyse the validity of information in primary and secondary sources and evaluate the approaches used to solve problems (ACSIS172)

Communicating

- Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (ACSIS174)

Australian Curriculum (Year 10 Science)

Science as a Human Endeavour
Use and influence of science

Values and needs of contemporary society can influence the focus of scientific research (ACSHE230)

Science & Inquiry Skills
Questioning and predicting

- Formulate questions or hypotheses that can be investigated scientifically (ACSIS198)

Planning and conducting

- Plan, select and use appropriate investigation types, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSIS199)
- Select and use appropriate equipment, including digital technologies, to collect and record data systematically and accurately (ACSIS200)

Processing and analysing data and information

- Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS203)
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence (ACSIS204)

Evaluating

- Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (ACSIS205)
- Critically analyse the validity of information in primary and secondary sources and evaluate the approaches used to solve problems (ACSIS206)

Communicating

- Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations (ACSIS208)

NSW Curriculum (Stages 4 & 5)

Values and Attitudes

- develop an appreciation of the contribution of science to finding solutions to personal, social and global issues relevant to their lives now and in the future
- develop a willingness to use evidence and reason to engage with and respond to scientific and technological ideas as informed, reflective citizens

Skills

- develop knowledge, understanding of and skills in applying the processes of Working Scientifically

Stage 4

- **SC4-4WS** identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge
- **SC4-5WS** collaboratively and individually produces a plan to investigate questions and problems
- **SC4-6WS** follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually
- **SC4-7WS** processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions
- **SC4-8WS** selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems
- **SC4-9WS** presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations

Stage 5

- **SC5-4WS** develops questions or hypotheses to be investigated scientifically
- **SC5-5WS** produces a plan to investigate identified questions, hypotheses or problems, individually and collaboratively
- **SC5-6WS** undertakes first-hand investigations to collect valid and reliable data and information, individually and collaboratively
- **SC5-7WS** processes, analyses and evaluates data from first-hand investigations and secondary sources to develop evidence-based arguments and conclusions

WORKSHOP overview

UNDERSTANDING SCIENCE: INVESTIGATING VACCINES AND VIRUSES WITH THE SCIENTIFIC METHOD

	• **SC5-8WS** applies scientific understanding and critical thinking skills to suggest possible solutions to identified problems • **SC5-9WS** presents science ideas and evidence for a particular purpose and to a specific audience, using appropriate scientific language, conventions and representations