MindSET-do

Year 10 – Citizen Science 70min Lesson 1

What is citizen science?

Learning Intentions	Lesson Outcomes
• Students will explore the world of citizen science projects • Students will investigate scientific approach, the methodology through which all science is carried out • Students will learn about insect and plant biodiversity and be introduced to the concept of ecosystem services and the economic values of biodiversity. • Students will learn about biodiversity breakdown and the citizen science projects going on today to protect our planet. • Students will explore different jobs in STEM that require collaboration and benefit from citizen science	• Understand what it means to be a citizen scientist • Understand that citizen science projects are essential for investigating big problems and large amounts of data • Understand that scientists all follow the same approach when carrying out research. This is known as a scientific method. • Understand how biodiversity is essential for human survival • Understand how human activity largely results in a decrease of biodiversity as we disrupt the circular relationship of our environment • Be able to talk about different careers and research areas in STEM and how these might benefit from citizen scientists, including generating new career opportunities.

Australian Curriculum Content Descriptors	Australian Curriculum General Capabilities
Science **Science as a Human Endeavour** 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 (ACSHE194)	**Critical and creative thinking** • Inquiring, identifying, exploring and organising information and ideas **Critical and creative thinking** • Generating ideas, possibilities and actions **ICT Capability** • Investigating with ICT

Assessment

Formative assessment

In groups students will carry out 4 activities investigating citizen science projects and careers in STEM. After each they will discuss their findings with the rest of the class in an informal discussion.

Phase/Slide	Learning Activity	Resources
Slide 1 - 3	• Greetings/introduction • Acknowledgement of Traditional Custodians • Lesson outcomes	PowerPoint
Slide 4	• Scientists around the world • There are over 8 million researchers/scientists worldwide • Discuss diversity and communication of scientific knowledge	PowerPoint
Slide 5 - 6 Engage	• Introduction to tackling big issues, big data and the considerations when collecting and analyzing a lot of data. • Introduce the idea that these big issues need a lot of people working on them to collect and analyze the data and that is where citizen scientists can help scientists. • Ask the questions in the presenter notes to facilitate a discussion. Nearly 2 million people are involved with citizen science projects and a lot of them are centred around environmental studies	PowerPoint
Slide 7 Explore Evaluate	• Introduction to citizen science projects. • Recount the story of a successful citizen science project carried out during COVID that asked members of the public to identify guano-stained snow from satellite images. This led to the discovery of a new penguin colony! • Some example questions are provided in the presenter notes to prompt discussion.	PowerPoint https://www.space.com/penguins-search-galaxy-zoo-citizen-science-during-coronavirus.html

Phase/Slide	Learning Activity	Resources
Slide 8 Engage	• The concept of ethics when carrying out a citizen science project is introduced by showing the class the 10 principles laid out by the Australian government. It is important that the students start to think about these as they may be creating their own project after this course. Discuss briefly.	PowerPoint https://citizenscience.org.au/10-principles-of-citizen-science/
Slide 9 Explore	• **Activity 1: 5 minutes** • Talk about 2020 bushfires - three billion animals killed or displaced • Watch the video about a nationwide citizen science project, a bioblitz, that is going on today in response to the bush fires and discuss following the questions in the presenter notes. • Class discussion: 1. How does this bioblitz project actively involve citizens in scientific endeavour that generates new knowledge or understanding? 2. What is the genuine science outcome of the project? 3. What is the benefit of the bioblitz project to society? 4. What are some of the ethical considerations of the project? • Explore BioBlitz and how this project operates, discuss why bioblitz is such an effective way to study biodiversity on a large scale.	PowerPoint **Video** **https://youtu.be/l63GdM3JwPc**
Slide 10 **Evaluate** **Explore** **Reflect**	• **Activity 2: 10 minutes** • In groups students will explore some citizen science projects that need their help today and then report to the class • Teacher: students are asked to spend a few minutes on Zooniverse – a citizen science project website – pick a topic that interests them and find out what the citizen scientists must do to contribute. Facilitate and guide them through the discussion when they are reporting back to the class.	PowerPoint And link to https://www.zooniverse.org/

Phase/Slide	Learning Activity	Resources
Slide 11 Evaluate, Reflect Problem solve Explain	• Introduction to scientific approach. The aim here is to introduce the students to the concept and the importance of scientific approach and its role when designing and carrying out a citizen science project. • Run through the 7 steps all scientists follow to carry out research. • Tell the story of John Snow and the Broad Street pump. Set the scene and point out each step in turn that John Snow took to convince doctors and stop the spread of cholera. A link has been provided to read up on the facts of this story.	PowerPoint https://www.ph.ucla.edu/epi/snow/snowcricketarticle.html
Slide 12 Explore Engage Reflect	• Students have gone through what a citizen science project is, reviewed some active projects and now it is time to hear about some success stories. • Penguin Populations and Big City Birds • Highlight how both examples clearly defined aims, methods etc. And followed the scientific approach.	PowerPoint https://www.theguardian.com/environment/2020/nov/12/app-allows-city-dwellers-to-turn-citizen-scientists-and-track-australias-urban-birds
Slide 13-14	• Introduce the project, a bioblitz, that the students will be carrying out over the next few lessons. • Show them the data collection sheet that they will be working on. Highlight that the question has already been defined and we will be following the 7 steps of scientific approach to answer it.	PowerPoint Data Collection Sheet 1.doc

Phase/Slide	Learning Activity	Resources
Slide 15-16	• **Video and discussion: 7mins** • Watch the video about biodiversity and follow the questions in the presenter notes. Biodiversity is in the curriculum but depending on the term this course is run you may find the students are unclear of the concept so prompt a discussion to find out the knowledge level. • ASK: what is biodiversity? Why is it important? • **Video and discussion: 7 mins** • This video explains the importance of ecosystems and ecosystem services. Here we uncover why studying biodiversity is so important • Prompt a discussion after the video and link back to why bioblitz are so important. Pre-covid tourism in Australia was worth $122 billion. Agriculture was worth $81 billion. • Wrap up this section and make sure that to answer any questions students have about the project and citizen science in general	PowerPoint https://youtu.be/XTC4qiXd36Q https://youtu.be/wMIUglBligI
Slide 17-19 Explore Elaborate	• Introduction to a career in STEM, industry jobs and helpful advice about career paths for students interested in a career in STEM. • **Activity 3: 5 mins** • Research task – In groups students will pick one of the jobs mentioned in the slides – Using the website CareerHQ database, research information about the career – Students need to imagine they were to have this job, then write down how they would use scientific approach in this role. – Report back to the class • Discuss study options in grades 11 and 12 (subjects, clubs and Headstart) • Discuss university options (degrees and majors) for STEM careers	PowerPoint https://careerhq.com.au/careers-database

Phase/Slide	Learning Activity	Resources
Slide 20-21 Evaluate reflect	• Wrapping up of ideas • Ask specific questions (highlighted on slide) and check for understanding.	PowerPoint
Slide 22	• Next lesson we will be learning about the citizen science project that we are going to take part in and learning how to investigate the biodiversity in our local area.	
Slide 23	• USC current research	PowerPoint
Slide 24	• MindSET-do acknowledgements	PowerPoint
Slide 25	• Links to video and references	PowerPoint