Year 10 – Citizen Science 70min Lesson 3

Designing an experiment

Learning Intentions	Lesson Outcomes
• Students will explore different scientific techniques and sampling methods to carry out field work and then construct their own following a design brief • Students will plan, select and use appropriate sampling techniques to carry out their field work, to collect reliable data and investigate the two chosen habitats further	• Understand the different sampling techniques and the data and conclusions we can infer from them • Understand and be able to describe sample data collection methods of the plant and insect life around their school following a scientific approach • Identify different habitats in our school grounds to be sampled • Investigate and make judgements about the choice of materials used to make quadrants and hanging traps • Plan, select and use appropriate sampling techniques to perform field work experimentation, to collect reliable data

Australian Curriculum Content Descriptors	Australian Curriculum General Capabilities
Geography **Geographical Knowledge and Understanding** • The application of systems thinking to understanding the causes and likely consequences of the environmental change being investigated (ACHGK073) • Develop geographically significant questions and plan an inquiry that identifies and applies appropriate geographical methodologies and concepts (ACHGS072) **Science** **Scientific Inquiry Skills** • Formulate questions or hypotheses that can be investigated scientifically (ACSIS198) • Plan, select and use appropriate investigation types, including field work and laboratory experimentation, to collect reliable data (ACSIS199)	**Critical and Creative Thinking** • Inquiring, identifying, exploring and organising information and ideas **Critical and Creative Thinking** • Generating ideas, possibilities and actions **Critical and Creative Thinking** • Analysing, synthesising and evaluating reasoning and procedures **Critical and Creative Thinking** • Reflecting on thinking and processes **Ethical understanding** • Reasoning in decision making and actions

Design and Technologies **Knowledge and understanding** • Investigate and make judgements on how the characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions (ACTDEK046)	

Assessment

Formative assessment

Students investigate their local area and identify key habitats at their school. Students build their own quadrats and hanging traps to collect data in the subsequent lesson and explain their reasoning for choice of materials. Students build on their own hypotheses around the biodiversity at their school and scientific knowledge to develop a random sampling strategy and plan for data collection. Students record data at three sites to randomly sample biodiversity with either quadrats or hanging traps.

Phase/Slide	Learning Activity	Resources
Slide 1 - 4	• Greetings/introduction • Acknowledgement of Traditional Custodians • Lesson outcomes	PowerPoint
Slide 5 - 7 Engage Explore Engage	• Introduction to biodiversity sample methods and the data that we can infer from them • Explore why scientists wish to sample biodiversity and why it is important to have an accurate understanding of biodiversity across habitats. Watch a 2:20min video explaining an Australian born citizen science initiative. • Evaluate human impact on biodiversity • Question: Students will be asked to deliberate "Why do we need to accurately compare insects and plant biodiversity at different locations?" • Answer: Biodiversity is globally declining due to human activity – destruction of habitat and food sources. We need to monitor plant and insect numbers to understand our impact and how well initiatives to bring back biodiversity are working	PowerPoint Video https://youtu.be/jQXjV6m_Tcc

Phase/Slide	Learning Activity	Resources
Slide 8 Explore Evaluate Problem solve Engage	• Activity 1: In groups students will build their own quadrats to the specifications on the slide (1m x 1m) • Teacher: Guide students where necessary to keep them on track and make sure they stick to the build specs • Teacher: Ask groups to explain the reasons for their choice of materials –properties of material, choices about joining materials etc.	PowerPoint Materials to build quadrats – household items (string, plastic tubing etc)
Slide 9 Evaluate Reflect Problem solve	• Activity 2: In groups students will build their own hanging traps to the specifications on the slide • Teacher: Guide students where necessary to keep them on track and make sure they stick to the build specs • Teacher: Ask groups to explain the reasons for their choice of materials –properties of material, choices about joining materials etc.	PowerPoint Materials to build hanging traps – household items (string, plastic tubing etc)
Slide 10 -13 Explore Evaluate	• Students will learn about the different sampling strategies (random and systematic) and what information can be inferred from each	PowerPoint
Slide 14 Evaluate Explore	• Students will watch a 6min video about sampling different habitats with quadrats	PowerPoint and video https://youtu.be/UDp3l07Wcrg
Slide 15 Evaluate Problem solve Reflect	• Activity 3: Using a map of their school grounds that they used to identify the different habitat zones in the previous lesson, students will identify 2 zones to investigate • Students will use this grid to randomly sample their 2 areas using the knowledge they have learnt about sampling strategies • Students will identify 2 sites per group (1 in each habitat) to sample with their quadrats	PowerPoint, satellite map and Data collection sheet 1

Phase/Slide	Learning Activity	Resources
Slide 16 - 17 Evaluate Problem solve Reflect	• Activity 4: Students will identify 1 site per group to sample with their hanging traps	PowerPoint and data collection sheet 1
Slide 18	• Activity 5: students will go outside and hang their hanging traps ready for the next lesson at their designated sample site	Hanging traps
Slide 19 Evaluate reflect	• Wrapping up of ideas	PowerPoint
Slide 20	• Possible extension ideas	PowerPoint
Slide 21	• USC Current research	PowerPoint
Slide 22	• Links to videos	PowerPoint