MindSET-do

Year 10 – Citizen Science 70min Lesson 3

Data Collection and Analysis

Learning Intentions	Lesson Outcomes
• Students will use quadrats to sample the plant life at their proposed sample sites • Students will collect and record their data following a scientific approach • Students will identify the different flora and fauna they have collected and start to systematically compare the 2 sample sites • Students will share ideas for digital technologies that can be used for data sampling, collection and analysis	• Understand how to identify and record plant data accurately and systematically using a scientific approach • Compare data from the two different habitats • Analyse patterns and trends in data to describe relationships between variables and identify inconsistencies • Identify strengths and weaknesses of digital technologies used for data sampling, collection and data analysis • Understand how mathematical modelling is used in STEM and be able to describe some examples of everyday mathematical models and how they impact our lives

Australian Curriculum Content Descriptors	Australian Curriculum General Capabilities
Science **Scientific Inquiry Skills** • Select and use appropriate equipment, including digital technologies, to collect and record data systematically and accurately (ACSIS200) • Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS203) • Critically analyse the validity of information in primary and secondary sources and evaluate the approaches used to solve problems (ACSIS206) **Digital Technologies** **Processes and production skills** • Develop techniques for acquiring, storing and validating quantitative and qualitative data from a range of sources, considering privacy and security requirements (ACTDIP036)	**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 procedures and outcomes **ICT Capability** • Applying social and ethical protocols and practices when using ICT **ICT Capability** • Investigating with ICT **ICT Capability** • Creating with ICT **Numeracy** • Recognising and using patterns and relationships

Assessment		
Formative assessment Students survey 2 habitats in the school grounds using quadrats, they then collect, record and start to analyse their data in Microsoft Excel.		
Phase/Slide	**Learning Activity**	**Resources**
Slide 1 - 3	• Greetings/introduction • Acknowledgement of Traditional Custodians • Lesson outcomes	PowerPoint
Slide 4 - 5 Engage	• Introduction and recap of the data sampling task: sampling the biodiversity in the two chosen habitats. • Review how to collect and record data in the data collection sheets provided	PowerPoint
Slide 6 Explore Evaluate	• Discuss how to identify living things using the “MRS GREN” mnemonic. • This is something students usually struggle with – be clear that rocks, sticks and dead leaves don’t count as species! They should be looking for living things only.	
Slide 7 Explore Evaluate	• **Activity 1: 40 mins** • Students will use quadrats to sample the plant life at their proposed sites. • In groups go outside with equipment noted on the slide. • Allow 20 minutes for each site and tell the students this. • Teacher: Guide students through the data collection task. • It can be useful to use tools like “iNaturalist” to identify species. Otherwise, a description of each species such as “leafy weed with purple flowers” is okay. • Take pictures where appropriate	PowerPoint 2/3 x copies of data collection sheets per group and pens Quadrats from previous lesson Camera

Phase/Slide	Learning Activity	Resources
Slide 8-9 Explore	• Introduction to mathematical modelling and its uses in different STEM careers. • Follow the prompts in the presenter notes to introduce this topic. • Ask if students have used mathematical modelling before. They probably have in class, even if they don't know it. • Ask if they've seen mathematical modelling in adverts, news or television.	PowerPoint
Slide 10 - 12 Evaluate Explore Problem Solve Reflect	• **Activity 2: 15 mins** • Ask students to count how many species they found at each of the two sites (NOTE: number of species, not individuals). Compile this in Data Analysis sheet 2. • Follow the steps and explain how to carry our statistical analysis. The data the students will be using for this example has already been generated in Data Analysis Sheet 2.xls • Walk the students through how to create a box and whisker plot. Ask if they have suggestions of other types of graphs that could be used to model biodiversity. • This activity shows how to analyse data. In the 4th, teacher led lesson the students analyse their own data.	PowerPoint and Excel spread sheets: Data analysis sheet 2
Slide 13	• **Activity 3: 3 mins** • Step 6 of the scientific method: modify and improve experimental design. Ask the students to THINK/PAIR/SHARE in pairs or in groups about how they could improve this experiment and improve biodiversity in their school. • Don't spend too much time on this, we just want them to consider improvements	PowerPoint

Phase/Slide	Learning Activity	Resources
Slide 14	• **Activity 4: 3 mins** • Step 7 of the scientific method: presenting your findings • Give the students a minute or two to decide if their hypotheses were right or wrong. • Ask “put your hand up if you got both right” “put your hand up if you got one right and one wrong” etc. • Have a quick discussion about why we found some things we didn’t expect.	PowerPoint
Slide 15-16 Reflect	• Wrapping up	PowerPoint
Slide 17	• **Survey: 5mins**	Paper of QR code Survey
Slide 18	• Possible extension ideas	PowerPoint
Slide 19	• Acknowledgements	PowerPoint
Slide 20	• Links to useful resources	PowerPoint