

Lesson Plan

Description
 Students will use the scientific research process to determine the type of grass that grows the tallest, while graphing growth data with Python, to discuss the efficiency of water resources.

- Learning Outcomes**
- Students will learn about the scientific experimentation process
 - Students will examine plant species and determine which is the most resource efficient.
 - Students will learn to communicate their findings, using scientific and technology vocabulary
 - Students will learn to communicate their data in a graph with Python by analyzing and using prewritten code.

- Specific Expectations**
- A1.2 use a scientific experimentation process and associated skills to conduct investigations
 - A1.4 follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials
 - A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes
 - A2.1 write and execute code in investigations and when modelling concepts, with a focus on automating large systems in action
 - A3.2 investigate how science and technology can be used with other subject areas to address real-world problems

Introduction

- Students, in groups, will write down everything they know about plants on a whiteboard.
- Students will then cap their markers and watch the video. The educator will instruct the students to listen carefully as the groups will be adding what they learned from the video to their whiteboard.
- Video Link: <https://www.youtube.com/watch?v=-ky0FLjhrGA>
- Educator will place three different types of grass seed so that students can view them.

- Students will then discuss the problem at hand, and will plan a scientific experiment to observe which grass seed grows the fastest.

Action

- Students will begin by considering the variables that remain constant, and the variables that change. This is important as it will help to define what information will be collected and analysed.
- Once the data to be used is specified, students are to create a list of steps to complete the experiment. (Growing each specific type of seed and tracking its growth over a period of time)
- After the procedure is complete, students will begin their experiment and create a table for their observations. It is important to emphasize that record keeping and detailed notes are critical for an effective investigation.
- Lastly, students will use a prewritten sequence of Python code to create graphs of their results to explore the growth rate of each type of seed.
- Students are to examine the code, and ensure they make required adjustments to titles, data sets, and any other important information.

Consolidation/Extension

- You can challenge students by changing the number of seeds used. This will increase the amount of data that is collected.
- You can extend the activity by having students bring seeds of their own choosing. Some seeds take significantly longer to germinate, thus it can help to discuss different climates, and requirements for each plant.
- Students can discuss which organization of data (Table vs. Graph) helps to visualize the overall growth of the seedling more efficiently. (Mathematics extension, how can graphs be misleading?)

<p>Accommodations/Modifications</p> <ul style="list-style-type: none"> ● Students can work in strategic groups or in groups of their own choosing. ● Teacher can guide the experiment by leading the action phase. ● Teacher can guide the creation of the python program by walking students through the code and having them transcribe it on their own terminals. 	<p>Assessment</p> <ul style="list-style-type: none"> ● Assess your student’s ability to formulate a hypothesis and carry out an experiment. ● Assess student’s ability to review a prewritten code, analyse its components, and make adjustments required. (Guided)
<p>Additional Resources</p> <ul style="list-style-type: none"> ● This lesson was created using https://trinket.io/embed/python3 as it allows for the calling of math libraries without having to go through additional directory settings. ● For users who are familiar with python, https://replit.com/languages/python3 is also an effective alternative as it provides users with the ability to have an account to store their projects. ● Materials needed: <ul style="list-style-type: none"> ○ Soil ○ Potting receptacle ○ Grass seed (varied) or other seeds ○ watering container ○ access to a browser with internet access ○ Scatterplot.txt code file 	