


Lesson plan: Phidgets Plant Kit and Data Collection

Possible curriculum connections:

- Alberta Grade 5: Science revised 2023 curriculum
 - students analyze climate and connect it to weather and agriculture practices
- Alberta Grade 6: Science revised 2023 curriculum
- Alberta Grade 7: Plants for Food and Fibre

Grade
6-9

30 min./activity



Phidgets Plant Kit and Data Collection

Introduction

This is a free resource for teachers and students and is part of the [Callysto](#) project, a federally-funded initiative to foster computational thinking and data literacy in Canadian Grade 5-12 classrooms.

During this lesson, our focus will be on investigating data gathered through the sensors of the Phidget Plant Kit in conjunction with a small house plant. This data includes the plant's soil moisture levels, the amount of light it receives, as well as the surrounding air's temperature and humidity.

Students will engage with their personalized data from the [Phidget Plant Kit](#), gaining hands-on experience by extracting information from an online spreadsheet and crafting visual representations using the Jupyter notebook. Through this exploration, they will venture into the captivating world of data interpretation, exploring questions surrounding sudden data spikes and the significance of daily and hourly variations. Students will untangle the complexities of data clusters displayed on graphs, decipher the underlying meanings of data trends, and develop the ability to quantify these patterns. Additionally, they will acquire valuable skills in navigating through extensive datasets, uncovering hidden trends that can be harnessed to modify the environmental impact of their individual plants. This lesson offers a dynamic opportunity for students to acquire practical data analysis skills with real-world applications.

Grade level and audience

Grades 6 - 9

Curriculum connections

- [Alberta Grade 5: Science Revised 2023 Curriculum](#) Students analyze climate and connect it to weather conditions and agricultural practices.
- [Alberta Grade 6: Science Revised 2023 Curriculum](#)
- [Alberta Grade 7: Plants for Food and Fibre](#)

Required materials

- a charged computer, with internet access, for each student or group
- an internet browser, preferably Google Chrome
- a Google or Microsoft account (Callysto does not collect any personal information)
- [Phidgets Plant Kit](#)
- A growing, healthy plant

Students should know how to log in to the [Callysto Hub](#) as well as run a notebook prior to interacting with it. Teachers, to get started with Callysto notebooks and running material on the Callysto Hub, see our [Starter Kit](#).

In-class activities

Activity 1: Collecting data from plants with Phidgets (30 mins)

1.0 Sensor readings

https://bit.ly/plant_kit_1

In this initial notebook, you'll familiarize yourself with your Phidget devices and obtain the first readings from your plant. Connect the sensors to the VINT Hub Phidget and the moisture probe to your plant.

1.1 Live visual gauges

https://bit.ly/plant_kit_2

Continuing from the previous notebook, your plant will provide you with frequent, real-time readings of its temperature, humidity, moisture, and light levels.

Activity 2: Collecting data from plants with Phidgets using Google Sheets (30 mins)

https://bit.ly/plant_kit_3

In this activity, students will gain knowledge about a plant's environment as they explore temperature, humidity, soil moisture, and light level using the Phidgets plant kit. They will then follow step-by-step instructions to create an online spreadsheet for live readings from all sensors.

Activity 3: Water pump utilizing desired moisture level (60 mins)

3.0 Manually watering

https://bit.ly/plant_kit_4

Keep in mind the importance of water safety when placing the water pump in relation to technology and nearby electronic components.

The instructions involve setting up the pump described in the [Phidgets Plant Kit link](#). After analyzing the moisture level data, students will determine their desired moisture threshold. Once this threshold is chosen, students will be able to turn on the water pump on and off manually. It's important to monitor the moisture level closely, considering that external factors such as humidity and light can also influence the moisture reading.

3.1 Automatic watering

https://bit.ly/plant_kit_5

This short notebook allows users to establish an automatic watering system, providing the option to either water the plant daily or adjust a slider to a preferred moisture level.

Reflections

- *What does a plant need to survive and thrive?*
- *How would you describe the four types of plant data we saw?*
- *How important are they to the health of the plant?*
- *Did anything surprise you about this data?*
- *Did this data confirm anything you already knew about plants?*
- *These data sets are examples of “time series.” What characteristic of the data makes it a time series?*
- *What does it mean to “clean up the data?” What cleaning was necessary here?*
- *Give an example of an unusual change in the data. What is the difference between seeing something unusual in the data, and knowing why that unusual change occurred?*
- *How do the characteristics of the data correspond to your knowledge of how a house plant’s environment might be in real life?*
- *What is an example of a cluster of data points? Why might we expect certain data to form a cluster?*
- *What is a trend line? How does it connect with the information we have about the different items we are measuring?*
- *What does it mean when a trend line goes up? What does it mean when the trend line goes down?*
- *Can you see examples where the data sticks closely to the trend line, and other examples where the data seems to jump far away from the trend line?*

Next steps

For more information, you can check out our [YouTube videos](#), [online courses](#), or [callysto.ca](#) for [learning modules](#), [tutorials](#), [lesson plans](#), [exercises](#) and events.

Contact

If you encounter any issues or have any suggestions, please get in touch with us at contact@callysto.ca or twitter.com/callysto_canada.