PERFECT PLANTS

Levels 3-4

This unit of work had been developed in collaboration with Ironbark Ridge Public School, New South Wales.

Unit Overview

These lessons have been designed to complement a unit of work that investigates plants and greenhouses. Prior to these lessons, students will have demonstrated knowledge and understanding of farming and have created a mini greenhouse. It is the intention for students to grow and maintain their plant. They will investigate important factors that influence the growth of plants and collect data to judge the 'best' location to place their greenhouse.

Students will use Cubit Voyager kits to collect data to influence the placement of the greenhouse to maximise plant growth. Students will code the temperature gauge, light sensor, LED light to gather data. They will represent the data and use the data to explicitly influence their decision to find the 'best' suitable place for their plant.

Other Curriculum Targeted Areas

Other curriculum areas can be targeted and assessed within this unit. Areas of interest may include:

- Design and Technology (Food Fibre and Production)
- Science (Biological Science)
- Mathematics (Data)

Further investigation into these areas is required to ensure they align with the following activities. Activities may need to be modified to ensure Content Descriptions and Achievement Standards are met.

Australian Curriculum Alignment

The following sessions have been created using the Australian Curriculum: Digital Technologies Curriculum. Activities may need to be modified to ensure state Digital Technologies Curriculum Standards/Syllabus are met. ACS has support and documents to help align this unit to other Digital Technology Curricular.

Session

'Session' has been used to define the order of tasks to complete the unit. It does not define a set time required to complete the task. Time allocated to complete a session is the teacher's discretion. This allows for flexibility to drive the duration of the task and make modifications if necessary. Sessions can be merged into one allocated class period or may run over multiple periods.

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Key Preparation

Cubit Kits

Cubit Voyager Kits are available for loan through ACS. Cubit Kits have been used as a key resource to code as they contain all the necessary components and parts to execute these lessons. It is recommended to familiarise yourself with the Cubit Kits, the components used and software prior to implementing these lessons. Cubit has a range of support materials to assist successful implementation into your classroom.

ACS Resources

Resources have been created to help teachers and students unpack and understand topics found within the Digital Technologies Curriculum. These give brief explanations of the topic and the expectations to teach the topic at the curriculum year level. It is intended the information is presented in a way that will set the foundation for further research.

ACS ICT Educators Community

ACS has resources to support the teaching of the Digital Technologies Curriculum from Foundation to Year 10. Access the community and resources by joining for free via: https://www.acs.org.au/ict-educators.html

Key Understandings	Key Questions
Students will: ▪ Program the Cubit to gather light and temperature data. ▪ Gather and sort the light and temperature data. ▪ Make conclusions backed up by their data collection to find the most suitable spot for their green house.	▪ How does the Cubit Kit help your decision to find the 'best' spot for your greenhouse? ▪ Why is it important that we gather this data? ▪ What data have you collected from programming the cubit? ▪ What does it tell you about the 'best' position for you to keep your greenhouse?

Key Vocabulary

Data, information, collect data, access data, represent data, computational thinking, algorithms, visual programming, branching, user input, robotics

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher instruction	Whole class activity
1.	Introduction to Cubit	**Learning Intention** Students will familiarise themselves with the Cubit Kit and Cubit Workshop software and begin basic programming. **Success Criteria** I can connect my Cubit to Cubit Workshop and code lights to turn on and off, and a buzzer to make noise.	Students will be introduced to Cubits. It is encouraged students have access to two devices/computers one to watch the videos and one to have workshop. Students will be given a box that contains a cubit controller (identified by an animal). It is recommended students keep the same controller while using Cubits as it easier to use for the duration of the unit.	Students will work through the introduction information and watch the videos to help familiarise themselves with Cubit Kits. Videos for students to watch: ▪ Introduction to Cubit ▪ Examples connecting the controller with the USB and smartware cable, connecting the cubit to Workshop and finally locating the cubit in Workshop. Cubit Workshop Explains the software program Cubit Workshop. This video details all the different functions within Workshop. Light 2 videos that explain the functions that are available when the LED strip is connected. Buzzer 1 video that explain the functions that are available with the buzzer is connected.
Session Resources	**Student Resources** • ACS Student Resource: Algorithms • Laptop with Cubit Workshop preinstalled • Cubit Robotics Introduction to Cubit		**Teacher Resources** • ACS Teacher Resource: Algorithms	

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher instruction	Whole class activity
2.	Measuring Temperature with the Cubits	**Learning Intention** Students will code the LED strip and temperature gauge to create a digital thermometer. **Success Criteria** I can program the temperature gauge and LED strip to create a digital thermometer.	Discuss with the students the importance of knowing the temperature to assist with plant growth. Introduce students to using Cubit battery. Rather than inserting the USB into the computer. Insert the USB into the battery. The battery will act as a power for the Cubit to function and the Bluetooth connects the Cubit Workshop with the controller.	Students will code to create a thermometer. Because they will use the battery, the Cubit will become mobile. Students take the cubit LED thermometer around the school and manually collect data for 10 different areas of the school, then they sort that data into coldest place to hottest place.
Session Resources	**Student Resources** • Cubit Robotics Programming Digital Thermometer Presentation		**Teacher Resources**	
3.	Using the light sensor	**Learning Intention** Students will program the light sensor to collect data. **Success Criteria** I can code the Cubit to collect data from the light sensor through user input.	Discuss with students the importance of light for growing plants.	Students will now learn to code their Cubit to collect data, every time the cubit controller button is pressed. This will introduce students to user input.
Session Resources	**Student Resources** • 'Perfect Plants Programming the Light Sensor' Presentation		**Teacher Resources**	

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher instruction	Whole class activity
4.	Collect light and temperature data	**Learning Intention** Students will use the temperature gauge, LED stripe, light sensor and Log Values over time to collect data. **Success Criteria** I can collect data over the course of the day to help me find the 'best' spot to place to my greenhouse.	Discuss how to go about finding the best spot to place the greenhouse, including collecting data over the course of a time frame. Prior to coding in this session, students need to understand how the LED strip will present the temperature data. Students will have the code of the temperature gauge, LED stripe and light sensor ready to go.	Students will be introduced to Log values over time function. They can choose how often the Cubit collects data. Students will either physically press the Cubit button to collect the data or they can code the Cubit to repeat the data collection. This will depend on individual skill level. Students will collect the data over a number of days. The Cubits will be placed in different areas of the school and data collected. Eg: Day 1: Cubit placed in classroom, over the course of the day collect data. Day 2: Cubit placed outside classroom, over the course of the day collect data. *NOTE: This session has been kept student driven and haven't provided the code. Refer to session resources*
Session Resources	**Student Resources** • Cubit Robotics Collecting Light and Heat Data • Log Values Over Time Function - Code		**Teacher Resources** • ACS Teacher Resource: Data	

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher instruction	Whole class activity
5.	Representing data	**Learning Intention** Students will use the data they have collected and create graphs. **Success Criteria** I can represent the data I have collected in Excel.	Brainstorm the different methods that can be used to present data and give reasons why data needs to be represented.	Students will present their data they have collected in graphs. The data from the Cubit be saved into a spreadsheet. Students will use this data to create graphs to interpret the data and make conclusions.
Session Resources	**Student Resources**		**Teacher Resources** • ACS Teacher Resource: Data	
6.	Solving their problem	**Learning Intention** Students will use the data they have collected to justify the placement of their greenhouse. **Success Criteria** I can use the data I have collected to justify the 'best' place to place my greenhouse.	Look through examples of data that has already been collected. Create statements based on the data focusing on the 'best' place to place the greenhouse to grow.	Students look at their data they have collected and make statements. Ensure students evaluate the importance of using the Cubits to collect the data and how that influenced any decisions. They present their data and statements to the class.
Session Resources			**Teacher Resources** • ACS Teacher Resource: Systems to Meet Needs	

Assessment – Australian Digital Technologies Curriculum			
Content Description	**Session Number**	**Assessment Piece**	**Assessment Statement**
Identify and explore a range of digital systems with peripheral devices for different purposes, and transmit different types of data (ACTDIK007)	N/A		
Recognise different types of data and explore how the same data can be represented in different ways (ACTDIK008)	5	Collecting and representing the heat and light data	Students collected data about temperature and light. They viewed and presented this data in different formats.
Collect, access and present different types of data using simple software to create information and solve problems (ACTDIP009)	4	Collecting and interpreting data (temperature and light)	Students collected light and temperature data assessed and presented the data.
Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them (ACTDIP010)	2, 3 & 4	Following the steps provided within the Cubit presentations to create the code to their collect data.	Students followed the steps to help them program the Cubits to build code to collect data through digital thermometer and light sensors.
Implement simple digital solutions as visual programs with algorithms involving branching (decisions) and user input (ACTDIP011)	5	Implementing and creating the code to log the temperature and light data.	Students programmed the Cubit Robotic kits to gather data. They demonstrated user input by programming the Cubit to only commence after the user had pressed a button. They demonstrated branching by programming code for light and temperature.
Explain how student solutions and existing information systems meet common personal, school or community needs (ACTDIP012)	6	Statements about how the Cubits helped to determine the most suitable spot to place their greenhouse for maximum growth	Students explained the importance of collecting data to help meet the needs of effectively growing plants around the school community.
Plan, create and communicate ideas and information independently and with others, applying agreed ethical and social protocols (ACTDIP013)	N/A		

Assessment – Victorian Digital Technologies Curriculum			
Content Description	**Session Number**	**Assessment Piece**	**Assessment Statement**
Explore a range of digital systems with peripheral devices for different purposes, and transmit different types of data (VCDTDS019)	N/A		
Recognise different types of data and explore how the same data can be represented in different ways (VCDTDI020)	5	Collecting and representing the heat and light data	Students collected data about temperature and light. They viewed and presented this data in different formats.
Collect, access and present different types of data using simple software to create information and solve problems (VCDTDI021)	4	Collecting and interpreting data (temperature and light)	Students collected light and temperature data assessed and presented the data.
Individually and with others, plan, create and communicate ideas and information safely, applying agreed ethical and social protocols (VCDTDI022)	N/A		
Define simple problems, and describe and follow a sequence of steps and decisions involving branching and user input (algorithms) needed to solve them (VCDTCD023)	5	Implementing and creating the code to log the temperature and light data	Students programmed the Cubit Robotic kits to gather data. They demonstrated user input by programming the Cubit to only commence after the user had pressed a button. They demonstrated branching by programming code for light and temperature.
Develop simple solutions as visual programs (VCDTCD024)	2, 3 & 4	Following the steps provided within the Cubit presentations to create the code to their collect data	Students followed the steps to help them program the Cubits to build code to collect data through digital thermometer and light sensors.
Explain how student-developed solutions and existing information systems meet common personal, school or community needs (VCDTCD025)	6	Making statements about how the Cubits helped to determine the most suitable spot to place their greenhouse for maximum growth.	Students explained the importance of collecting data to help meet the needs of effectively growing plants around the school community.

Assessment – New South Wales Science and Technology Syllabus (Stage 2)			
Outcomes and Objectives	**Session Number**	**Assessment Piece**	**Assessment Statement**
Describes how digital systems represent and transmit data (ST2-11DI-T)	N/A		
Use a range of methods to represent data, including tables and column graphs	5	Collecting their data (temperature and light)	Students collected data about temperature and light. They viewed and presented this data in different formats.
Collect, access and present data, using software to present and communicate information and solve problems (ACTDIP009)	4 & 5	Collecting and interpreting data (temperature and light)	Students collected data about temperature and light. They presented their data and used this data to make conclusions to find the most suitable spot to place their greenhouse.
Defines problems, describes and follows algorithms to develop solutions (ST2-3DP-T)	2, 3 & 4	Following the steps provided within the Cubit presentations to create the code to their collect data	Students followed the steps to help them program the Cubits to build code to collect data through digital thermometer and light sensors.
Develop a sequence of steps and decisions (algorithms) to solve a problem (ACTDIP010)			
Generate visual programs using algorithms to create simple digital solutions			
Explain how existing information systems meet personal, school or community needs (ACTDIP012)	6	Making statements about how the Cubits helped to determine the most suitable spot to place their greenhouse for maximum growth	Students explained the importance of collecting data to help meet the needs of effectively growing plants around the school community.
Participate individually and collaboratively with clear roles and goals	N/A		
Organise and perform strategic roles within a group to solve a problem	N/A		

Assessment – Western Australian Digital Technologies Syllabus			
Year 3			
Content Description	**Session Number**	**Assessment Piece**	**Assessment Statement**
Digital systems and peripheral devices are used for different purposes (ACTDIK007)	N/A		
Different types of data can be represented in different ways (ACTDIK008)	5	Collecting and representing the heat and light data	Students collected data about temperature and light. They viewed and presented this data in different formats.
Collect and present different types of data using simple software to create useful information (ACTDIP009)	4 & 5	Collecting and interpreting data (temperature and light)	Students collected data about temperature and light. They presented their data and used this data to make conclusions to find the most suitable spot to place their greenhouse.
Use visually represented sequenced steps (algorithms), including steps with decisions made by the user (branching) (ACTDIP011)	2, 3 & 4	Following the steps provided within the Cubit presentations to create the code to their collect data	Students followed the steps to help them program the Cubits to build code to collect data through digital thermometer and light sensors.
Create and communicate ideas and information safely (ACTDIP013)	N/A		
Create a sequence of steps to solve a given task (WATPPS16)	2, 3 & 4	Following the steps provided within the Cubit presentations to create the code to their collect data	Students followed the steps to help them program the Cubits to build code to collect data through digital thermometer and light sensors.
Develop and communicate ideas using labelled drawings and appropriate technical terms (WATPPS17)	6	statements about how the Cubits helped to determine the most suitable spot to place their greenhouse for maximum growth	Students explained the importance of collecting data to help meet the needs of effectively growing plants around the school community.
Select, and safely use, appropriate components with given equipment to make a solution (WATPPS18)	2, 3 & 4	Using the Cubit kits and robotics resources	Students identified and used the appropriate robotics components to create a digital solution to collect data.
Use criteria to evaluate design processes and solutions developed (WATPPS19)	N/A		
Work independently, or collaboratively when required, to plan, create and communicate sequenced steps (WATPPS20)	Throughout the unit	Completion of project in small groups	Students worked in small groups and followed steps to program robotics to collect data and present the findings to the class.

Assessment – Western Australian Digital Technologies Syllabus			
Year 4			
Content Description	**Session Number**	**Assessment Piece**	**Assessment Statement**
Digital systems and peripheral devices are used for different purposes and can store and transmit different types of data (ACTDIK007)	N/A		
Data can be represented in different ways (ACTDIK008)	5	Collecting and representing the heat and light data	Students collected data about temperature and light. They viewed and presented this data in different formats.
Collect and present different types of data for a specific purpose using software (ACTDIP009)	4 & 5	Collecting and interpreting data (temperature and light)	Students collected and presented their data to make conclusions to find the most suitable spot to place their greenhouse.
Use simple visual programming environments that include a sequence of steps (algorithm) involving decisions made by the user (branching) (ACTDIP011)	2, 3 & 4	Following the steps provided within the Cubit presentations to create the code to their collect data	Students followed the steps to help them program the Cubits to build code to collect data through digital thermometer and light sensors.
Create and communicate ideas and information safely, using agreed protocols (netiquette) (ACTDIP013)	N/A		
Define a sequence of steps to design a solution for a given task (WATPPS21)	2, 3 & 4	Cubit robotics digital solution to collect data	Students followed a sequence of steps to program a digital solution that collected light and temperature data.
Identify and choose the appropriate resources from a given set (WATPPS22)	2,3 & 4	Using the Cubit kits and robotics resources	Students identified and used the appropriate robotics components to create a digital solution to collect data.
Develop and communicate design ideas and decisions using annotated drawings and appropriate technical terms (WATPPS23)			
Select, and safely use, appropriate components and equipment to make solutions (WATPPS24)	2,3 & 4	Using the Cubit kits and robotics resources	Students identified and used the appropriate robotics components to create a digital solution to collect data.
Use criteria to evaluate and justify simple design processes and solutions (WATPPS25)	N/A		
Work independently, or collaboratively when required, to plan, create and communicate ideas and information for solutions (WATPPS26)	Throughout the unit	Completion of project in small groups	Students worked in small groups and followed steps to program robotics to collect data and present the findings to the class.

Log Values – Code