 Sustainable Soups for Sustenance – 5C STEM

Stage 3 Term 2/3 2016

How can we create a sustainable garden environment within our school and in turn help our school and local community?

Big ideas/why does the learning matter

Sustainable Soups for Sustenance.

‘How we can get our garden growing in a sustainable manner and help our school and local community at the same time.’

Built Environments (BE) – students develop their understanding about places and spaces, and their uses. People create, construct and modify their surroundings for a wide range of purposes. The environments people build are an important part of our communities and culture.

Driving question

How can we create a sustainable garden environment within our school and in turn help our local community?

Central syllabus ideas/concept

* Science and Technology – Built Environments – [Science (incorporating Science and Technology K-6) K-10 Syllabus](http://syllabus.nesa.nsw.edu.au/science/science-k10/) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2012
* Geography – Place – [Geography K-10 Syllabus](http://syllabus.nesa.nsw.edu.au/hsie/geography-k10/) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2015
* Mathematics – Numeration, Measurement & Geometry – [Mathematics K-10 Syllabus](http://syllabus.nesa.nsw.edu.au/mathematics/mathematics-k10/) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2012
* English – Writing (Letter, Report, Explanation, Information Reports) – [English K-10 Syllabus](http://syllabus.nesa.nsw.edu.au/english/english-k10/) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2012
* Creative Arts – Design artwork – [Creative Arts K-6 Syllabus](http://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/creative-arts/creative-arts-k-6-syllabus) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2006.

Hook/entry event

Rejuvenation of a school vegetable patch.

Excursion around local area with Aboriginal Community representatives to see native food sources.

Possible experts

Penrith City Council, local citizens, school community members, Herbarium Curator at the Royal Botanical Gardens, Penrith Council, Environmental Matters,

Local Aboriginal Community Educational Officers (Local Support – Panthers on the Prowl Program – Nutrition and Community Links)

Audience

Years 3-6 and families and friends, local community and local media.

Culminating event

Invite students (3-6) and their families to an Open Day to view displays of student’s work at harvesting time with taste testing available. Emu Heights Collaborative Stem Exhibition and invite local community and media.

Vegetables to be sold at Soup Kitchen.

Mathematics outcomes

Working mathematically

* MA3-1WM – describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions
* MA3-2WM – elects and applies appropriate problem-solving strategies, including using digital technologies, in undertaking investigations
* MA3-3WM – gives a valid reason for supporting one possible solution over another

Length

* MA3-9MG – selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length

Fractions and Decimals

* MA3-7NA – compares, orders and calculates with fractions, decimals and percentages

Addition and Subtraction

* MA3-5NA – selects and applies appropriate strategies for addition and subtraction with counting numbers of any size

Multiplication and Division

* MA3-6NA – selects and applies appropriate strategies for multiplication and division, and applies the order of operations to calculations involving more than one operation

Two-Dimensional Space

* MA3-15MG – manipulates, classifies and draws two-dimensional shapes, including equilateral, isosceles and scalene triangles, and describes their properties

Angles

* MA3-16MG – measures and constructs angles, and applies angle relationships to find unknown angles

Position

* MA3-17MG – locates and describes position on maps using a grid-reference systems

English outcomes

Environments

* ENS3.5 Patterns of place and location – demonstrates an understanding of the interconnectedness between Australia and global environments and how individuals and groups can act in an ecologically responsible manner
* ENS3.6 Relationships with places – explains how various beliefs and practices influence the ways in which people interact with, change and value their environment
* EN3-6B – uses knowledge of sentence structure, grammar, punctuation and vocabulary to respond to and compose clear and cohesive texts in different media and technologies
* EN3-2A – composes, edits and presents well-structured and coherent texts
* EN3-3A – uses an integrated range of skills, strategies and knowledge to read, view and comprehend a wide range of texts in different media and technologies

History outcomes

* HT3-1 – describes and explains the significance of people, groups, places and events to the development of Australia
* HT3-2 – describes and explains different experiences of people living in Australia over time
* HT3-3 – identifies change and continuity and describes the causes and effects of change on Australian society

Science outcomes

* ST3-4WS – investigates by posing questions, including testable questions, making predictions and gathering data to draw evidence based conclusions and develop explanations
* ST3-5WT – plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints
* ST3-10LW – describes how structural features and other adaptations of living things help them to survive in their environment
* ST3-11LW – describes some physical conditions of the environment and how these affect the growth and survival of living things
* ST3-13MW – describes how the properties of materials determine their use for specific purposes

Creative and Performing Arts outcomes

* VAS3.1 – investigates subject matter in an attempt to represent likenesses of things in the world
  + closely observes details of things in the world and seeks to make artworks about these
  + utilises different artistic forms and explores how symbols may be used in their interpretation of selected subject matter
  + explores subject matter of personal and social interest from particular viewpoints including objects, events, places and spaces

Open-ended assessment opportunities

Describes some physical conditions of the environment and how these affect the growth and survival of living things ST3-11LW

Assessments integrated across KLAs.

Pre – task

Driving Questions – “How can we create a sustainable garden environment within our school and in turn help our local environment and community?”

Midpoint – task

* STEM Learning Journal incorporating all KLA’s.
* Learning Journals QR codes
* Across Curricula – Aurasmas
* Children Progress Monitoring – A continuous measuring and documenting of change or progress against standard criteria
* The growth and survival of living things are affected by the physical conditions of their environment.
* Create learning journal
* Students explore our local school with the key question of …

How can we create a sustainable garden environment within our school and in turn help our local community?

Evidence to collect

A systematic teaching that engages students in learning the essentials knowledge and life-enhancing skill through and extend, student influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.

* It starts with the questions or challenge
* It is a student-centred activity
* It requires critical thinking, collaboration and communication
* It involves meaningful tasks
* It is assessed on individual basis

STEM – Buck Institute website that shows teachers how to use project-based learning – <http://www.bie.org/about>

Throughout this unit students will

* collaboratively and individually be selecting suitable methods for gathering data and information first-hand and from reliable secondary sources

Evidence to collect

* emotions displayed on back wall tracking students’ individual progress against standards
* letter to appropriate food organisations eg: Council

Students will conduct investigations by

* working individually and collaboratively in conducting a range of appropriate investigation methods, including fair tests, to answer questions or solve problems
* accurately observing, measuring and recording data, using digital technologies as appropriate
* using formal units and abbreviations for measuring and recording data
* suggesting improvements to the methods used to investigate a question or solve a problem.

Evidence to collect

* ongoing assessments through Learning Journals
* science explanation, testing, conclusions
* Ant-Pest Designs and Protype and final product
* information reports on Insects
* coding project outcomes
* student notes
* student photo journey
* students open night presentation including all student designed resources
* integration of technology in student presentations
* iMovies, Aurasma [website on making and using augmented reality] <https://www.aurasma.com/>
* QR codes, Coding projects.
* Microsoft Excel they can utilise this to produce graphs to record results.

Students process and analyse data and information by

* constructing and using a range of representations, including tables, graphs (column, picture, line and divided bar graphs) and labelled diagrams
* using numerical techniques to analyse data and information, including calculating the means and percentages of small sets of data
* drawing conclusions and providing explanations based on data and information gathered first-hand or from secondary sources
* comparing gathered data with predictions, and using as evidence in developing explanations of events and phenomena.

Evidence to collect

New South Wales Department of Education Learning Tools Selector web application – <https://app.education.nsw.gov.au/learning-tools-selector/Search>

Students will reflect on their gathered evidence in relation to

* the process used to gather, process and analyse their data and information
* their own prior knowledge as well as accepted scientific explanations their own and others' conclusions.

Learning activities

* constructing and using a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data including using digital technologies as appropriate
* using a variety of ways to accurately communicate ideas, explanations and processes, including multi-modal texts, labelled diagrams, as well as written and oral factual texts as appropriate
* map and plan a sustainable school space within our school environment using a sketching app
* analyse student questions and answers and document through recording student responses and ideas using the video on the class iPads
* discuss the environment and the need for gardens and their role in sustainability
* decide on the important elements for the garden
* design and plan a suitable garden
* discuss issues and limitations and ways to overcome them
* create a final garden plot design through consensus
* implement their plan to create a garden with assistance from other stakeholders and experts (Pop Buttercup, Kris McColl, Local Council, Environmental Matters – school student community, local community)
* participate fully in their STEM garden project with the commitment towards monitoring and achieving personal and group goals and to develop life – skills integrating many key learning areas
* use Science, Technology, Engineering and Maths predominantly to help solve problems with a focus on rich, deep thinking that will help overcome real life problems 21st Century tools to solve 21st Century problems.
* visit the vegetable patch and students make a plan through establishing what we need to do in order to get the vegetable garden growing
* use deBono Six Thinking Hats as a tool to strengthen critical thinking, collaboration, communication and creativity skills across all KLA’s in this enquiry based learning journal
* students use the iPads to video and recorder; teachers, support from community helpers and stakeholders to help steer, guide and scaffold the process
* discuss the environment and the need for gardens and sustainability
* decide on the important elements to include in a sustainable garden design
* research various vegetables and fruits that are in our garden
* adjust design and plan according to the learning journey of the students
* consider issues and limitations and ways to overcome them
* create a final design (through consensus) and use drawing and sketching apps to make garden plot prototypes using correct measurements – areas, perimeters, volume and length.
* students engage in collaborative thinking and once they have established the garden direction begin the purchase (money and budgets) and planting part of the program
* while plants are growing in the garden contact professionals with the aim of setting up experiments with differing scientific variants
* organise Herbarium Curator at the Royal Botanical Gardens to visit and provide educational opportunities and professional knowledge to set up experiments. Eg focus on light, water, soil, fertiliser variants
* investigate the growth and variables of the garden environment by predicting what the findings of an investigation might be through; posing questions, including testable questions, making predictions and gathering data to draw evidence-based conclusions and develop explanations
* applying experience from similar situations in the past to predict what might happen in a new situation under varying climatic conditions
* organise experiments and Test predictions, answer questions or solve problems including surveys, fieldwork, research and fair tests
* seeking guidance from the experts seek and decide which variable should be changed and measured in fair tests while keeping everything else the same
* using suitable equipment and materials, checking observations and measurements by repeating them where appropriate
* students use equipment and materials safely, identifying potential risk
* experiments are constructed with the help of students and predictions and results are recorded
* students then use this information to continue to grow plants to the best outcome based on evidence supported from their tests
* information and explanation science reports are written and recorded in books
* the students will look to the land and Aboriginal 8Ways Learning – by contacting Local Aboriginal elder Aunty Maureen and take up her offer to help establish native food garden
* discuss the diverse relationships between Aboriginal peoples and the British
* the role that a significant individual or group played in shaping a colony; for example, explorers, farmers, entrepreneurs, artists, writers, humanitarians, religious and political leaders, and Aboriginal and/or Torres Strait Islander peoples
* students look at bush tucker and establish a bush tucker garden alongside our vegetable garden with the consultation and help of the local Aboriginal community advisors
* look at ways the aboriginal community control pests (if so)
* students look at pests and research how they effect and how they affect plants
* invent, design and engineer environmentally friendly anti – pest devices to keep insects at bay in order to minimise crop damage
* experiment and provide a marketing plan to sell anti-pest devices to the parents of our school in order to fund further gardening produce projects. Self-efficient gardening
* describe a simple food chain, eg plant is food for caterpillar which is food for magpie
* represent simple food chains in a variety of ways, such as a pictorial representation or flowchart, eg plant → caterpillar → magpie
* using coding technology design an environmental ap that relates to bugs being eaten or handpicked in an ecologically friendly manner
* research and experiment with companion garden and the part it plays in sustainable gardening
* contact Enviro-matters visit and help with ideas and suggestions on how to get the worm farm up and how to make it viable
* use our experts and Kristine McColl to help identify endangered butterflies in our local community and how we can use our garden area to encourage their reproduction
* establish protocols for harvesting the food using food safety and managing timelines
* harvest and deliver produce to soup kitchen
* use the knowledge of aboriginal elders to inform us on how we can use sustainable practices to protect our
* become ambassadors for the environment with their families and in the community through writing articles for the school newspaper.

Evidence to collect

* Incursion (optional) – Dart Conferences website incursion (video conference) booking for ‘Target 100: Future Foods’ – <http://dartconnections.org.au/DART-excursions/target-100-future-foods-1?ItemID=3338056>
* Main excursion – Mt Annan excursion to look at Seedbanks in a High Tech facility. It has an awesome teaching classroom. The Sydney Royal Botanic Gardens’ website – <https://www.rbgsyd.nsw.gov.au/Learn>
  + Germination for younger groups is covered in:
  + ‘Get Growing’ section of the Royal Botanic Gardens New South Wales website – <https://www.rbgsyd.nsw.gov.au/Learn/Primary-School-Excursions/Royal-Botanic-Garden-Primary-School-Excursions/Get-Growing>
  + ‘Plant Connections’ section of the Royal Botanic Gardens New South Wales website – [https://www.rbgsyd.nsw.gov.au/Learn/Primary-School-Excursions/Royal-Botanic-Garden-Primary-School-Excursions/Plant-Connections](%20https:/www.rbgsyd.nsw.gov.au/Learn/Primary-School-Excursions/Royal-Botanic-Garden-Primary-School-Excursions/Plant-Connections)

Possible questions for Experiments

* What claim will you be testing?
* Do you need to research how you could test this properly? Where will you look for information to assist you?
* What will you be measuring? How will you actually measure this? How will you ensure your measurements are accurate?
* What equipment are you going to use? Is it available?
* What results will you record? How will you record these?
* Are there any safety precautions you need to take?
* List the steps you will do in your investigation.
* Have you designed a fair test?

Improve on their methods if they were to do the investigation again. What did they find difficult when doing this experiment? What would they change to make it better?

Post – task

* This project will culminate in the delivery of our school based projects in the school hall for an open night
* feedback/completed survey and collated results from all stakeholders
* paper to publish the project

Evidence to collect

* use of technology scanning information
* student work is presented to the school community/ public through exhibition including 21st century technology – QR codes, Aurasmas, Google drive, Class blogs and I movies
* students are asked to publicly explain the reasoning behind choices they made, their inquiry process, how they worked, what they learned, etc.