Glenreagh Public School

STEM Teacher Enrichment Academy North Coast Primary 2018

Garden Project for Years K-6

The STEM Garden Project involved students across the school from Kindergarten to Year 6. The objective was to *create an environment for all living things in our school*. Within the project all students brainstormed who lives in and uses our school environment and then considered what we may need to include in the garden space. Early Stage 1 and Stage 1 focused on the layout of the garden, building a model and coding Ozobot to travel through the garden model. Stage 2 focussed on Native Bees in our garden, researching their needs and building a bee hotel. Stage 3 focussed on native plants, visiting the botanic gardens and hosting a fundraiser to purchase native plants for the garden. A group of Gifted and Talented students participated in an enrichment research task and designed a Sphero powered garden machine which was presented at a school assembly.

Science and technology outcomes	STe-1VA ST1-1VA ST2-1VA ST3-1VA	STe-5WT ST1-5WT ST2-5WT ST3-5WT	STe-8NE ST1-10LW ST2-10LW ST3-10LW
Mathematics outcomes	MAe-9MG MA1-9MG MA2-9MG	MA2-5NA MA3-5NA	MA2-16MG

Statement of impact

Through the Glenreagh Garden Project students were engaged in authentic learning experiences. Students in all classes showed enthusiasm towards their involvement in the project and demonstrated initiative in seeking and utilising the required resources. The project also successfully engaged members of the community who volunteered their time and expertise to assist us. Through the design thinking process students developed resilience, problem solving skills and collaboration skills. Glenreagh Public School is looking forward to further school wide STEM projects and fostering a culture of authentic, project based learning in classrooms.

For more information
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THE UNIVERSITY OF SYDNEY

Introduction

Time travel is theoretically possible, scientists have said. One of the researchers, Ben Tippett, said: "People think of time travel as something fictional and we tend to think it's not possible because we don't actually do it. But, mathematically, it is possible."

https://www.independent.co.uk/news/time-travel-possible-time-machine-dr-who-tardis-spacetime-university-of-british-columbia-university-a7711411.html

Scientists have travelled forward in time to the year 2028 to investigate the changes in technology that have occurred in the last ten years. In particular, they are investigating the advances that have been made in the agriculture industry. In their travels they have discovered robot powered machinery that can assist with garden maintenance.

Challenge

To design and build the prototype for a simple garden care machine that can be powered by Sphero. The machine should streamline garden care by carrying out an autonomous task such as planting or irrigating as independently as possible.

Presentation

During the presentation your team must:

- Demonstrate the machine and explain how it will streamline garden maintenance.
- Demonstrate the coding component of the product and explain how the machine can carry out its task independently.
- Explain the reasons why this particular machine was chosen and why the selected materials were used.
- Explain, including three reasons, the impacts that a trip to the future would have on technology and scientific advancements today.

Before you commence your presentation you must present the following:

- A copy of your script
- A sketch of your machine demonstrating the design process.

Glenreagh PS Garden Project | Stage 2 | Science, Technology

Unit overview

How can we create a useful space for all living things in our school environment?
The Coffs Harbour Botanic Gardens have donated their old board walk to the school. The school in consultation with the P&C have decided to use this resource to create a garden space for all living things in our school environment. ES1 and S1 students will learn who uses our school grounds, how can we attract and protect these species. Students will also consider the population of our students and community and their history when designing elements of the garden.

Duration

13 weeks

Outcomes

Science and Technology K-6
ST2-2DP-T selects and uses materials, tools and equipment to develop solutions for a need or opportunity
ST2-5LW-T describes how agricultural processes are used to grow plants and raise animals for food, clothing and shelter

Science K-10 (inc. Science and Technology K-6)

- ST2-1VA shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities
- ST2-2VA demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures
- ST2-16P describes how products are designed and produced, and the ways people use them
- ST2-15I describes ways that information solutions are designed and produced, and factors to consider when people use and interact with information sources and technologies

Assessment overview

Students will complete a range of multimodal resources to share with other students and community members.
Students will complete a number of designs and models to represent our garden space and individual elements.
Students will use coding to solve digital technology challenges.

Content

Design and Production

Identifying and defining

- critique needs or opportunities for designing solutions through evaluating products and processes
- define a need or opportunity according to functional and aesthetic criteria
- consider potential resources in defining design needs and opportunities
- investigate and research materials, components, tools and techniques to produce design solutions (ACTDEP014)

Researching and planning

- identify and define a design problem with consideration of practical and aesthetic needs
- consider sustainable use of resources and time constraints in planning design solutions
- develop, record and communicate design ideas and decisions using appropriate technical terms
- produce labelled and annotated drawings including digital graphic representations (ACTDEP015)
- plan a sequence of production steps when producing designed solutions individually and collaboratively (ACTDEP018)

Stage 2 - Information

There are processes and considerations involved in designing and producing information solutions.

Teaching, learning and assessment

Phase 1: Weeks 1-4

Weeks 1&2 - Brainstorm who uses our garden space?
Brainstorm elements to include in the garden?
In groups students research four driving questions and produce a digital text to teach others about their area of expertise.
What if native bees were removed from the ecological web?
What flora and fauna are native to our area? How/Why have they adapted to our area?
What kind of plants did the local Gumbaynggir people use to support and sustain life?
How can we attract and sustain native insects and animals?
Weeks 3&4- In groups students will measure the garden space and create a scale drawing for a draft plan of how the garden will look. We will pool our ideas and decide on a final plan for the garden space.
Students will collaboratively create a model of the garden i.e. each group of students will be responsible for creating a specific element for the model. Students will then code Ozobot through the model and produce a digital tour of the garden to share with community members.

Phase 2: Weeks 5-8

How can we fund this project and who can help us?
Week 5 – List the materials needed for each element. Research the cost of these materials.
Weeks 6&7 – Plan a fundraising event and develop a business plan and budget with estimated profit.
Begin building garden space. Each class will have designated elements to design and work with community members to build.

Resources

- A3 paper
- rulers
- iPads and laptops for research
- iPads for creating digital texts
- Recycled materials for building model
- Ozobots & iPads for coding through garden model.

- iPads & laptops for research
- Materials for beginning to build garden space

Students: ▪ use common digital technologies and applications to organise and communicate information for a specific task, eg word processing and digital presentation software ▪ investigate the effectiveness of an information solution for its intended use, eg a game or animated story book ▪ demonstrate how a variety of media can be combined to address the needs of a specific audience, eg combining visual images, sound and text in a digital presentation People interact with information sources and technologies in a variety of ways. Students: ▪ interview the users of an information solution and find out how the design has influenced their decisions and opinions, eg the design of advertisements ▪ explore how people use current and emerging technologies to communicate, access and record information, eg email, mobile phones, blogs and wikis A range of factors need to be considered when using information sources and technologies. Students: ▪ demonstrate appropriate safety and etiquette in relation to computer usage, eg general computer care, file security, maintaining confidentiality of passwords, printing and sharing resources ▪ acknowledge ownership of information when selecting and using information, eg citing sources	### Phase 3: Weeks 9 - Week 3 (Term 3) **Week 9 -** Create garden care books or multimodal texts to teach ES1 and S1 students how to care for the gardens. **Weeks 10 -** How can we streamline garden care with automated machinery? In two teams develop an innovative product powered by Sphero that will streamline garden care e.g. seed planter, irrigator, rotary hoe etc. This product is to be presented in a Tournament of Minds style presentation in Education Week Term 3.	• iPads and laptops to research and create multimodal texts. • Spheros • Recycled materials • Art and craft supplies such as plastic cups, pipe cleaners, straws, skewers etc.

Evaluation

Glenreagh Public School Garden Project ES1-S3 Term 2 2018	
Big Ideas/Why does this learning matter?	The Coffs Harbour Botanic Gardens have donated their old board walk to the school. The school in consultation with the P&C have decided to use this resource to create a garden space for all living things in our school environment. ES1 and S1 students will learn who uses our school grounds, how can we attract and protect these species. Students will also consider the population of our students and community and their history when designing elements of the garden.
Driving Question	How can we create a useful space for all living things in our school environment?
Supporting Questions	How can we attract and sustain native insects and animals? What if native bees were removed from the ecological web? How can we fund this project and who can help us? How can we streamline garden care with automated machinery? What flora and fauna are native to our area? How/Why have they adapted to our area? What kind of plants did the local Gumbaynggir people use to support and sustain life?
Syllabus Outcomes	<u>Science</u> Living World, Working Scientifically, Built Environments, Woking Technologically, Digital technologies, Products. <u>Mathematics</u> Measurement – length, area, volume and capacity, working mathematically. Data – Graph growth etc. Entrepreneurial skills – addition and subtraction of money, costing of project. Culminating in fundraising stall at the Glenreagh timber festival with P and C support.
Hook/Entry Event	Visit to the Botanic Gardens and cultural display.
Possible experts	Rick Ackland from Botanic Gardens, Michael Aboriginal elder, community members to assist with building, bee keeper?
Audience	Students K-6 will be involved in designing the garden space and then all students will be involved in the ongoing care of the garden.
Culminating Event	Partial garden opening on 9th August at Education Week picnic. Students will show parents and community members how the garden has progressed. At Presentation Day in Term 4 we will open the completed garden and view a video of our journey.
Milestones	**Description of event/process/activity/program**
Phase 1 – Plan elements and layout of garden.	The unit will begin with a visit to the Coffs Harbour Botanic Gardens to participate in activities relating to careers in horticulture. On the same day they will also be exposed to an Aboriginal cultural show. These events will engage students in considering the layout and elements of a garden space as well as the uses of flora in Indigenous history. *How can we attract and sustain native insects and animals?* *What if native bees were removed from the ecological web?* *What flora and fauna are native to our area? How/Why have they adapted to our area?* *What kind of plants did the local Gumbaynggir people use to support and sustain life?*

	Students will research native flora and fauna species to Glenreagh and determine who will use our garden. They will then research how we can cater to these species needs. Students will also research flora used by the Gumbaynggir people and include this in a bush tucker garden. Students will map out a scale plan of how the garden will look and collaboratively create a model i.e. each group of students will be responsible for creating a specific element for the model. Students will then code Ozobot through the model and produce a digital tour of the garden to share with community members.
Phase 2 – Funding the project and begin building.	*How can we fund this project and who can help us?* Students consider what materials we will need to complete the project and who can help us (e.g. careers and community members). They will conduct research to determine the cost of the garden project based upon the materials that we will need. They will then brainstorm a fundraising event and product to sell at the local Timber festival in order to raise money for the garden project and appeal to necessary community members to engage their assistance. Stage 2 & 3 students will write business plans and develop a budget for the production of their product and estimate profit.
Phase 3 – Streamlining garden care.	*How can we streamline garden care with automated machinery?* Stage 2 & 3 students will create garden care books to teach ES1 and S1 students how to care for the gardens. They will also develop an innovative product powered by Sphero that will streamline garden care e.g. seed planter, irrigator, rotary hoe etc.
Phase 4 – Presentation.	The partial garden opening will be held during Education Week in Term 3. At the end of Term 4 the completed garden project will be opened at presentation day and a video created in collaboration with students will be displayed.