Children's Education at the Singapore Botanic Gardens

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Abstract

The first botanic garden in Singapore was established in 1822. This was eventually discontinued and restarted at its present location in 1859. A School of Ornamental Horticulture was established in 1972 in the Gardens. Though its focus was formal training in horticulture it had an arm that provided outreach programmes promoting education and awareness about plant diversity. While the demand for formal training leading to a Diploma or Certification was steady over the years, it was small, with about 30-35 students a year. However, the demand for informal educational programmes from the public and from the schools continued to grow.

In 1998, the Gardens partnered a local Polytechnic to offer an upgraded Diploma in Horticulture and Landscape Management. The Gardens itself, focused its attention on outreach programmes. We now reach out toabout 19,000 children and 700 adults a year. As the demand was mainly from school children, we made a strategic decision to plan and build a garden dedicated to the entertainment and education of children. A major sponsor was secured. The Jacob Ballas Children's Garden in the Singapore Botanic Gardens will be opened later this year. This paper focuses on Children's education in the Singapore Botanic Gardens.

Introduction

The Gardens has been the leading provider of trained horticultural workers since 1972 when the School of Horticulture was first set up. It ran two formal horticultural programmes, offering a Trade Certificate and a Diploma, respectively. These were part-time programmes ran largely in the evenings and weekends. By 1997 over 600 graduates had been trained, forming the backbone of a skilled workforce supporting the transformation of Singapore into a garden city. In order to upgrade the quality of its graduates, the Gardens partnered a local polytechnic to provide a 3-year full-time Diploma in Horticulture and Landscape Management. This replaced the earlier part-time evening programme. The first intake of this programme, which trains about 40 students a year, was in 1998.

The needs of the nation however went beyond what these training programmes can provide. It was felt that the entire horticultural and landscape industry needed upgrading. It was also felt that gardening as a hobby and recreation could benefit from greater support and opportunities.

To this end, an entirely new Division called Industry Development was recently set up as an arm of the National Parks Board (Nparks), our parent organisation. This has a mission to upgrade the industry through skills training for industry practitioners, professional development and to act as a platform for knowledge sharing. It also took over the running of the formal educational programmes from the Gardens.

Another recent initiative by NParks is the "Community in Blooms" programme where opportunities are provided to interested community groups to participate in gardening activities. To date there are over 150 such groups.

In the Botanic Gardens, data over the years indicated that over 80% of the participants in our educational outreach activities are children. Currently we reach out to over 19,000 children and 700 adults a year with our talks, and other educational programmes. Responding to this demand, for children's activities, we refocused our efforts on children's education and strategised for the development of a Children's Garden.

Workshops and tours for children

In the Botanic Gardens we offer a fairly wide range of guided tours as well as workshops with the aim of furthering our mission to "connect plants and people." Currently more than 15 programmes are offered. Tours typically last one or one and a half hours. Children are usually provided with specially designed worksheets, a clipboard and writing materials and/or crayons for them to carry out the activities under the guidance of an education officer. They are conducted outdoors.

An old favourite, running since 1994, is a treasure hunt based on the adventures of Sara, our resident dinosaur. A storybook that doubles as an activity book called 'Sara the forgetful dinosaur,' accompanies this programme designed for kids 5-8 years old. Children follow Sara's adventures as she hunts high and low for eggs she is looking after for her mother. In searching for the eggs, children discover interesting plants and are finally delightfully rewarded when the candy eggs are found.

Children can also share Sara's adventures in another story/workbook entitled 'Adventure with plants, Sara at the Evolution Garden.' This programme set in our new Evolution Garden takes children along a trail where they encounter a selection of plants in an evolutionary sequence, including bryophytes, ferns, cycads and flowering taxa.

The Evolution Garden is a good example of how different tour programmes are designed for different age groups. While Sara's adventures entertain and teach children aged 5-8 years, other tour programmes in this garden are designed for older kids. "Evolution Garden Tour: Plant Classification" and "Evolution Garden Tour: Evolution and Adaptation of Plants," are for children 9-12 years of age.

Workshops typically run for either half a day or a full day. Worksheets, art and craft materials, plants and potting mixes are provided. They are conducted both indoors and outdoors. Examples include, "Young Fern Dectective," a full day programme that includes a fern trail tour, looking at ferns under a microscope and planting a little fernery in a container that participants will be able to take away with them. A half-day workshop that wows the children with the wonderful, large and unusual trees in the Botanic Gardens is the popular, "Trees and Me."

The children's garden

Growing an idea & guiding principles

The demand for children's programmes is very strong. At the same time we felt that we could move children's education to a higher plane with a special place in the Botanic Gardens dedicated for the use of children. A few years ago we started to plan systematically to create such a facility. First we gathered information from all available sources including making visits to gardens in the UK and the USA and listening to others with experience in running a children's garden.

Careful thinking and planning using the information gathered then helped us achieved clarity in determining the philosophy, goals and theme for the garden. They enabled us to develop our guiding philosophy, "creating happy memories in a fun and wonderful place and developing an appreciation for plants and the environment." It will be a garden for children to explore, play, laugh, enjoy and develop a sense of wonder. It will be a Garden where they will feel safe and comfortable. The theme will be "all life on earth depends on plants." With these guidelines established, we drafted a concept plan detailing all the different features we hope to see.

The major challenge was balancing the fun, adventure and creative play with safety concerns, and the freedom of unstructured exploration with elements of structured learning. Another challenge is the use of plants to tell their stories instead of using props and artificial models and science-centre type mechanical exhibits. Finally, the greatest challenge to us, our designers and contractors was perhaps transforming ideas into form.

A decision was made to use the butterfly as a motif in our Children's Garden. Butterflies always delight children. They represent active life, brightness, beauty and joy. We also decided that the Garden will be pesticide free, not only from environmental concerns but for health reasons.This fact will be weaved into relevant educational programmes.

A 2 ha plot of land in the Gardens was identified taking into consideration, access, parking and existing vegetation. Next funding was sought and a team with educational specialists, botanists, horticulturists and artists was formed.

We managed to secure a major donation that allowed us to fully explore and develop our goals. Our Children's Garden is named for Jacob Ballas (1921 – 2000), who was a successful stockbroker and whose trust made us a beneficiary.

Features

The Children's Garden may be conveniently divided into two key components: plant features and fun features.

Plant Features

An interactive photosynthesis exhibit anchors plant features. This is an artificial tree with fruits. Cranks that the kids must turn, activate major elements required in photosynthesis. One crank makes water (and minerals) flow up the tree in a transparent tube built into the trunk, another lights up the sun (providing energy), another shows that carbon dioxide in taken up by the tree and the fourth shows that energy and food is make by the tree and oxygen is produced when the fruits light up and air gushes out from the nozzles embedded in the leaves. Interpretative plaques and guides will explain that plants with their chlorophyll through photosynthesis are the primary producers. The magic of photosynthesis is the process that makes life possible for other living beings, including humans.

Beyond this exhibit children cross a rope bridge and start their "walk of amazing plants" in a "forest of adventure." Here they can walk under a waterfall, see aquatic animals in ponds and a stream and will encounter various plants displays. These include plants that are carnivorous, aquatic, epiphytic or are with unusual fruits or that produce easily identifiable products used in their everyday life. Elsewhere they will encounter an area that displays decomposition and learn about nutrient cycling. Before they emerge from the "forest" they will come to a tree house enveloped by the aerial roots of banyan trees.

The special displays of plants that impact the kids' everyday life include plants for dye, fibre, fruits, beverage, and herbs and spices. There will be a sensory trail where kids encounter plants of various textures, fragrant plants and plants with special tastes including spicy hot, sweet and bitter.

To help us achieve our objective of creating a fun and memorable place, several 'indicator' species were planted. These include two species with very large and unusual fruits, the Calabash Tree (*Crescentia cujete*) with its smooth green melon-like fruits hanging from branches and the Cannonball Tree (*Couroupita guianensis*) with its brown football size fruits on the main trunk. Another species that add to happy memories is the Saga Tree (*Adenanthera pavonina*) whose very hard, bead-like shiny bright red seeds never fail to delight children (and parents) who pick them off the ground.

Another conscious decision to help us generate happy memories is the planting of plant species that attract butterflies. These are either species that produce nectar for the adults or are those that caterpillars feed on.

Fun Features

Specific non-plant fun features, guided by our theme of "laughter and joy" are integrated into the "forest of adventure" and also located elsewhere. For the very young there is a sand pit with several play equipment. Other features include a water play area with water jets that can be activated by kids and mechanical pumps

where children can collect water for watering potted plants that will be placed on a rack. There is a plant maze, a cave under the waterfall, the tree house and slides descending from the tree house.

Programmes

Learning in the Children's Garden may be classified in several broad areas:

(i) informal creative play, exploration and discovery,

(ii) informal learning from the exhibits, interpretive signages and brochures, and

(iii) facilitated learning provided through organised programmes.

Informal Play and Learning

The Garden is designed as a safe, interactive, fun and educational environment where children from the very young to 12 years can play and explore on their own. We however expect their adult minders to take responsibility for the actions of their kids.

The plants have been selected for their diversity, habits and colours, beautiful leaf shapes and their unusual flowers or fruits. Children can use all their senses to explore and investigate these plants, with adult supervision.

A rich selection of interpretive signages will accompany many plants.

Guided Programmes

Educational programmes for school groups and family groups (with children) are being developed.

The themes being developed will directly relate to the exhibits and plants in the Garden. A list of proposed topics for our programmes in this garden is presented in the table below.

Proposed Topics	Learning Objectives
Walk of Amazing Plants	To discover different types of plants in the plant kingdom What is a plant? Plants & Their Differences. Plant Diversity.
Plant Classification	Plant Diversity. Flowering & Non-Flowering Plants Land & Water Plants Poisonous & Non-Poisonous Plants
Plant Identification	The Diversity of Plants. To learn to identify different types of plants Names of common plants
Looking at Plants	Looking at general characteristics that make up a plant: Stem / Leaf / Flower / Fruit / Seed
The Magic Of Photosynthesis	How plants make food? What is photosynthesis? The photosynthesis process
Blooms In The Garden	Different types of flowers Parts of a flower Function of a flower
Fruits Glorious Fruits!	Tropical fruits / Local fruits Temperate fruits / Imported fruits
Walk of Discovery (Plant Products)	Products from Plants: Food / Clothing / Medicine / Building / Perfume

Food From Plants	Parts of plants which can be eaten Vegetables / Fruits Consumers: Humans & Animals
Plant Life Cycle	How plants make new plants. Plant parts and what they do. Learning about what it takes for a plant to grow well.
Plant Propagation	To learn different methods of propagation To grow new plants from old.
Plants & Animals In the Gardens	To study common minibeasts in the Garden Learning about the inter-relationship between plants & animals
Arts & Crafts In The Garden	Hands-on workshop for the young Drawing / Painting / Colouring / Clay modeling / Sculpting
Story-Telling In The Garden	Story time in the Gardens

Table 1. Educational Topics/Programmes for the Children's Garden

Each programme we offer will be accompanied by a set of notes compiled for the adult guides who may be our education officers, teachers, part time educators, or volunteers.

In addition, depending on the programme, there will be worksheets for the children (with model answers for the guides). For every programme there will be evaluation forms to be completed by the teacher or accompanying adult. Another form will be designed for feedback from the child participant.

Example of a Programme

As an example, an outline of a programme (Walk of Discovery – Plant Products) is provided here together with the table of contents for the notes that will be provided to the adult guides.

Programme Title : WALK OF DISCOVERY (PLANT PRODUCTS)

Description : An educational tour for students to the Jacob Ballas Children's Garden, introducing the various products from plants. Learn about the importance of plants to all living things in the world. Experience an exciting tour discovering some of the wonderful plants we use almost daily in our life.

Learning Objective :
* To learn the many uses of plants.
* To discover the many products derived from plants.
* To realize that plants are important for all living things and that we should never take them for granted.

For : 7 to 12 years old

Group size : 20-25

Duration : 1-1.5 hr

Location : Jacob Ballas Children's Garden

Plants / Points to cover: Notes of tour is attached

Instruction (s) to guides :

To meet participants at the visitor centre of Jacob Ballas Children's Garden. A short briefing in the classroom on what can be expected from the programme, before proceeding on the tour.

Table of Contents

1. Plants and Life on Earth

2. Plant Information

- *Saccharum officinarum L.* (Sugar Cane)
- *Lawsonia inermis* (Henna)
- *Coffea liberica* (Liberian Coffee)
- *Pandanus amaryllifolius* (Fragrant Pandan)
- *Thebroma cacao* (Cocoa Tree)
- *Cyperus papayrus L.* (Egyptian Paper Plant)

3. Worksheet (Optional) & Model Answers

Conclusion

The Singapore Botanic Gardens has a policy on education since 1972 when a School of Horticulture was set up in the Gardens. This evolved to meet the prevailing needs of the changing socio-economic and other macro indicators and directions of Singapore. Responding to more recent visitor needs, the Gardens refocused its education outreach activities on children's education to meet demands as well as to fulfil its mission in education and conservation. An analysis of the situation suggested that we could go beyond merely expanding our children's programmes to creating a special garden dedicated to children for their enjoyment and education in plants, nature and environment.