

A photograph of three children in red long-sleeved shirts, focused on planting seeds into a blue tray filled with brown growing media. The child in the center is looking down at their hands, while the child on the right is looking to the side. The child on the left has a name tag that says 'PALENI'. The background shows some green foliage.

*Children planting seeds in the growing media.*

# **Simplified Hydroponics for Kindergartens**

Hydroponics has become a valuable educational tool to stimulate learning and improve the nutrition of four and five-year-old children in this Uruguayan kindergarden.

Story by Martin Caldeyro Stajano (M.Sc.)



*Lettuce is harvested by the children.*



*The children taste and eat their own produce.*

**A**t the Kindergarten of The British Schools, in Uruguay, there is a continuing interest in finding new ways to improve the educational system. The kindergarten experimented with a traditional garden plot with little results, due to several factors – limited space; mud prevented the children from keeping clean; the large number of children participating in the activities has not allowed the direct handling of tools; watering has been too complex for them to carry out; and last, the crop has not been worth it, taking into account the big effort made by the group.

Therefore, when they had the opportunity to learn about the hydroponics technique at AQUAFOOD (where teachers and children are exposed to an audio-visual and direct contact with a different and innovative way to cultivate plants), there was great interest amongst the teachers. After observing the enthusiasm of the children and their involvement, the idea was born of integrating this technique at school.

Simplified Hydroponics is hygienic and does not require a lot of space, and it offers direct and individualised participation by children. It allows children to observe plant roots without pulling the plant out of its environment, and to watch as plants grow relatively quickly.

In 1999, a team of teachers joined with author to plan a simple hydroponic project for the 70 children who attend the kindergarten every day. This was the first time hydroponics had been adopted as a learning aid at a pre-school in Uruguay. The objectives of the project were to:

- Facilitate an understanding of the life cycle of plants.
- Facilitate an understanding of plant functions.

- Participate in the process of food production.
- Contribute to the development of healthy eating habits.
- Develop teamwork among children in group projects.
- Motivate respect and values for life in nature.

### Teacher teamwork and resources

There were four teachers and one coordinator who worked with two groups of 35 children, morning and afternoon. The materials used were sand, rice skulls, nutrients, water, plastic, logs, ice-cream containers, plastic pots, PVC pipe and seeds.

A small greenhouse shelter was built in the backyard corner of the kindergarten. Supported by wooden posts, the roof was covered with plastic and a sun-shade screen to protect the plants from the sun, rain and wind. The plants were placed on long wooden planks, elevated above the floor. Small boxes wrapped in plastic were filled with sand and rice skulls and used as nursery beds. The growing systems also included a large floating system, and PVC pipe attached to the side wall.

### Kindergarten activities

#### Preparation

Hydroponic cultivation was integrated into the kindergarten curriculum as part of the unit "Plants", and included the following elements:

- Parts of the plant.
- Growing requirements.
- Functions of the plant.
- Life cycle of the plant.
- Parts of the plants that can be eaten.





*Children water the seeds in the nursery.*



*Observation of seeds using magnifying glasses.*

### *Theory-practice*

During the second term (mid-August to the beginning of November), a series of visits to AQUAFOOD were carried out to develop the following activities:

*Motivational talk* – A talk with slides to introduce this alternative way of planting to children, inviting them to cultivate their own plants.

*Nursery* – Observation of seeds with magnifying glasses, and sowing seeds in the nursery. Afterwards, observation of the germination process, and the development of small plants.

*Transplanting vegetables* – Transplanting small plants to containers and adding water and nutrients. Each child transplanted two lettuce to an individual box. Lettuce varieties included butterhead, red and crisp lettuce. Each child also transplanted basil and parsley into a small plastic pot filled with solid growing media.

*Transplanting flowers* – Transplanting marigold to a small plastic pot filled with solid growing media.

*Transplanting a variety of vegetables* – Transplanting lettuce, radish, strawberries, cabbage, herbs, etc., to the PVC pipe system. This activity was carried out collectively.

### *Caring for the plants*

There were many visits to the kindergarten to teach the technical aspects of Simplified Hydroponics. The children inspected their own plants periodically (water level, water colour, root aspect and plants leaves), always in the company of the teachers, who continued reinforcing concepts and instructing them about the control and growing of plants. As an agronomist,

I taught the teachers how to prepare the nutrients, so the children could refill their containers when needed. I also monitored the childrens' plants to ensure the best conditions were achieved for optimum growth.

### *The educational process*

A talk was given to parents, family and members of the school. It was open to everyone who was interested. The purpose of the talk was to relate the experience seen from an educational point of view, and evaluate the experience at the kindergarten. The whole process was illustrated with photographs. In this way, it was possible to help parents understand the educational process their children experienced.

### *Tasting and eating*

When it was ready to harvest, some of the produce was collected (lettuce, chives, radish, basil, etc.) by the children, and washed and prepared in a salad with oil, vinegar, lemon and salt. This was always done under the supervision of a teacher. Snack tables were laid and the children encouraged to taste or eat the salads. The message was: "I taste, if I don't like it, I may leave it", which was very effective. The children felt free to satisfy their curiosity, and the message stimulated their willingness to explore. In this way, it became an adventure for the children who experienced new tastes, including a hot radish, which was fun to watch at times. Ninety per cent of the children tasted the different types of produce, and many confessed they liked it more than when they were younger. A large number of children simply devoured the offerings.

### *The vegetables arrive home*

When the plants were ready for harvest, they were given to the



*Children looking after their plants.*



*View of the plants and greenhouse shelter in an unused corner of the kindergarten.*

children to take home to eat with their family. A note with instructions for parents was written in their school communications book (diary), to be sure the plants arrived safely home. Each child took home:

- One box with two varieties of lettuce grown in water.
- One basil or parsley plant, and a flower plant, all cultivated in solid growing media. These plants were to be transplanted in soil at home, encouraging the child and family to continue the growing process during summer.

### Visit to a supermarket

The objective of the visit to a supermarket was so the children could understand the process involved for vegetables and fruit once they are harvested; from the moment they arrive at the supermarket until they are placed in the stalls for sale. The children saw the entire process: the trucks, unloading of boxes, the cold rooms, packing, weighing and price sticking, and the way the fruit and vegetables were placed in the stall and sold.

### Results

#### The children

From hands-on experience, the children had direct observation of plant development, with continued involvement until the plants were ready to eat, the final experience for each child.

With regards to knowledge, they learnt about the needs and functions of plants, and understood the importance of human intervention in the growing process. In the different areas of

learning, the children also related the experience to mathematics, natural science, literacy, art and music.

### Developing values

The hydroponic project encouraged a commitment from the children to look after their plants during the growth cycle, from seed to harvest. It also gave the children a respect for life sciences, and helped develop self-esteem for having been part of a project as producers of food, or decorative flowers. The hydroponic project not only taught the children how to work together as a team, but helped them develop healthy eating habits.

### Dietary Habits

At the age of four and five years, eating habits are still developing. A significant benefit of the project was the improved eating habits of the children and their families. Over a three-month period, the acceptance of vegetables in their diet went from 51% to 74%, an increase of 23%.

Table 1. Lettuce consumption of the children

	Initial Situation		Final Situation	
	Children	%	Children	%
Do not like Lettuce	34	49	18	26
Like Lettuce	35	51	51	74
Total	69	100	69	100

Source: evaluation made in class with the children at the beginning and end of the project (November 2003).





*Martin Caldeyro Stajano with children from the Kindergarten of The British Schools, Uruguay.*



*Children enjoying the success in the production of their own plants, which they take home to share with their families.*

### *The family*

The hydroponic project promoted dialogue between the family and children, and parents followed their progress with interest. Parents also questioned teachers about how it had been done, and commented that their children had shown more knowledge about science facts. Some children asked for more plants and participated in the maintenance of the gardens. Other children started garden pots at home, and asked for seeds. Some children asked their parents to bring plants to school (such as sunflowers and strawberries), and to bring tomatoes or other uncommon fruit for snack time.

The children showed more interest in food, especially fruit and vegetables, and became more involved in the preparation of meals. Parents hold the hope that it is possible to change the diet of their children to include healthy food. They realised that the experience was a valid way to improve the nutrition of their children.

At the end of the experience, the children took their high quality plants home, and there is a special moment when the lettuce comes to the table. It is, somehow, a ceremony, where the child becomes the most important person in the home. Everyone acknowledges the child as someone who is valued for their own knowledge and experience, which the rest of the family do not have.

### *Final evaluation by parents*

In 93% of cases, parents observed that the hydroponic experience motivated their sons and daughters. The final

products grown by the children and taken home were considered of excellent quality. Of the children, 78% were motivated to cultivate plants in their homes. Of the parents, 90% said it was very important to continue these activities to promote the wellbeing of their children.

### *Conclusion*

It is evident that Simplified Hydroponics is a valuable tool in the education process, because it arouses curiosity in young children and stimulates their learning. It also brings them nearer to nature, and increases their self-esteem and personal satisfaction when they become aware of their achievements over a short period of time.

This has been a most rewarding experience for all those who have been involved in the project. While the project started at school, developing knowledge and better eating habits in children, it ended by passing its "fruit" on to the family itself. As an educational tool, Simplified Hydroponics should be adopted in other education centres in Latin America.

### *About the author*

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