

COMBINING SPECTRA PROJECTS

Anthony Nolan O.A.M

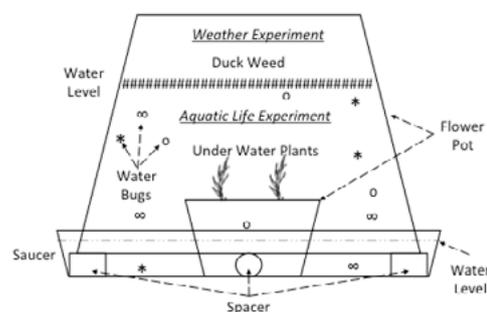
Both our children, Ryley and Flynn, attend Lane Cove Public School (LCPS), which has a very strong STEAM teaching environment, and actively encourages student participation across the school. Our family's work and hobbies often include activities and experiments in the science and maths professions, hence when ours and our children's worlds collide, science tends to occur.

Ryley is almost 8 years old and is in Year 2. Flynn is just 5 years old and is in kindy. Both Ryley and Flynn are involved in the school's gardening club and are helping me restore the school's frog pond. (I helped establish the first frog pond when I was a student at the same school in the 1970s.) Our family also competed in GovHack Australia 2017, using Bureau of Meteorology's data in a rain predicting model.

Naturally, when our children learnt about SPECTRA, both Ryley and Flynn expressed a strong interest in taking part. This year, they are currently each doing six projects across two worksheets.

As data scientists, my wife and I do a lot of analytical modelling and profiling in both the environmental and robotics/artificial life fields. One day, we happened to be driving into the country to collect bugs, when we started talking about both the weather and water projects, and what they had in common. One project was 'Weather Watch', the other about 'Pond Life'. We were discussing about how to keep the water bugs alive and what weather/environmental conditions were needed.

The boys quickly made a connection between the projects, which both involve water. They linked them together by thinking about how water was sourced, how water was the main substance in both weather and pond life, and how one fed the other in a cycle/cause and effect sequence.



As a result, we decided to build an upside down 'aquarium', which is sealed at the top and simulates rain, fog, mist, and cloud to generate weather patterns, while remaining open at the bottom for servicing and providing food and water. To do this we simply bought a transparent flower pot and saucer from Bunnings, turned it upside down and — using a retractable air tube — generated a vacuum inside, which sucked the water three quarters of the way into the pot. The aquarium was placed on top of a freezer in the garage near a north-west facing window.



The aquarium contains pond water and water bugs from Peats Ridge, water plants from the Blue Mountains, water snails from a pet shop, and duck weed from Terry Hills. Within three days, we had observable weather patterns where Flynn could see clouds, mist, fog and rain forming. Within a week, the water bugs (4 to 6 of different types) had claimed territory, and within two weeks they had started breeding. We now have a thriving aquatic experiment. Ryley is still trying to identify all the bug types, as well as mapping out their behaviours.

We run informal coding and robotics gatherings at our house for some children from the school. Ryley's classmate, Grace, saw the setup and immediately wanted to know more.

Naturally, Grace wanted one too, and Ryley knew about repeating experiments to confirm results from what he had learnt at school. So, he thought, why not help Grace set one up too? Grace, who is 8 years old (also a Year 2 student at LCPS and a keen SPECTRA participant), designed her own setup, which is smaller, but still follows the same methodology. Emma became the 4th member of the team, helping with catching the water bugs, and housing an offsite habitat also.

A surprise occurred in our experiment when 30 baby bugs appeared and they seemed different to the rest of the bug population. We are now waiting to see if they are from those bugs already established, or from eggs on the plants. While some of the bottom water plants have died, there is still a healthy number, and the top weed is thriving. It appears that a food chain has established itself within the aquarium. However, a top-up of water has been necessary, to ensure that air does not leak into the aquarium and flood the garage.

Although Flynn originally participated as a home study student because of his age, the school decided to present him with his SPECTRA certificates at an assembly, making him the youngest in the school to receive them.



The word of the children's project spread to other schools through a YouTube video about the experiment. The experiment has been continued in three different stages: the first being just water plants, the next with land plants, air breathing bugs and water maze, and the final variation was a return to a simpler habitat. The group also experimented with cold and heat to generate different weather conditions. Several of the water bugs have, and there are many babies in the habitat.

The experiment now has its own web page and there has been a suggestion from the Australian Museum for the movie to be entered in the Eureka Awards. You can find out more about this and other similar projects at <https://ozgifted.com>