



Sensors for the STEM project.



Student-constructed grow house.



Ayushi Majhi with her microgreens.

## planting ideas

Gardening has much to teach us about science and technology, as these students discovered.

Kate Macdonald with (from left) Danica Wiley, Katelyn Wilson, Sala Alexandre, Arya Bhatnagar, Jasmine Sears and Maddie van Dorp.



GROUP PORTRAIT: JOHN KIRK-ANDERSON/STUFF

### CHRISTCHURCH

*I studied electrical engineering at Canterbury University in the late 1990s. At that time my class was about 10 per cent female.*

**A**t my first job after graduation, I was the first female engineer in the company's 70-year history. In the 20 years since then, things have improved a little, but we still have a very long way to go. In 2020 in New Zealand, women made up about 25 per cent of engineering students, 13 per cent of working engineers and only 7 per cent of chartered engineers.

My dad is a mechanical engineer and he encouraged me to study engineering. Anecdotally, talking to my female colleagues, everyone seems to have a dad or similar role model who encouraged them into engineering. Role models are so important, which is why I try and be one whenever I can, and it's why I put my hand up to be a Wonder Project ambassador last year.

The Wonder Project is a school programme developed by Engineering New Zealand to get young Kiwis excited about science, technology, engineering and maths (STEM). The project pairs STEM professionals with teachers to deliver a series of hands-on programmes designed to spark wonder and awe in young Kiwis from Years 5 to 13, and get them excited about a STEM career.

I took up the Plant Challenge, where students work together to experiment, test and build a microgreen farm of the future. They learn what plants need to grow, build a hydroponic grow house and use technology to measure their success. Now, I come from a family of accomplished gardeners – NZ *Gardener* editor Jo is my sister – though somehow the green thumb gene skipped me completely. Nevertheless, I hoped that my enthusiasm for science, technology, engineering and maths would make up for my poor track record in keeping plants alive.

I was thrilled to see Breens Intermediate on the list of schools, having attended there myself in the early 1990s. I volunteered to do the Plant Challenge there, and had a meeting with Ann Paterson, the teacher with whom I would be working.

Engineering NZ resources for the Wonder Project are excellent, with step-by-step teaching guides, activity notes and online videos to guide us every step of the way. However, there was a disaster in the first week! The Plant Challenge kit hadn't arrived.

The first week is supposed to involve unpacking the kit, meeting the ambassador and a sensor time trial using the sensors in the kit. Luckily Ann and I were able to improvise. I was able to spend longer than originally scheduled

to share my career story with the students. I showed them some photos of some of my favourite projects (and also the class photos of me at Breens 30 years ago!). We were also able to analyse the carbon footprint of their lunchboxes, which didn't require anything from the kit.

It felt great to return to my old school. It had changed a lot in the years since I was there; I certainly don't remember doing cool science stuff like this when I was a student!

When the kit arrived in Week 2, the students set up the sensors and charged around the school garden, using them to measure temperature, humidity, light and conductivity.

We planted our first batch of microgreen seeds in Week 3. They could choose from mizuna, rocket, basil, beet and radish. The students lined icecream containers with hemp mats, then soaked their seeds in water for five minutes before spreading them out over the damp mats. By week 4, the microgreens had all grown. The rocket looked particularly healthy and was almost as tall as the icecream container. Eventually, they also planted a second trial of seeds and made a compost tea out of banana skins, old teabags and vege scraps.

We watched a great video which demonstrated some amazing modern farming techniques for growing microgreens in amazing places, including outer space! This inspired the students to improve the grow houses they had built by putting windows into the tops and sides of their containers. They even started designing their own farms of the future and came up with some great ideas, including one on the roof of a carpark building, and another which was a complex, inverse hollow pyramid structure with solar panels, nutrients coming out of sprinklers on the ceiling, and racks of plants that came in and out depending on how much sunshine they required.

It was not all smooth sailing. Sometimes, despite daily reminders, the students didn't remember to take the necessary measurements. Most of the plants from the first trial died – we suspect that by sticking the windows onto the grow houses with a hot glue gun, the ventilation suffered. Also, some of the plants seemed to have been overwatered – they had rotted and smelled bad.

But I enjoyed volunteering for The Wonder Project. I hope that the students enjoyed it as well and that they learned something from the Plant Challenge about the varied and interesting opportunities that a future in STEM can offer. ■

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