BIG WORK (Finding our voice)

MONTESSORI @ MALFROY - Rotorua (9-12)
Submitted by Helen Ramsdale (Teacher)

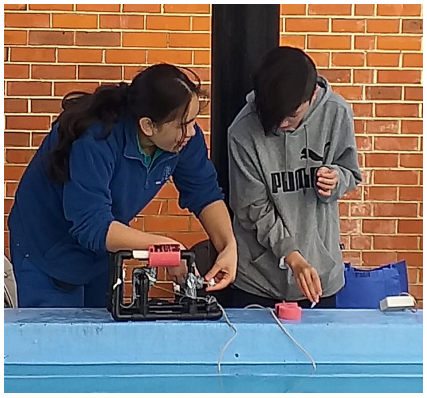
The Background:
In 2019 I had a class of 24 students that ranged from year 0-8 (I had only 3 intermediate age students, 2x Year 7 and 1x Year 8. I also had a few of each year group at the senior and middle level and a bunch of juniors). Many of the students had not come from a Montessori background and some of the younger ones had little numeracy or literacy skills. New students could come in any time of the year with no set intake dates, as it was dependent on the child's eligibility to start school. The school was (and still is) in charge of enrolments, although they did consider my recommendations after the students had visited several times. As such, a lot of work needed to be done around class culture, choosing appropriate work, freedom with responsibility, etc., and a lot of the (part time) T.A.'s time ended up supporting those transitioning and ongoing support for the Year 1 students in particular.

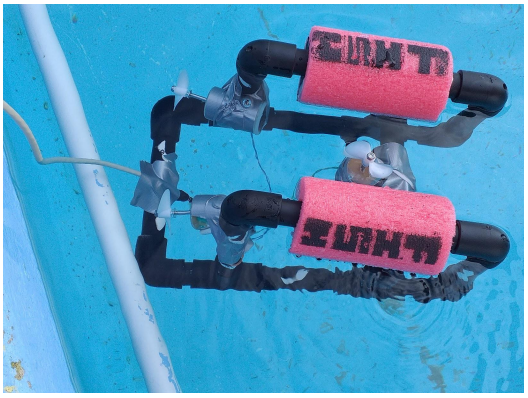
The Challenge:
Since returning to the Montessori class, "big work," (defined as students 'creating, researching, building, collaborating, thinking, learning, questioning, imagining, and following their passions" on the Southwest Institute of Montessori studies website: https://www.sims-ami.org/big-work-in-the-elementary-classroom/) was getting lost in the day to day "stuff." The students tended to stay in comfort zones rather than create or take opportunities to extend themselves. I had given the class examples of ways they could build on their learning and even generated some learning opportunities as part of follow-up to lessons to show how to go about the processes too, but they were still not planning their own interest related trips or seeking their own opportunities.
Due to the quiet nature of the older students (very caring, quite shy, quiet, and often submissive in the face of others wants/needs), I felt there was a real need to start with them, especially as they could then potentially lead/support others.
I started looking at options particularly relating to science and technology, as the oldest child was very interested in science/engineering (she had been sharing some kits she had been getting at home) and the others had been highly engaged when she shared.

The Opportunity:
At about this time, I got an email from the library makerspace teacher regarding something called Äquabots." It sounded interesting (underwater tethered robots) and it was highly appropriate in terms of being within our kaupapa of having a purpose that helped protect our environment. Aquabots not only provided the students with an opportunity to build a mini remote controlled vehicle using a kit, but it allowed for them to test and modify it, learn about hydrodynamics, propulsion, refraction and other scientific concepts. The condition of taking up the aquabot kit was that we needed to support the local initiative by participating in the competition (this was a first in our region). This competition was also focused on the potential for devices such as aquabots to be used in the future to clean up our oceans or deactivate mines.

The Action/Plan:
Once I got them started they were really excited and they ran with it. I sent them to a “build day” with a parent (I was unable to get release to take them) and they came back with their first model. The Museum educator had organised and guided them during the day but they had to do a lot of thinking, problem-solving and decision-making themselves. As part of the competition, not only did the students need to follow the design process for constructing and improving the Aquabot, they also had to prepare an engineering journal (this was a steep learning curve for all of us), and research various aspects including Polynesian Navigation, and look at the pros and cons of other methods currently used to clean up our oceans (waste, oil, plastic, etc.).
We went to a testing day and the team discovered that they needed to modify the aquabot to allow it to float in a balanced way and move correctly. It took several tries for them to work out an appropriate level of buoyancy.

The Outcomes:
The three students developed both engineering and science testing skills as they found and tested different “attachment” options for the various tasks that were in the competition (some related to maneuverability, some to precision and others to retrieving and placing objects). I coached them through some of these aspects but once they had the gist of it they really took off. The Year 8 girl was particularly invested and spent hours trialling different options and recording the results of testing. She had access to a small pool at her home so we used this during the holidays (several times) and she did a lot of extra bits on her own. We had several after school trips to test the aquabot at a local school pool. The competition rules were comprehensive and they had missed the Polynesian Navigation components initially so I stepped in briefly to go over what they needed to include. It was a great opportunity to discuss careful preparation as opposed to rushing in. They set roles to share the workload and then taught each other what they had discovered. They also had to complete a slideshow presentation showcasing their process and learning and recorded their learning journey in the log book and on a science fair style board.





The competition took place on a Sunday at the Rotorua Aquatic centre, over 7 hours. Despite some big mistakes, the team came third (Intermediate/High School category) and qualified for the Nationals in Nelson. The kids really wanted to try to overcome their mistakes, give it their best, and learn as much as they could. The whole class got behind them and we embarked on some serious fundraising to get there. Timing was a bit short so we still had to do some fundraising when we got back too.
The practice day (the day before the finals) in Nelson was a disaster. The aquabot was not operating as it should and the students spent a long night stripping it back and rebuilding it (their choice).

On the day of the competition the students demonstrated some impressive resilience and problem-solving. They excelled in the quiz on Polynesian Navigation, one of the retrieval tasks and the Presentation (highest marks out of all teams, including the High Schools), as they were able to confidently discuss their processes, choices and learning. Against 24 other teams, they won the Primary/ Intermediate category, to become the 2019 National Aquabot Champions, which meant they qualified for the Sea Perch International Competition in Washington D.C., in June 2020. We set about raising funds, applying for grants and the kids modified the aquabot and enhanced their presentation. We were close to booking flights, Covid-19 got there first and despite how devastating this was after all their work, the kids showed amazing resilience and maturity. The biggest gain was their massively improved confidence and motivation and the fact that the entire class (and much of our school) now believe anything is possible if you work hard enough.

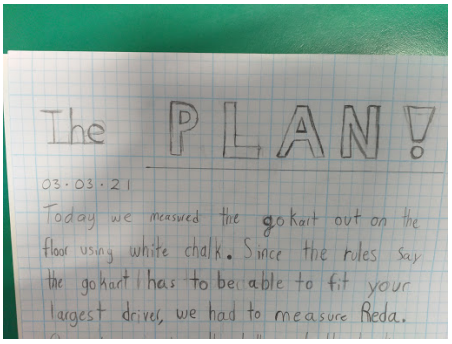
Ongoing Impacts: The ongoing impacts have been just as impressive. The success of the Rotorua teams (Our team, the Year 9 team from another local school who won the High school section, and the team taken by the library educator who came 2nd in our section), <u>attracted news coverage, which attracted funding for the Aquabots programme in Rotorua; 70 kits were given to local schools because of this.</u> In 2020 the aquabot programme was embraced by our mainstream school too and together we entered 7 teams! We will enter again this year - the kids have to modify the aquabot if they are entering again. We never looked to enter competitions but we have found they are opportunities to learn and effect real change. It's hard work, but so worth it! **Some of their success also promoted Montessori… it helped us grow to 2 classes in 2020.**

Ongoing Impacts Continued:
The original 2019 Year 8 student (with her new team mate) has just won the 2021 National competition and they are submitting their entry to the International competition. The others who are now year 9s are still involved in robotics and engineering.

Inspired by the possibilities and the idea of doing something that matters (cleaning up the oceans/our environment), in 2020 some of my students submitted their ideas to Fair Go. One group who focused on getting rid of plastic bread tags won the Consumer Heroes competition (they were looking at making the date stamps bigger or as biodegradable stickers and getting rid of bags too but this didn't survive the editing process on T.V). We had not even realised this was a competition! They featured on Fair Go in December 2020. The girls travelled to Auckland and toured the Tip Top Bread factory with Fair Go reporter Garth Bray to interview them about using recyclable tags. **(Did you know that this one factory alone uses 75 million bread tags a year!).** We have been collecting them in our school ever since to send to a "bread tags for wheelchairs" charity in Africa that we found out about just before the show aired.

2021 and onward:
This year, I have 20 students from Year 4-7. My year 7s (and one year 6) are entering Evolocity (building an electric go-kart, no kit… this one is from scratch/old parts etc.). Again, although it is a competition, it gives the students an opportunity to learn, grow, develop ideas and skills, learn from others, share, build confidence and presentation skills, get creative and find better ways of doing things for our planet.
The whole class has also been inspired by the achievements and opportunities the aquabots created, and this year they were given the opportunity to come up with or buy into some other initiatives and so far, they are working on finishing a "bee-friendly" garden in our school (in an otherwise slightly neglected area), raising money for the S.P.C.A (they made cupcakes and sold them at our mini gala, raising $100), and saving the lakes from the invasive species of Catfish (A group of 5 will go every fortnight to check two nets locally). We even sent a video to Parliament about homelessness, an area that they encounter and are greatly concerned about. The students have realised they have a voice, they can have their say, it's important to care about our environment and they can really make a difference (recyclable bread tags are coming in 3 years earlier because of what they did… that's 225 million less little bits of plastic!
And, next year, the entire senior school will join us doing community/eco projects!

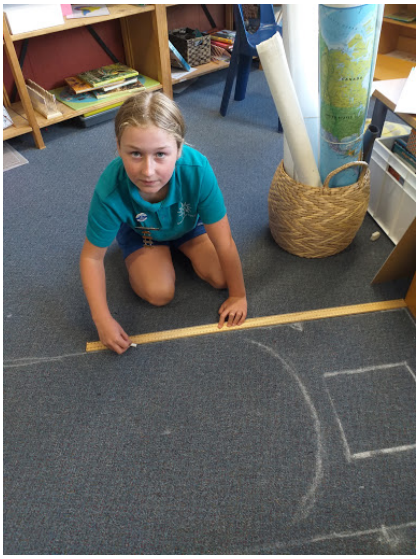
Catfish programme (checking nets, counting fish and recording for data logging, removing catfish)
Below: Planning, resourcing and building the Evolocity Go-Kart



The PLAN!

03.03.21

Today we measured the gokart out on the floor using white chalk. Since the rules say the gokart has to be able to fit your largest driver, we had to measure Reda.



Above: Part of the Engineering Journal for the Go-Kart.

Below: The plan for the Bee Garden and Sign, in the area we are creating it in (from our video to Parliament about what we are doing and how we need help to help the homeless!)

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ONE PAGE SUMMARY (for QUICK READ):

The Background:

- **In 2019 many students were not from Montessori. 24 students, ages 5-13, Year 0-8**

The Challenge:

- **Children were not initiating "Big Work" projects.**
- **I needed to facilitate this, especially for older students (lacking confidence when I came into the class) who could have been organising this for themselves.**

The Action/Plan

- **An opportunity came our way (it was part of a competition - not really known at the outset but entering supported the establishment of the programme so it was a requirement if we wanted to be involved).**
- **Lots of Learning involved: Research - Options for cleaning up oceans, buoyancy, refraction, propulsion, hydrodynamics, Polynesian Navigation; Learning to use and record scientific and engineering processes; Carrying out properties of materials investigations: Problem-solving; Developing presentation skills and teamwork.**

The Outcomes:

- **Class and school got behind us to help us go to Nationals**
- **Huge learning curve, led to them winning National 2019 Aquabot Championships**
- **Publicity led to increased interest and helped us move to 2 classes again.**
- **Publicity of success (us + 2 other teams) led to funding at Library Makerspace to gain 70 kits for Rotorua schools**
- **Inspired many others and the students involved grew exponentially in confidence**
- **Developed interest in "Big Work" and since then, students have been involved ever since (big focus on projects that are community based or eco-friendly … We're building a bee garden at school (planned, measured and organised by students with some support), involved in the Lakes Catfish Programme to eradicate this invasive species, raised money for the S.P.C.A ($100) by making cupcakes and selling them at the school 'mini-gala," entering the Evolocity, electric Go-Kart Challenge, many teams across the senior school entering aquabots (and getting girls interested in engineering), featured on Fair Go to help get rid of bread tags (75 million a year = one company alone) and brought this forward 3 years, sent a video to Parliament to ask for help re the homeless… and the entire senior school (including mainstream) will be following us in doing community based projects next year (which kids opt into based on interest!**
    - **Part of these projects have also been highlighted and recently published in the ERO report regarding best practices in New Zealand schools!**

- **The children have a voice and are confident using it!**