

# EVOLOCITY

FOUNDING SPONSOR **Orion**

## Case study 2: Avonside Girls High School

Learning that incorporates student choice provides a pathway for students to fully, genuinely invest themselves in quality work that matters. Offering the NCEA technology students at this school the choice to participate in the EVelocity project proved a very successful approach for engagement of learners.

The students were given a choice between participating in the EVelocity project or developing wood-based technological outcomes. A car from the previous year's EVelocity competition was placed in the workshop- a powerful visual prompt for discussions on the project.

This project was also a great opportunity to challenge gender stereotyping and show that girls too are interested in car design and constructing cars.



*I found out that I really loved welding ....and I never thought I would be able to do that. I am going to a MIG welding course next week ...Samantha Douglas Year 12 student*

*We had a couple of people come in and talk to us about steering and I just got it. I'm the go to person on steering now! Zavariah Gribben Year 12 student*

*I like making things that are messy without a predictable outcome - also the challenge of a girl constructing a cart hooked me in... Katherine Parkinson Year 13 student*

*I have always wanted to make New Zealand a cleaner and better place. this project gave me an opportunity to explore this idea from a different angle Johanna Church Year 13 student*

The students were encouraged to select a group of 3-4 to work on one car. Managing workload during development and providing a team on the competition days to maintain and drive the car is essential. Thirteen students chose the EVelocity project for their year's work. Two cars were made in both the year 11 and year 12 classes and one in the year 13 class.

The girls took out "The best in the show" and "The best street circuit" prizes at the Christchurch regional competition

## We learnt so much!

As well as having lots of fun the girls say they learnt how to:

- meet deadlines and manage a project
- make models and test and trial ideas
- apply physics knowledge in the aerodynamics of an electric kart
- manage safety when developing a vehicle
- drive an electric kart
- make new friends and value the contributions of others to a project
- research efficiently
- work with a range of different materials
- wire an electric car
- weld
- fit all the components together in a vehicle
- consider ergonomics in car design
- consider sustainability in terms of transport and electric vehicles
- broaden their thinking on women's work



## Assessment

Conceptual design, planning, specialist skills and technological modelling were assessed at each of the three levels. See below for an example of assessment for the level 1 NCEA technology programme.

Level 1	Standard	Credits
AS91045 (internal)	Use planning tools to guide the technological development of an outcome to address a brief	4
AS91046 (internal)	Use design ideas to produce a conceptual design for an outcome to address a brief	6
AS91057 (internal)	Implement basic procedures using resistant materials to make a specified product	6
AS 91048 (external)	Demonstrate understanding of how technological modelling supports decision-making	4
Total credits		20

## Key competencies and values

The EVelocity project provides a rich opportunity to contextualise many of the key competencies and values within the technology learning area. The girls learnt about managing self by having to plan ahead and use resources efficiently to realise their kart. They also developed their sense of self and own self-image as they became involved in this project and its associated competitions. Relating to others and participating is critical to the successful outcome of their kart.

There are numerous opportunities for students to develop their capabilities in the use of the language, symbols and texts associated with designing and building an electric kart.

Critical and creative thinking are an essential part of this project. The girls worked in their groups to resolve multiple design issues. For example, the kart's aerodynamics, ergonomics, steering, and aesthetics.

Reducing carbon emissions to protect New Zealand's clean green image is a topic that is hotly debated. The EVelocity project develops student's capabilities to explore their own values, the values of others in the context of sustainable energy resources for transport.

## Resourcing

Quentin Smitheran, technology teacher, makes the following suggestions to teachers interested in introducing the EVelocity project:

- Prior knowledge -the students came with more prior knowledge on construction rather than electricity and electronics. As this was the first year that the school had offered the project within technology programmes the students were encouraged to focus on the construction of the cart rather than tweaking the motor. There are plans to include more electronics as part of the year 9 and 10 programmes.
- Technical support -having a technician with a mechanical engineering background was helpful. Arranging more industry connections to help the students with the aerodynamics and overall finish of their cars is planned for this year.  
Increasing students' knowledge on how the motor works and how to open the controller to improve the speed of the cars.
- Teaching space - it's easier for a teacher to manage parallel programmes in one classroom space (some students were continuing with wood outcomes rather than choosing the EVelocity project)
- Equipment - the project provides real life opportunities for students to plan and schedule to use equipment when this is limited. For example, only one welding machine was available.
- Storage -it is important to think about storage space as the cars and their components need to be stored away safely at the end of class.
- Costs -there are plans to reuse the motor sets next year. One student has taken a car home for the holidays to play with her brother. Generally, the students seemed happy to be

involved in the process of designing and making the car but had no desire to have the car at home. Bikes were sourced from the local recycling centre to provide wheels for the karts.

- Students other commitments - it's important to find out students' commitments at the beginning of the year. Several of the students were involved in a school trip to Japan and unable to make the Regional competition.
- Workshop access- the students were captivated by their karts and many came in at lunchtime and after school to complete work on their cars.
- Parent involvement - parents were very supportive of their daughters and added enthusiasm to the project. There were great conversations at home with parents about the construction of cars and motors. On race day, several parents brought their own go-karts in to add to the competition.



- Community support - Enlisting the support of a local tertiary education provider, [ARA institute of Canterbury](#) proved invaluable. They supported build days, offered welding tuition, made their facilities available and tutored students throughout the programme.

## Future plans

The project has been so successful that it will be offered again next year. Students who have participated in the project this year are very keen to be involved in it again.

They see this as an opportunity to improve on their original prototypes and develop their skills further in for example project management.

The girls are also thinking about their future careers. The project has given them the confidence to include engineering and sustainability in their career visions.

*I really enjoy mechanics and want to work on planes in the future.*

Samantha Douglas Year 12 student

*I am enrolled to study a Bachelor of Sustainability at ARA Institute of Canterbury. Johanna Church year 13 student*

