STEM IN PRACTICE

HOW DOES STEM WORK?

Education Departments around Australia are encouraging schools to adopt STEM focused learning. The intention is to encourange various departments to work together to create joint programs that will make learning more meaningful for the students.

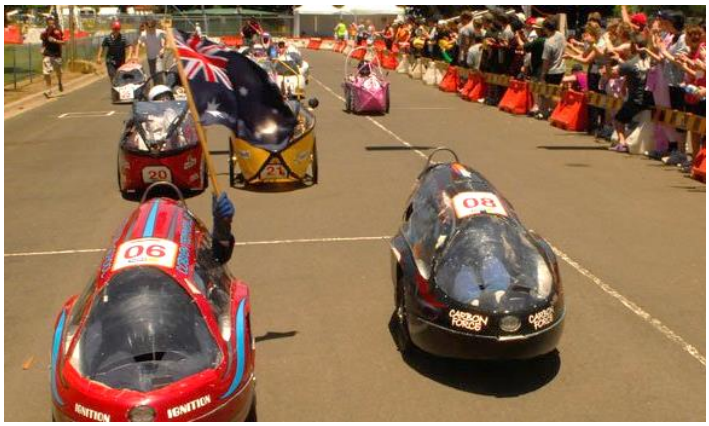
STEM IN TODAYS SCHOOLS

Science **T**echnology **E**ngineering **M**athematics is practised Australia wide by many teachers, and has been for many years. For example:

- Ask any Primary level teacher – that is what they do – they just don't call it STEM!
- Most Technology teachers in Secondary schools do it – but without (in most cases) getting other subject teachers involved. They do this by e.g.: getting the students to make a "Dragster", which also involves teaching students about:

Science	Materials - their advantages/disadvantages
Technology	Electrical and mechanical parts, assembly, soldering
Engineering	Manufacturing methods for body parts
Mathematics	Gear ratios, speed vs acceleration

STEM IN PRACTICE – Human Powered Vehicles (HPV)



One place where the cross-departmental approach works well and is run on a much larger scale is the RACV's Energy Breakthrough. For many years (in a former life in Holden's Powertrain Engineering) I volunteered at the RACV's "Energy Breakthrough" event held in Maryborough, Victoria. This was a 4 day event for Human Powered Vehicles (HPVs) and Hybrids (dual power source) – The event is similar to the Australian International Pedal Prix in South Australia and the RACQ Technology Challenge in Maryborough, Queensland.

The event requires the school teams to build and race a HPV. During the event the teams are judged on (and awarded) for 3 categories:

- *The 24 hour race*
- *Design and Construction*
- *Display and Presentation*

The Energy Breakthrough aims to…

- Provide an excellent technology project for students from Prep to VCE level
- Encourage young people to explore solutions to environmental and transport issues
- Provide an opportunity for schools and communities to work and learn together
- Provide an opportunity for women and girls to participate in what has traditionally been a 'male' dominated area of the curriculum
- Be a fun program with real world challenges
- Offer students opportunities to explore and address vehicle design, driving skills and vehicle and passenger safety issues.

http://www.racvenergybreakthrough.net/

If the teams made a great HPV, they could win the 24 hour race, but someone further down the field could still get the overall "Best" prize. Why? Because the teams had to do well in ALL 3 sections - this only happened when the Technology teacher got everyone else involved. How?

SCORPIO TECHNOLOGY Vic Pty Ltd
17 Inverell Ave, Mt. Waverley Vic 3149
www.scorpiotechnology.com.au

October 2016

STEM IN PRACTICE

THE 24 HOUR RACE

To perform well requires a good Technology and Engineering approach.

Science	Aerodynamics, fuel efficiency for Hybrids
Technology	The initiator and maker
Engineering	Metalwork, materials etc.
Mathematics	Power to weight, gearing

DESIGN AND CONSTRUCTION

This section assessed student involvement, understanding of the HPV and construction, as well as their understanding about why the event is held, and why we need an "Energy Breakthrough".

Science	Learning about the enhanced Greenhouse effect, fossil fuels and their usages, alternative energy sources etc.
Technology	Vehicle features, design choices etc.
Engineering	Designing a light weight car body that is strong and protects the driver etc.
Mathematics	Measurements for precise cutting of materials, timing of vehicles etc.

DISPLAY AND PRESENTATION

Telling the story of the journey to the event. This could be very interesting to watch, as it is a "Show and tell" – often by very creative teenagers!

English / Graphics (making posters / Powerpoint presentations to document and illustrate the various steps),

Food Technology (food pyramid, develop a food plan suitable for before and during the event to maintain stamina during the event etc.),

Physical Education (exercise routine and classes, warm up and cool down techniques)

Music (writing a song, sending along guitar players, etc).

All in all, I enjoyed my years at the RACV Energy Breakthrough, learnt a lot from both the teachers and the students, and made some good friends along the way! (and I keep meeting many of those great teachers at DATTA Conferences!).

Scorpio team with "Rode RAGE" (**R**ide **A**gainst **G**reenhouse **E**missions) 2015 team and their hybrid pedal/electric vehicle. This enthusiastic group (and many more) have participated in long distance HPV driving around Australia and overseas, raising money along the way. Check out their exploits on their web page http://roderage.com.au

Arnie Scorpio 's Technical Manager

REFERENCES:

- http://www.racvenergybreakthrough.net/
- http://roderage.com.au/

Inspirational projects for teaching Design, Creativity & Technology

SCORPIO TECHNOLOGY Vic Pty Ltd
17 Inverell Ave, Mt. Waverley Vic 3149
www.scorpiotechnology.com.au