

PLAY

CREATE

LEARN

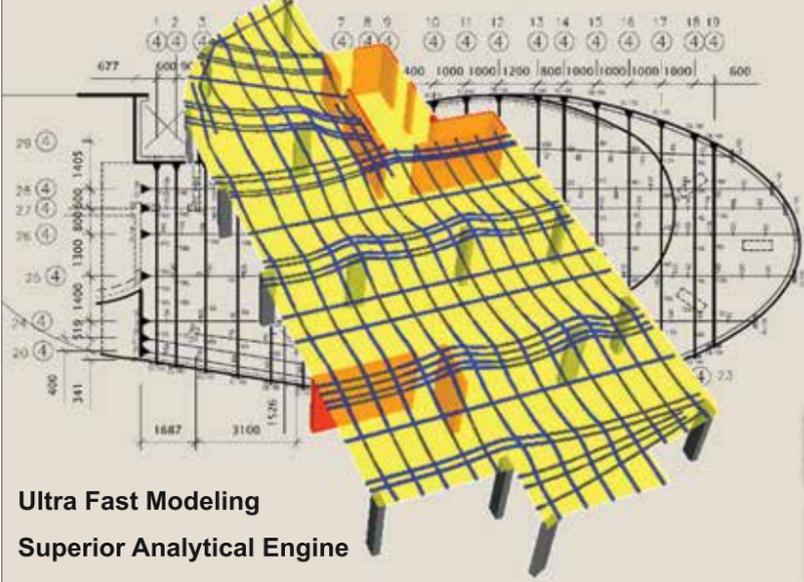
Tiny engineers,

# big dreams

Children as young as four are getting crash courses in engineering and robotics to encourage an interest in STEM pursuits, writes Chelsea Wallis.

Bee-Bots are simple robots that can be programmed to move and turn by the children.

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**S**WISH instructor Rachel Purdy is never sure what's going to happen when she shows up to a lesson. She strives to become as knowledgeable as she can about her topic for the day, which ranges from 10,000 leagues under the sea to ancient Egypt or an introduction to bridge building. Yet as well as she plans, Purdy is most equipped simply knowing that the lesson is going to go wherever the kids want it to.

The SWISH program (Specialised Workshops in School Holidays) is a Canberra-based alternative to the standard school holiday enrolment. Kids in kindergarten to year six choose one-day sessions – many of which focus on STEM subjects – on everything from robotics and engineering problem solving to chemistry and life on Mars.

From 9 am to 4 pm, the day is divided into four sessions, with an experiment at least once during the day. With a topic such as robotics, kids are introduced to the material, observe how it works and then straight into hands-on experimentation: Bee-Bots for five-year-olds, Edison robots and MaKey MaKey boards with laptops for eight-years and up. Kids also get their hands on iPads for apps with basic coding and robot programming.

### A gap in education

In early 2015, Rebecca Evans, SWISH director of education, and her business partner Michele Justin, SWISH director of operations, were looking for an alternate holiday program for their exceptional daughters, both registered with MENSA. They were unhappy with the disproportionate number of holiday programs for gifted teens, while the only option for younger minds was the traditional childcare trips to the beach or watching a movie.

SWISH's Michele Justin (left) and Rebecca Evans want to challenge younger children in the school holidays.

**"We talked about the need for something for really bright children, particularly in the STEM subjects."**

"We got together on a number of occasions and talked about the need for something for really bright children, particularly in the STEM subjects," Evans remembers. "We heard that an existing holiday care program was for sale and we thought that it was a great opportunity to get an existing business and adapt it to what we needed."

The two bought SWISH in April 2015, added a few tweaks and had it open by July to gauge interest. Over the most recent holiday season, the programs sold out, with 22 students in three workshops per day for three weeks.

"With the gifted kids, you ought to grab their interests," Evans insists. "Their brains are going a million miles an hour, so you introduce them to something and off they go. They go home adapting it, thinking about how they can use it and what can they do with it."

To manage these interests, SWISH hires teachers rather than childcare professionals. It is always looking for educators with specialised tech skills, for instance, scientists who become teachers, or those experienced in 3D printing.

Next year, Evans and Justin hope to tap into the corporate market, and in three years they want to implement a presence in every state.

"It's so needed," Evans says. "We need to get them at that age – when they don't have society's limitations of what we can and can't do to limit their imaginations."

### Expert in the room

It makes teacher Rachel Purdy's teaching experience at SWISH more than a little different than her regular primary school gig. With the older kids, she has to know enough about a lot to be able to answer their questions, and perhaps more importantly, be able to lead discussion.

"You almost need to become a topic expert before you walk in there, because not once have I been the smartest person in that room, especially when they get to choose their lessons," she says.

While Purdy expected her Monday lesson about oceans to lead the year four-six students into the currents and reefs, or even James Cameron's expedition to the bottom of the Mariana Trench, they ended up discussing the effects of the sun on the ocean. What if we could harness the billions of watts of electrical power in the ocean? What affect would it have on the ocean if the sun were to disappear? Could thermal springs in Iceland support human life without the sun?

"I hadn't planned for that," Purdy laughs. "You've got to be flexible with them or you're going to be forcing them to learn something they're not really interested in."

### Creating sparks

For Evans, the reward is watching the kids build rockets: while parents think "up and down," the kids are already asking themselves how to make a rocket move sideways and backwards. At the end of the day, Evans wants SWISH to light something inside the children.

"If we can make a little spark or get them thinking about something they haven't thought about, the imagination potential is unlimited." ●

## Starting tech early

SWISH students of all ages get right into handling technology during their one-day holiday courses. Along with the hands-on tech below, students are given iPads for the day to do programming, take photos and movies, and research topics like the chemical properties of the atmosphere. Instructors also employ SMART boards in the classroom, combining the whiteboard with software to transfer content from the board into a computer. These are some of the other devices with which the students can interact.

### BEE-BOTS (WWW.BEE-BOT.US)

These entry-level robots help students understand the basics of sequencing and if/then relationships. Using directional keys, the Bee-Bots can be programmed to move in different directions, powered by a rechargeable battery. A curriculum is also available for guiding lessons in the classroom.

### EDISON (MEETEDISON.COM)

These Lego-compatible robots are a product of South Australian company Microbric. They use infrared light and sound sensors to navigate obstacles, sense light, follow lines and detect sound. The robots teach programming skills through included graphical software, and can be given commands by driving across printed barcodes.

### MAKEY MAKEY BOARDS (WWW.MAKEYMAKEY.COM)

With MaKey MaKey, students turn everyday objects into keyboards and use them with the internet. The board comes with alligator clips and a USB cable to inspire young inventors with anything that can conduct electricity – from bananas to finger paint – to make anything into a key. No programming, breadboarding or software necessary.



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# AWARD SUBMISSIONS

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## A selection of programs that SWISH runs

### Engineer Enrico... A bridge too far

Age: Year 1-2

Theme: engineering, design, construction

The session introduces students to different types of bridges before a session to design and construct their own series of structures.

### Professor Brain's mind boggling world

Age: Year 1-2

Theme: problem solving

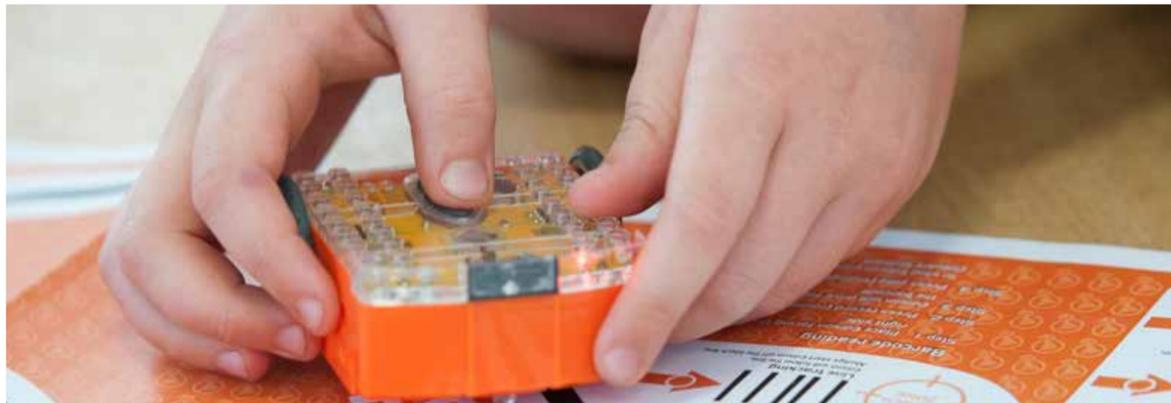
Students are introduced to a range of riddles, conundrums, puzzles, brainteasers and mind benders in an introduction to the lateral brain. The session engages students who love to concentrate on a puzzle until it is solved or deemed impossible.

### Phenomenal physics... All revved up

Age: Year 2-3

Theme: physics

Students investigate how things move, what an engine is and how a steam engine works. They go on to use everyday items to build their own self-propelled vehicles.



### Life on Mars

Age: Year 2-3

Theme: role-play, emersion

With more and more discoveries on Mars in the past few years, students learn why water on Mars is a big deal.

### Chemical Chaos... Atmospheric

Age: Year 2-3

Theme: chemistry

Students explore the chemical make-up of the atmosphere. They top off the day with an experiment to replicate the chemical cocktail of the atmosphere.

### Get into gear, you're an engineer

Age: Year 2-6

Theme: problem solving, engineering

Year 2-3 students research, design and make their own wheels and turbines to harness water for energy. Year 4-6 students teach their robots to respond to sound, light and obstacles before designing their own Mega Bots using one, two or more Edison robots.

### Construction... A box of tricks

Age: Year 4-6

Theme: engineering, problem solving, design and construction

Students tap into their creative talent with a box of secret items. Maybe it's a screwdriver, some hinges and a wheel – whatever it is, they have to design and create something useful from the items.

Clockwise from above: Edison is a Lego-compatible robot; students can design and build products using 3D printing; Bee-Bots get ready to race; Chemical Chaos, Edison robots on the move; and more 3D printing.

