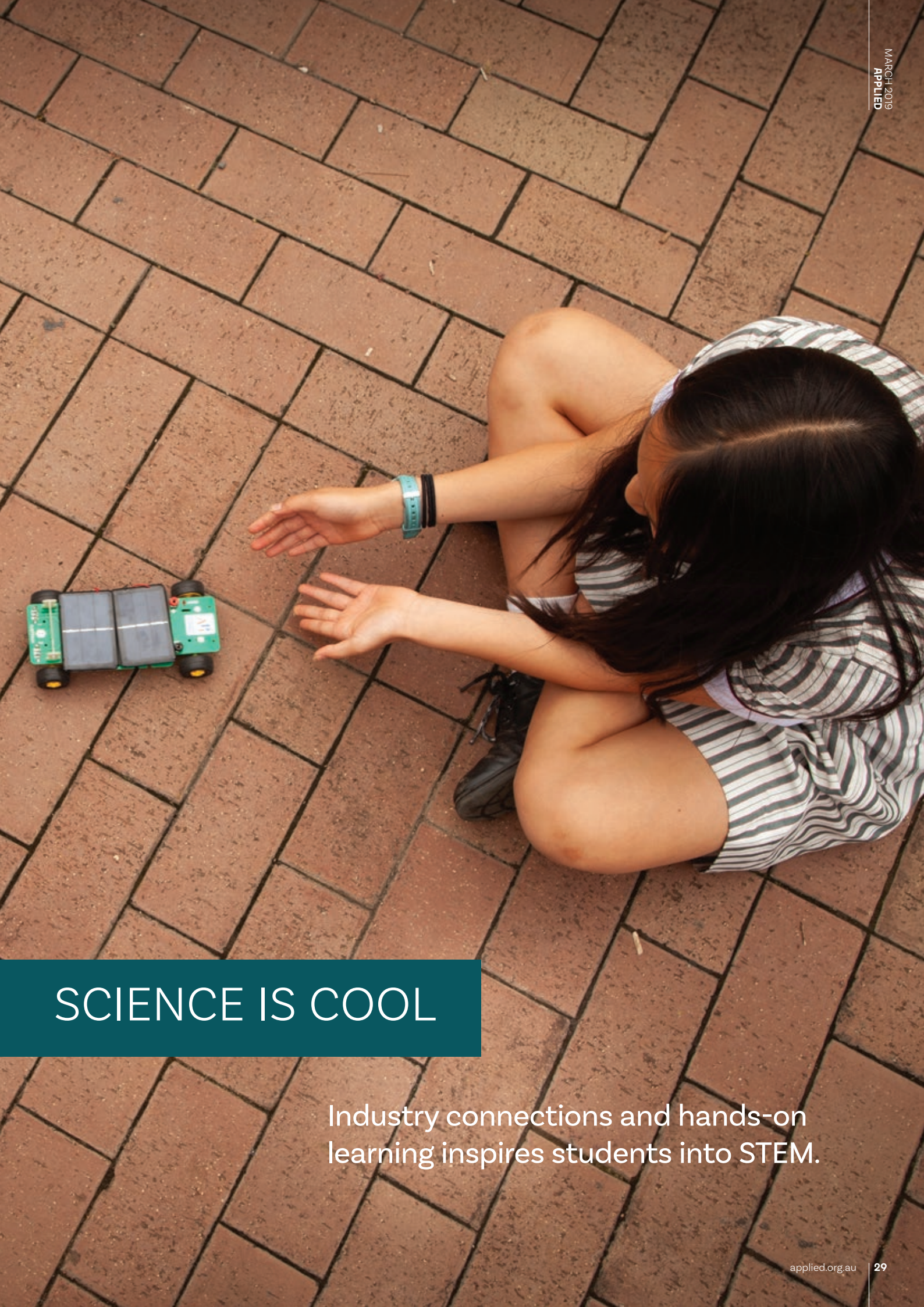
FROM SKIPPING SCHOOL TO

Scott Sleap

Photo: Eamon Gallagher



SCIENCE IS COOL

Industry connections and hands-on learning inspires students into STEM.

STEM EDUCATION

Jordarna, a Year 8 student from Cessnock Academy of STEM Excellence (CASE) in NSW, disclosed to a local state politician that she had once wanted to be a beautician, but would now like to be a pilot after working on interesting projects with CASE.

This shows the influential power a hands-on learning approach can have on young minds.

With more than 20 years of experience as a public school technology educator, I have worked with both industry and educational organisations on partnership programs that have long-term sustainable and measurable success.

Kyle, an Aboriginal student at CASE, was unsure of his future direction until he became involved in number of its activities. He is now enrolled in Aerospace Engineering at the University of Newcastle and is in the running to receive a scholarship from Boeing Australia.

In my passion for promoting widespread STEM uptake, I led the development of the STEM Industry School Partnerships (SISP) program for the NSW Department of Education, which was piloted in three regions of NSW in 2018.

The SISP program is a contemporary education model matching primary and secondary schools with region-specific industry partners and provides industry-specific technology programs and equipment to make classroom learning relevant and motivating.

There is a major emphasis on inquiry, problem and project-based learning, providing authentic and practical learning activities.

SISP is delivered in partnership with "Academies of STEM Excellence" in regional NSW, an initiative I helped develop, leading with the Cessnock High School Learning Community, to form CASE.

SISP collaborates with Regional Development Australia (RDA) offices across NSW. Networking extensively within their communities, RDA delivers insights into the industrial base, economic conditions, workforce requirements and skills gaps in their regions, acting as a conduit between schools and industry.

They foster mutually beneficial partnerships, which underpins the SISP program.

> Cessnock High has reduced suspensions by 50 per cent, Year 7 enrolments are up, the school is winning or placing at regional, state and national STEM competitions, and students are now aspiring to employment in emerging STEM areas.

Students from the Cessnock Academy of STEM Excellence.

Results speak for themselves

Cessnock, in the Hunter Valley, has been steadily declining from the mining boom of 2013, leading to the local government area ranking in the lowest 30 per cent in Australia. Youth unemployment is stubbornly high and students from the region did not recognise that jobs in the emerging STEM sectors are for them, despite chronic skill shortages in the region.

But the benefits of introducing real-world, hands-on learning approaches has made immense changes and created new opportunities. And the results speak for themselves.

Cessnock High has reduced suspensions by 50 per cent, Year 7 enrolments are up, the school is winning or placing at regional, state and national STEM competitions, and students are now aspiring to employment in emerging STEM areas.

Last year we established Australia's first All-Girl Aboriginal F1inSchools team. With significant assistance from our industry partners Boeing Defence the girls designed, manufactured and raced a miniature Formula 1 car.

The team has been so successful in the regional and NSW state finals that they will compete for the national title at the world's largest STEM competition later this year.

Academy students who worked on designing, constructing and racing electric bikes for the Hunter Valley Electric Bike Festival led the school to be the overall winner in its first attempt at the competition in late 2018.

From strong beginnings ...

There has been a long history of Australian businesses and industries assisting schools, as it is in their best interests that students have the skills and knowledge required for their future workforce needs. Schools have enthusiastically embraced such partnerships, but long-term sustainable success in this area is, indeed, rare.

The success of the SISP program began with initial, measureable triumphs of the Regional Development Australia's ME Program. Since 2012, the ME Program successfully implemented a whole-of-region approach to industry-school partnerships.

We were credited with dramatically turning around falling STEM enrolments in Hunter Region schools. STEM participation in senior studies in program schools increased by more than 19 per cent while the remainder of NSW's enrolments declined during the same period.

Much of the success of the ME Program, through to the state-wide SISP initiative, can be attributed to the development of highly effective partnerships with organisations like Google, Boeing Australia, the Australian Academy of Technology and Engineering, PwC, Jetstar and more.

Other evidence that this hands-on approach is having a major impact on student engagement has been observed in Cessnock High School's Year 9 iSTEM class.

Integrated STEM (iSTEM) is a curriculum that I developed in partnership with Industry and RDA-Hunter and is taught in more than 250 schools across NSW.

Students in the iSTEM class were regularly truanting, were late to class and were not at all engaged in the work being presented.

A change of head teacher and classroom teacher, who embraced the practical approach of the course, meant all this has changed.

Now, the students want to stay back at lunchtime and after school to complete work on their projects, they are competing at regional competitions and are placing in them for the first time.

Crookwell students get hands-on

Crookwell Academy of STEM Excellence and RDA-Southern Inland made renewable energy their main industry focus to develop hands-on learning through the SISP Program. The area is home to the largest network of renewable energy stakeholders in Australia.

They chose to invest in STELR Renewable Energy equipment packs and educational resources to undertake their hands-on inquiry-based learning activities and to solve real-world problems.

Through locally developed partnerships with the Gullen Range Wind and Solar Farm, Taralga Windfarm, and Crookwell 2 Wind Farm, students were immersed in the renewable energy technology sector with excursions, incursions and mentoring.

Combining hands-on inquiry based lessons with real-world activities has had a major impact on student learning at the academy. Students use STELR renewable energy equipment in their projects, and the site tours meant they could get up close to one of the 130-metre-tall wind turbines.

They have worked with a number of local wind farm representatives, who have helped the students solve problems identified in the agriculture sector.

And the feedback has been outstanding. Eighty-eight per cent of the students said they had better knowledge of STEM careers; 73 per cent said they were now more motivated to consider further study in STEM; and 48 per cent were more interested in pursuing a career in the renewable energy sector.

The SISP program in operation in Southern Inland is an outstanding example of how industry, schools and organisations such as the Australian Academy of Technology and Engineering working together can provide real-world learning opportunities that engage students in the STEM professions and greatly increase the likelihood of these students following a STEM career pathway.

This year, the NSW Department of Education committed to more than $1.3 million to expand the SISP program from three regions to five, with plans to expand further to the whole of regional NSW.

Students from South Oakleigh College use STELR equipment in the classroom. Photo: Eamon Gallagher.

Dr Scott Sleap is an educational leader with more than 20 years' experience with various roles in the secondary and tertiary education sectors as well as industry workforce development. In 2018 he was awarded the prestigious Prime Minister's Prize for Excellence in Science Teaching for his work in STEM education. He is currently employed by the NSW Department of Education as the leader of the STEM Industry/Schools Partnership (SISP) program. Formerly the Director of the internationally recognised ME Program at Regional Development Australia – Hunter, Dr Sleap has built a reputation as being a leading expert in STEM education and workforce development.

Science Technology Education Leveraging Relevance (STELR) is a flagship initiative of the Academy that makes science relevant for students and teachers in more than 710 schools across Australia and internationally.

> "We use STELR equipment and curriculum to engage students across genders and cultures through its innovative, tactile, hands-on equipment packs that are purpose built, Australian designed and manufactured. It is vital that the STELR program continue to provide STEM leadership for Australian Schools. Students can solve authentic real-world problems and learn the way that STEM professionals do."
>
> **Scott Sleap, Winner of the Prime Minister's Prize, Best Secondary Science Teacher 2018.**