ENGINEERING IS WHAT? (ELEMENTARY!)

Defence engineers working with Questacon have classrooms buzzing across Australia

TEACHERS PARTICIPATE IN A WIND WORKSHOP AS PART OF THE ENGINEERING IS ELEMENTARY PROGRAM RUN BY QUESTACON AND THE ADF.

The Engineering is Elementary program tools up primary school teachers with hands-on activities to bring their STEM teaching to life. The free workshops are delivered by Canberra's National Science and Technology Centre, Questacon, and supported by principal partner Defence Australia until 2027.

Through these workshops, educators are empowered to enable their students to learn chemical engineering through playing with playdough, or get the lowdown on sustainable engineering by building a solar oven.

Each workshop focuses on an engineering challenge and uniformed specialists participate in both virtual and in-person workshops.

A senior teacher of inclusive education at Centralian Middle School in the Northern Territory, Michelle Pinto says her workshop group was focused on bridge building. They became so engrossed trying to cantilever five Jenga blocks off the edge of a desk that the organisers had to take the Jenga away!

"Simple things like that are really effective in my classroom setting and give me really practical activities for important concepts," she says.

TEACHERS IN MACKAY, QLD USE PLAYDOUGH TO BETTER UNDERSTAND CHEMICAL ENGINEERING.

BUILDING CONNECTIONS

Michelle teaches Year 5 and 6 maths online for the School of the Air in Alice Springs, which educates students living remotely. She has several international students, too. When she ran the sessions with students, those who didn't come to the in-school session built their bridges with whatever they had at home, like old tyres and other things they might find lying around a farm or station.

"The student from Fiji, who took part online, made his bridge out of seashells and fish bones, coconut and pandanus leaves," she says. "Those were the resources he had available to him, which is reflective of engineering in communities."

That's just the kind of imaginative approach Questacon, working with Defence, is hoping to spark. Broderick Matthews, Questacon Senior Manager Education Programs, says, "Engineering is Elementary helps students and educators build skills like creativity, critical thinking, collaboration and problem solving, which are critical to solving the challenges of our future."

"Australian Defence Force members are an important part of delivering Engineering is Elementary," says Major General Wade Stothart, Head of the People Capability Division at Defence.

"Engineering is Elementary workshops equip primary school educators with the skills, confidence and resources to integrate STEM concepts into their classrooms. The early introduction of STEM concepts teaches students to be problem solvers, critical thinkers, collaborators, and communicators, and better equips them to pursue STEM-related careers in the future.

"By doing so, they provide real, personal, and practical examples of the diversity of STEM careers in the Australian Defence Force. Over the length of this partnership period, Engineering is Elementary will reach over 1500 educators across Australia, and will enable effective STEM practice to reach diverse and under-represented audiences across schools in low socioeconomic areas, regional and remote communities, women and First Nations Australians."

ENGINEERING IS ELEMENTARY WORKSHOPS ARE ALSO DELIVERED VIRTUALLY, SO GEOGRAPHY IS NO OBSTACLE TO GETTING TOOLED UP IN STEM.

BUILD, TEST, REPEAT

Helen Foy is assistant principal at Binya Public School, NSW, which has just 19 students. She has participated in several Engineering is Elementary workshops online and says the magic works for kids right through from kindergarten to Year 6.

"The chatter and engagement increases as the students are succeeding or failing, as they are discussing the problems of why something isn't working or which ideas they will use to tackle the problem," she says.

"I want them to be intrigued and wonder about how things work. The activities created by Engineering is Elementary workshops help me do this."

Michelle agrees that teaching kids about design processes was a huge deal.

She talked to students about theory and the strength of different structures, like cylinders and prisms, which they built from paper and tested with tubs of rice. Then they had to research, design an idea, test it, improve it and repeat. Just like real engineers!

CAPTIVATING CAREERS

Exposure to engineering before high school helps students understand the huge role STEM careers can play in Defence. Helen says the workshops have inspired her students about the future.

"I have students who say engineering is something they want to study. I have students who will be farmers and engineering will be part of their everyday lives," she says.

"Even if students don't specifically become an engineer, the skills learnt following the design process of improving the world around them will help them in all careers."

Michelle's students are already making an impact – their bridges had to be usable, not just prototypes. One of them could hold the weight of three adults.

"This just took my teaching to a different level and gave me some really solid resources," she says, adding that primary teachers don't often get to do such thorough and fun homework before they go into the classroom.

Both teachers have also started seeing their world through an engineering lens. Michelle says she gained a new understanding of the tricky project to build a roundabout in Alice Springs. Helen now appreciates that engineering is about processes and problem-solving, not just products.

GOING AHEAD WITH STEM

Major General Stothart says the partnership between Questacon and Defence will also support the delivery of the Questacon STEM Futures program and the development of an Applied STEM program. These programs work together to empower primary and secondary educators to establish structures for STEM programs, develop their own STEM resources and embed STEM culture in schools.

"I am excited by the opportunities that this partnership with Questacon presents and am very pleased that it will allow Defence to showcase the diversity of STEM roles, while equipping teachers to teach STEM concepts to the young Australians who will be the future STEM leaders of the nation and the Australian Defence Force," he says. – *by Alison Ratcliffe*