

Biotech at Willoughby Girls High School



Amgen biotech experience

ET staff

There's nothing like getting your hands dirty when you're learning something new or, in the case of the Amgen Biotech Experience (ABE), your micropipette.

The program which has run for close to 30 years in the US and the UK launched officially in Australia in September after pilot programs were well attended and received. And that's for good reason; the ABE program gives teachers and students access to (expensive) industry standard equipment and exposure to the work that biomedical researchers and technicians perform every day.

Amgen is a leader in the field of advanced biologically-based medicines for the treatment of nasties like cancer, cardiac and kidney disease. The Amgen Foundation is Amgen's primary mechanism for corporate philanthropy and "seeks to advance excellence in science education to inspire the next generation of

innovators". The Amgen Foundation has dedicated \$10.5 million to the ABE which will go a long way towards the expansion of teaching biotech around the world.

Dr Hannah Nicholas, a molecular biology lecturer at the University of Sydney where ABE Australia is based is the ABE site director, she says; "The program helps increase student STEM ability, engagement and aspiration as well as boosting teacher capacity and STEM teaching quality.

"Often this material was taught through the use of textbooks as the equipment necessary is very expensive. This program gives schools access to the equipment used by professionals, free. We supply all the lab equipment as well as the reagents that are required.

"The Amgen Foundation had a vision of expanding the program into other regions where Amgen had a presence. The pilot went very well, we trained teachers from seven

schools and received very good feedback and we were then able to apply for ongoing funding which we received for three years. Teachers were positive about the training we provided as well as the equipment and the logistical aspects of the program."

With the intention that teachers armed with the knowledge gained through professional development activities as part of the ABE will implement what is learned in their teaching of senior biology students, the program's launch is timely as biotech has been nominated as a core component of the HSC biology course whereas it was an elective previously.

"The program is tailored for high school students and it sits very well with the HSC Biology curriculum. The teachers are appreciative of the opportunity to skill themselves up to teach biotechnology."

And the future is looking very STEM orientated in case you hadn't heard, 75% of the



fastest growing occupations now require STEM skills and knowledge which contrasts to sagging student involvement in STEM subjects.

There aren't many punches pulled in the program, each cohort of teachers attending the three-days course is immersed in learning about cutting-edge biotechnology. The program is based around the process that is used to manufacture insulin, which is, shall we say, involved.

When teachers attend the course at the University of Sydney they are exposed to a series of six lab activities and each has several classes worth of material attached. Teachers are given teaching strategies and the technical grounding to deliver students a good understanding of what it takes to be a bio technician.

"We talk about teaching strategies as well as talking about the technical skills and we cover the work, health and safety aspects, basically everything they need to take the material back to the classroom."

The first of the six labs introduces the tools of the trade; the techniques that students will need to carry out the program.

"The first lab covers the use of a micropipette. You need to be able to use the instrument well if you're going to be able to carry out any experiment in the biotechnology world. We also cover how to perform gel electrophoresis, separating molecules, usually on the basis of their size," Dr Nicholas says.

The rest of the labs are based around the idea of producing insulin, which is tricky. The human insulin gene is placed into a bacterium and ultimately the insulin is purified out of the bacteria. In the ABE labs the students work instead with a gene that encodes a fluorescent protein called the red fluorescent protein.

"Insulin is something you can't see, whereas the red fluorescent protein is observable. We're mirroring the process used to make insulin and after learning the basic skills they can see what they have made."

In the second lab students are given the DNA that encodes the fluorescent protein, they use a particular protein to cut the DNA and in the third lab they check the DNA is correct by separating it out using gel electrophoresis. In the fourth lab they insert the DNA into the bacteria which then begin to produce the fluorescent protein.

"The labs mirror the processes by which researchers produce medicines," Dr Nicholas says.

The program has run in several schools and by all reports the students have enjoyed the experience.

"Two of the schools that ran the program in the first part of the year have asked for the equipment back so it can be run for a second cohort of students. The program goes a long way to addressing the disconnect between education and industry," Dr Nicholas says.

Teachers completing the course also gain entree into the international community of Amgen Biotech Experience alumni with cross pollination and the free flow of ideas facilitated.



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In the past year, 83,188 students at 613 schools, taught by 1014 teachers, participated in the ABE around the world. Since the program began some 600,000 students have been through the course..ABE Australia plans to train 60 teachers and reach at least 5000 students in the coming three years.

The ABE links to the STEM Teacher Enrichment Academy at the University of Sydney which is directed by Prof Judy Anderson and aims to upskill teachers with regard to STEM subjects.

"We give the teachers a grounding in teaching STEM projects but we tend to leave the way that the program is delivered open ended as the teachers know their kids," Prof Anderson says.

The Academy caters to both primary and secondary teaching, it's currently partnering with secondary schools in the Greater Sydney region and primary schools in Wagga Wagga. 