Australian Space Camp student experience

Eleven students from 8 ATP schools recently attended the Victorian Space Science Education Centre (VSSEC) in April.

In total, only 24 South Australia students were selected from country and metropolitan schools as graduates of the 2015 South Australian Space School.

The students were briefed for the two missions they undertook: ‘Mission to Mars’ and ‘Mission to the International Space Station’. Both took place in Melbourne at the Victorian Space Science Education Centre (VSSEC), situated on the grounds of Strathmore Secondary School.

The missions involved role-playing real space practices including mission briefings, flight control and simulated space exploration in hostile and dangerous environments.

Students from Golden Grove High School, Hallett Cove School, Henley High School, Playford International College, Reynella East College, Unley High School and Valley View Secondary School were selected to take part.

Golden Grove High School year 11 student, Emma Seeliger said that one of the highlights of the trip was the time spent at VSSEC, including discussing some of the issues about a mission to Mars. “We talked about protective clothing that would be required, issues with muscle waste during travel, and the effect of gravity on the human body,” she said.

“Part of the experience was held in Adelaide and on the first day we learnt all about Mars exploration and how there are plans to ‘terraform’ the planet to make it possible for humans to live there. NASA is currently planning a future manned mission to Mars but there are a number of complications involved,” Emma said.

“There was a room that simulated the surface of Mars and we needed to put on similar protective clothing that an astronaut would wear. As the astronaut commander, I needed to collect all the information from other astronauts and communicate with mission control and other astronauts. We successfully completed our mission, which was to collect and analyse rock samples.

“After attending the State Space School in 2015 and the National Space School, I’ve become very interested in pursuing a career in astronomy or astrophysics.”

Year 10 students who are interested in science, especially space science, engineering, physics and astronomy are encouraged to apply for the next South Australian Space School.
From postdoctoral neuroscience to teaching maths and science

Since retraining as a teacher in 2011 and starting maths/science teaching at Blackwood High School in 2012, Dr Rogan Tinsley has been on the fast track to success culminating in his current position as STEM ATP at Seaview High School (specialist STEM school – advanced manufacturing) in 2016.

Rogan has many transferrable project and managerial skills when he entered teaching as a career through his postdoctoral positions in neuroscience in Sweden and Melbourne, obtaining and managing project grants and supervising PhD students.

“Taking advantage of the ATP professional development opportunities have really helped advance my teaching career,” Rogan said.

Blackwood High School used their ATP teacher release funding to allow collaborative meetings between staff, and time to write and develop new STEM pedagogy and curriculum.

“This meant that I could use my interest and passions around STEM to bring new topics like robotics into the curriculum,” Rogan said.

Rogan was also instrumental in developing and running Blackwood’s Primary Program between 2013 and 2015 with local primary schools to increase engagement and awareness of young students about STEM before they enter high school.

An opportunity to take an ATP industry placement at SAGE in 2013 shadowing an engineer and looking at project management helped Rogan identify what skills businesses need from graduate students around problem-based learning, working with colleagues and being an enthusiastic team member with a clear process for projects. This industry link led to Rogan running the ‘Hour of Code’ with students, with great success.

In 2014 Rogan was accepted into the ATP Leader’s program and used it to develop a STEM career awareness program for year 8s to allow them to see the variety and possibilities of a STEM career before they chose subjects in year 9/10 to improve STEM aspirations and pathways.

Rogan became the acting science coordinator for Blackwood in 2015, continuing and further developing his STEM programs. He was shortlisted for the Science Excellence Awards (Early Career STEM Educator) in both 2013 and 2014.

“I really valued the ATP state and regional meetings,” Ronan explained, “because they allowed me to step outside of a single classroom/school and see what’s possible in classrooms with other ATP teachers. These modelling and sharing processes can be used by more than one classroom and extend curriculum links to focus on the big picture and outcomes at a national level.”

The links to defence industries allowed Rogan to broaden his general science view and see what skills and career pathways are available in different industries and show that critical and creative thinking can sometimes be more beneficial to students than just focusing on content.

The links Rogan has made with other ATP schools, Tinsley, defence industries and universities during his time with ATP should stand him in good stead for his AP-STEM role at Seaview and we at the Advanced Technology Project wish him well.

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Introducing Playford International College

From 2016, Fremont-Elizabeth City High School is being transformed into a ‘state of the art’ 21st century learning environment. The changes go much deeper than a name change – not only is the school undergoing an exciting $9.5 million development, but secondary education will be redefined through an innovative curriculum and an alternative timetable structure.

This transformational plan is strongly supported by DECD and fits within the South Australian government’s plan to create a new school in the heart of the northern suburbs. Key features of the new Playford International College include:

- later school starts times to suit adolescent circadian sleep rhythms (first lesson is at 9.25am)
- extended opening hours of the school resource centre for students to study and receive tutoring (8.00am to 4.45pm)
- senior students undertaking SACE (South Australian Certificate of Education) spend more time with teachers and less time away from school
- a mosaic timetable of 1-hour learning blocks, and 2-hour doubles for practical subjects
- science and mathematics combined into the 1 integrated subject (iSAM) for years 8 to 10
- a huge variety of exciting and engaging middle school elective and specialist academy subjects in which students from years 8 to 10 learn together in mixed-age classes
- an inquiry or project-based learning approach to teaching and learning across all core and elective subjects
- involvement of community and business partners in collaborating with teachers and students to develop projects that have a real-world purpose
- positive education and powerful learning dispositions embedded in all classrooms
- placement of students into banded classes, based upon their learning needs. As students progress in their learning, they are moved to more challenging classes
- a targeted and intensive program of teacher professional development, including peer mentoring and action research administered by UniSA’s School of Education.

The successful implementation of a culture of innovation and progress should make the school almost unrecognisable by the conclusion of this 3 year journey in 2018.

STEM Academy

STEM Academy is an entirely team-taught, student-directed project-based learning approach to teaching the engineering design process.

In 2016 our program consists of 50 students from years 8, 9, and 10 who chose the class as an elective.

Students form their own multi-year-level teams to design and create a product to solve an identified real-world problem. They select projects from a variety of fields involving remote control electronics, data logging, robotic programming (Arduino or EV3), computer coding, CAD, 3D printing and laser cutting.

Students have the opportunity to enter local and national competitions such as the Australian STEM Video Game Challenge, Aurecon Bridge Building Competition, First Lego League as well as several Concept 2 Creation (C2C) competitions involving RC drones, vehicles and boats.
South Australian student brings 3D submarine to surface

Brandon & Marise Payne, Minister for Defence

Meeting the federal Minister for Defence is not an everyday life experience for most school students, but for Brandon McKelliff from Playford International College, it was an experience he will never forget.

“It was a great opportunity, but I was a bit nervous,” Brandon said after meeting the minister and posing for a photograph.

At an industry breakfast in December 2015, Brandon presented the minister with a model submarine created using a 3D printer, the culmination of the Defence Industry Pathways program he successfully completed with 12 other South Australian students.

“I’ve really enjoyed being part of the program and learnt a lot about the defence industry,” he said.

Brandon, accompanied by his father David, attended the breakfast at the Playford Hotel. In addition to the Minister for Defence, the Hon. Marise Payne, South Australian Premier Jay Weatherill, state opposition leader Steven Marshall, CEO of the Defence Teaming Centre Chris Burns, and Senator Nick Xenophon were also present.

CEO Chris Burns said that the defence industry is an excellent future pathway for students. “It’s an industry characterised by creativity, innovation, complex engineering and advanced manufacturing. Most equipment in defence is handmade. To sustain that industry we need to nurture, grow and sustain a highly skilled workforce,” he said.

“The Defence Industry Pathways Program (DIPP) provides the ideal model to reach out to school students and attract them to the industry.

“It is imperative that initiatives to encourage our youth to study science, technology, engineering and mathematics and enter the defence industry sector continue to be funded and supported.”

Pam Gerrard, Industry Broker for the Advanced Technology Project, said the program had been running successfully for a number of years.

“I’m aware of one student who changed his career path from architecture to now focus on becoming a naval architect,” she said.

“The students apply to be part of this program and attend Regency Park TAFE campus once a week. They are all extremely dedicated to realising their potential.”

The Defence Industry Pathways Program is funded by the ASC and supported by the Australian Government’s Advanced Technology Project.

Subs for SA!

Twelve new submarines for South Australia! We’ve probably all heard the news from the Australian Government, and now our state’s young people will be perfectly primed to take advantage of the decision to build the next generation of submarines at the Adelaide shipyard. It will secure thousands of jobs and the project is sure to play a key part in the state’s economic future.

DCNS of France has been selected as our preferred international partner for this $50 billion project.

Dr Sarah Baker, who manages the Advanced Technology project (ATP) involving 19 schools and 5,000 students across South Australia, believes that our students will be in keen demand as a result of the submarine build.

“We are very excited about the DCNS submarine contract and the other ship building projects that have been announced,” Dr Baker said.

“This perfectly aligns with the ATP, which focuses on students developing skills and an affinity with science, technology, engineering and mathematics (STEM). ATP is helping provide a skilled workforce for the future.”

Along with other recent naval shipbuilding announcements, the commitment to an Australian build will create a sustainable Australian naval shipbuilding industry here in South Australia, and will provide the certainty that industry requires to invest in innovation and technology and grow its workforce.

The Future Submarine project is the largest and most complex defence acquisition Australia has ever undertaken. It is said to be a vital part of our defence capability well into the middle of this century.

The $50 billion submarine investment is expected to create around 2,800 jobs in South Australia.

Adelaide will also be home to the early construction of 12 offshore patrol vessels with construction to begin in Adelaide in 2018, following the completion of the air warfare destroyers before being transferred to Western Australia.

“The Offshore Patrol Vessel program is estimated to be worth more than $3 billion and will create over 400 direct jobs,” said Dr Baker.

The ‘Future Frigate’ construction begins in Adelaide in 2020. Three designers have been short-listed for the Future Frigates to be built in Adelaide, incorporating the Australian-developed CEA Phased-Array Radar. The 3 companies are BAE Systems with the Type 26 Frigate, Fincantieri with the FREMM Frigate, and Navantia with a redesigned F100. The competitive evaluation process is on schedule, which will allow for construction to start in Adelaide in 2020.

This program is estimated to be worth more than $35 billion, and will directly create over 2000 jobs.

“This is all great news for our state’s young people,” said Dr Baker.
I first heard about the Defence Industry Pathways Program (DIPP) 8 course at school. A teacher gave us a brief overview of the course and I thought it sounded interesting so I completed the form and sent it off.

A few months later, much to my surprise, they sent me an email asking me to come in for an interview. I learned about the course in more depth and the more I heard, the more I wanted to do it.

I had previously done some work experience at an architecture firm in Adelaide, which was heaps of fun and after that I wanted to become an architect. Then, after taking part in the DIPP 8 interview, I realised that it was exactly where I wanted my career to start. The new 3D printer models from the DIPP 7 course confirmed my decision to participate.

I waited several weeks for the course to start, and in the meantime I calculated the crazy number of buses I had to take to get to class every Thursday. By the time I was off to TAFE for the first time, I was absolutely pumped! It almost felt like starting a new school where I was a complete stranger, but that feeling soon subsided as everyone was really friendly and easy to get along with.

In the first few weeks we worked on some 2D & 3D sketching, a process still used in architecture today. Next we moved onto the basics of Inventor, a CAD software program. I had used Sketch Up and Rhino, but nothing as complex as Inventor. I was really slow to start with, but as we continued to model up hinges and other things, I became so fluent that our teacher decided to give me some harder tasks to slow me down!

Our first task was to make a key ring to go with our USBs. After modelling our design, we needed to colour it up and send it off to the printer. Much to everyone’s amazement, the printer produced the exact colours we specified, which was so different compared with an everyday plastic 3D printer.

Our next task was the Hobart class destroyers. We all gradually became more proficient and I finished the basic shape of the destroyer quite early, so spent extra time adding plenty of detail. We coloured and then printed the models and I have to say they looked absolutely amazing once they had been coated in the glue.

After finishing the model destroyer and before starting the submarine, we got the chance to go to the ASC and board the real Hobart Destroyer. This was honestly the highlight of the course. It was incredible having spent several weeks building the destroyer, to then actually be standing on the same vessel we’d been modelling was quite something. We had a look around the bridge and to our surprise, the steering wheel was about half the size of a regular car steering wheel!

Our submarine models took next to no time to create and colour. I decided to make my own custom engine and control room. I spent quite a few hours on the engine in particular and both teachers were very surprised and pleased with what I had created. The final step was to add the finishing touches to our models, including adding the guns. We also mounted them onto a piece of wood and attached a plaque with our name on it.

On the Thursday of the presentation, everyone was in a rush finishing off their models. We showed our family and friends what we had been doing over the last semester. They were amazed because none of them had ever seen anything like it.

At the presentation, another student and I presented a speech to our families and the staff of TAFE, the ASC and DECD. We also had the honour of having Derek Gill, General Manager, Shipyard Operations at the ASC, as our guest speaker and we presented him with the model destroyer that I’d made. Afterwards, we were also given some very helpful advice about our careers.

I’m sad that I won’t be traveling down to Regency Park every Thursday for TAFE, but I know that I definitely want to pursue a career in naval architecture.

Noah Collinwood - DIPP Graduate 2015

Sarah started a Bachelor of Science at Adelaide University in 1990 and went on to complete an honours degree and PhD in molecular biology.

In 2005, Sarah started a Graduate Diploma of Education at Adelaide University. “I loved the teaching course so much that I resigned from research on the pain receptor NK-1 in neuroscience at Flinders Medical Centre to finish my teaching diploma,” Sarah explained.

In 2007 Sarah started her career as a contract maths/science teacher at Valley View Secondary School and taught there for 9 years. She gained permanency in 2012 whilst retraining as a chemistry teacher through a TeachSA research grant. A second TeachSA grant enabled Sarah to build on this training and gain her Master’s in Education (Digital Technologies).

For the past 2 years Sarah has been the numeracy, mathematical and science coordinator at Valley View Secondary School – the lead ATP school in the northern region. Sarah has been the ATP manager there since 2014 and involved with the program since 2010, so she is very familiar with the project and its objectives.

“I felt honoured to be offered the chance to work in Corporate Office, and I accepted the role of manager of the ATP program in January of this year.

Learning more about head office processes has led to a greater understanding of the governance side of education.

“Although I’m missing working directly with students, having the opportunity to see 18 other ATP schools and their STEM programs in action has been fantastic to look at best practice for STEM in South Australia. We can share with other schools through the Secondary Learners, Learning Improvement division within DECD.”

“No, it’s better that the 12 new submarines will be built in South Australia, there is genuine future right in our own backyard for defence industries and specialist schools to help prepare our STEM students for a vibrant and innovative future in South Australia,” Sarah said.
A new interactive teaching resource, STEM Teaching Activity Platform, or STEMTAP for short, was developed by young and enterprising final engineering students from Adelaide University. It was presented as their final year project at the University's Ingenuity engineering expo last October. The group of engineers was sponsored by the Advanced Technology Project (ATP).

The students Thomas Moyle, Thomas Kuys, Gwilyn Saunders and Phillip Kuys were awarded Best Mechanical Engineering Project at the Ingenuity expo for STEMTAP, which provides a standard digital and physical platform for teaching a wide range of STEM topics for students in years 5 to 10.

The young engineers have gone on to form MK2 Engineering Solutions, a company whose goal is to engage and inspire Australian primary and secondary school students in STEM.

Exciting teaching tools for STEM students

Student Alexandra Schutz is Pedare College's second recipient of the Andy Thomas Scholarship, offered by the University of Adelaide to one student who has demonstrated outstanding academic merit each year.

Students are invited to apply for the scholarship based on their ATAR and course selection of a Bachelor of Engineering (Mechanical, Mechatronic or Mechanical and Aerospace) program at the university. The student's leadership qualities and extra-curricular involvement during their studies are also taken into account.

In February 2016, Alex applied for the Andy Thomas scholarship as she was keen to study mechatronics, which would allow her to explore engineering pathways to apply her love of mathematics in more depth.

Pedare College began developing STEM initiatives through the technology learning area and purchased a class set of LEGO NXT sets with some of the initial ATP budget.

STEM units were developed using the programming of the robots designed in technology classes to collect data for maths and science problems in the middle school. Students also had the opportunity to become involved in the First LEGO League competition as an extra-curricular activity.

Alexandra participated in the robotics classes, competed in the First LEGO League and then went on to mentor this year’s students with the First Robotics competition. She also attended university visits and competed in mathematical and science competitions.

After winning the scholarship, Alex said that Pedare should be known as a math and science school.

"Pedare has consistently achieved high results in these areas. Students at Pedare are given lots of support from friendly staff who encourage students to achieve their best and offer extra support after school, such as maths help, as well as improving the infrastructure, and providing new, inspiring science laboratories," she said.

Robotics and the Andy Thomas Scholarship

"We think STEMTAP will be a valuable and affordable resource for schools wanting to expand their STEM curriculum," Thomas said.

STEMTAP has 4 main components: activity platform, activity modules, software and learning guide.

The activity platform is a physical platform with embedded electronics that allows ‘plug and play’ connectivity of activity modules. These consist of 3D printed housings with embedded electronic components and dedicated control circuitry. The modules can be designed to be virtually anything to teach a variety of STEM subject matter, including enabling students to design and make their own 3D printed housings, assembled with STEMTAP electronics.

The activity platform and activity modules are controlled by a graphic user interface or by code, dependent on the desired learning outcomes. The learning guide assists teachers with STEMTAP’s operation and details lesson examples that align with the Australian Curriculum. The learning guide also details how activities performed with STEMTAP are relevant to the real world.

Thomas explained further that the 4 components of the STEMTAP system combine to provide students with “a unique and exciting learning experience”. The resource can be used to teach most of the Australian STEM curriculum, including new additions such as coding and digital technologies.

“STEMTAP is also very helpful for teachers, especially those teaching out of their usual field or who may be inexperienced,” he said. “The use of a teaching system with a standard base allows students and teachers to become familiar with the resource as they learn and improve.”

“Senior students feel that their teachers are passionate in their fields and easy to communicate with, which is reflected in a positive class atmosphere that encourages camaraderie and keen student interest.”

The continuity of effective maths teachers through the senior years and the opportunity to be ‘fast-tracked’ in certain subjects has also had a positive impact on students’ pathways at Pedare.

When asked how she felt about winning the scholarship, Alex said, “I am excited to be recognised for my talent in academic subjects and will now have lots of opportunities to meet people in industries. This puts credit to my name.”

Alexandra is looking forward eagerly to participating in functions and marketing for the university. The Andy Thomas Scholarship provides an allowance of $6,000 per year in addition to tuition fees.
American global aerospace company, Northrop Grumman, has approached DECD with an exciting offer to sponsor 4 Aboriginal year 8 students and 2 teachers to attend their Space Camp in July 2016.

The Space Camp, held at the USA Space and Rocket Centre in Huntsville, Alabama, is the premier provider of authentic, inspiring and entertaining educational experiences in space science and aviation. The camp is held from 24 July until 29 July 2016.

Jackie Slavero, founder of ‘One Giant Leap’ and International Ambassador of the Space Camp program calls the space camp an ‘inspiration incubator’.

“What’s different about our program is that we’re trying to teach C to C++ students – those with the potential of being high achievers, but who just need a little push or motivation to excel,” Jackie said.

“We also carefully choose the teachers because they’ll have their own program while they’re at Space Camp and will be expected to design and facilitate a professional learning program once back home. We want to inspire students and teachers about space, science, engineering and emerging technologies.”

Northrop Grumman was named as the fifth-largest defence contractor in the world in 2015 and employs over 68,000 people worldwide.

Scholarships to attend the Space Camp have been funded by the Northrop Grumman Foundation for 8 years under its K-12 initiative, with a goal of achieving excellence in STEM education globally. The company is known for encouraging and supporting students and teachers from primary school through high school.

This is only the second year that the offer has been extended to Australian students. In 2015, 4 students and 2 teachers from the ACT attended the camp, and this year it is South Australia’s turn.

The Northrop Grumman program generously provides airfare, room and board, backpack and flight suit. The Advanced Technology project is also supporting this initiative and will provide spending money for both teachers and students and luggage for each student.

In a recent interview Jackie was asked what students get out of the program. “I have so much evidence surrounding self-esteem building,” Jackie answered. “The belief that they can achieve anything. One of the students I took away in 2008 said that she could write a novel about the impact Space Camp had on her life – it didn’t shape her career but made her believe that anything is achievable if she has conviction that it’s possible. Our program is not just about creating ideas about space – it’s also about hope, vision, empathy and all other things that lead to resilience.”

The department is currently going through a selection process and the lucky students and teachers will be jetting off to the USA in July.

Hour of Code @ UHS

Year 8 students at Unley High School recently completed a combined 180 hours of computer science during term 1 science lessons. The students learnt some programming through code.org, a set of online tutorials designed to introduce students to computer science. They completed the “Minecraft” tutorial (available at code.org/mc), which introduces players to basic coding skills, encouraging them to navigate, mine, craft and explore in a 2-D “Minecraft” world by plugging together blocks to complete all actions and generate computer code.

Students also used the iPad app, Hopscotch, following a tutorial to make their own version of a popular game.

This free app allows students to create things including games, pixel art, or animations by dragging blocks of code together. This easy-to-use but powerful computer language introduces the concepts of abstraction, variables, conditionals, loops, and more.

We are looking forward to what creative things the students develop over the holidays!

David Messer - ATP manager/senior biology/science teacher