

Benjamin (Ben) Garnaut is an emerging leader in Science/STEAM education having transitioned from his previous career as a geologist at the beginning of 2016. He shows real strength in curriculum development, pedagogical practices and leading initiatives, to the extent where he filled in for the Head of Science who took LSL for four weeks in 2017 – this after just 18 months as a teacher. In addition to taking on this leadership role again for 4 weeks in 2018, Ben has taken on his first student teacher and continues to support his colleagues in all endeavours. During the past three years Ben has revitalised both the Physics program and many elements of the science curriculum; coordinated the school's Science Club; led a number of significant science outreach/extension initiatives; and supported students in their applications to attend State, National and International science enrichment programs. Much of his work can be directly traced to the success achieved in the 2017 Governors School STEM Awards for 2017 where Warwick SHS was the recipient of the Meritorious Leadership Award.

Already recognised by the Science Teachers' Association of Western Australia when he was awarded their Jeff Cahill Early Career Teacher Award in December 2017, Ben is an outstanding candidate for the Department of Education's 2018 Beginning Teacher of the Year.

Professional knowledge and understanding

Girls, students from low socioeconomic status backgrounds and Indigenous students can be less likely to engage in STEAM education and therefore have a higher risk of not developing high capabilities in STEAM-related skills. Ben Garnaut has understood this fact from the moment he placed at Warwick SHS as a Student Teacher in 2015. On permanent staff from 2016, Ben has steadfastly worked to develop his own teaching skills at the same time as build science and STEAM pathways at the school.

For many years the school had lacked viable senior school numbers to offer Physics onsite but in 2016, 9 Year 11s sought to take the course. Although inexperienced, Ben was tasked with responsibility for the class and in just two years has built the reputation of the program so that a class in both Year 11 and 12 is now viable and students no longer need to work through SIDE. Ben's ability to teach at the standard required, provide engaging lessons and explain difficult concepts so that student achievement and confidence is fostered has resulted in outstanding outcomes for his students. To support student learning, Ben adopts a wide range of activities, challenges students with problems and questioning techniques, and has utilised STAWA's Physics Day at Adventure World to build understanding of real world applications. Year 12 performance data for 2017 shows a scaled mean of 60.09 in Physics with the class achieving a school-scaled mean adjustment of 0.31, indicating that he not only prepared his students very well for their ATAR examination but accurately assessed performance throughout the year.

Ben has played a major role in curriculum development in science since his arrival at Warwick SHS. He demonstrates real skill differentiating the curriculum to suit the needs of his students, evidenced when teaching Year 10 Biology. Working on the premise that project-based learning builds knowledge and generates authentic learning, students worked to construct an aquaponics system utilising recycled equipment sourced from the backyard of a house being demolished. Ben has initiated the re-sequencing of content in the Year 10 Academic Extension Physics course so as to improve alignment between the knowledge, skills and understanding, and build the resilience of students when challenged by the more difficult concepts. Ben has also taken the initiative to revamp the Year 8 and 9 Earth and Space Science courses, applying his industry specific knowledge so as to develop practical activities that have engaged the students and made connections to real-world situations. In all situations Ben has tapped into strategies to enhance student engagement and improved educational outcomes were the result.

Ben has introduced an electronics option course, incorporating experiences that are both engaging and challenging, to stimulate student interest in this area. This has included the use of Makey Makey kits, constructing electrical circuits and adopting projects that required soldering. The course continued to be refined under Ben's tutelage and is now proving to be one of the more popular option courses with 73 enrolments in 2018 and the involvement of a second teacher.

Ben is an exceptional teacher - not just an exceptional beginning teacher! He knows his students and creates a culture of high expectation and high care within his classroom. He enriches student learning through enhancing engagement and building rigour.

Professional practice

Ben has demonstrated excellent teaching pedagogy in his short career. He has an excellent rapport with students and this has enabled him to showcase his teaching abilities. Ben is always willing to ask for advice and try new activities to engage his students.

Having attended the *Science by Doing* PD in 2016, Ben recognised that there were students who were not proficient at answering high-level questions. Collaborating with Graham Johnson (HoLA), Ben designed an action research project to review the level of questioning occurring in both his classes and in assessment materials, and the effect this was having on student understanding and achievement. The research included recording questions asked in class and classifying them according to Bloom's Taxonomy. Data analysis revealed that there was a major discrepancy between the frequencies of higher order versus lower level questions being asked by the students when in class. Utilising *Science by Doing* strategies, Ben added activities to expose students to the skill of asking and being able to respond to higher-level questions. This work has undoubtedly contributed to his Year 12 Physics students achieving excellent ATAR results.

Ben saw his first class of Year 12 students undertake their Physics ATAR class in 2017. He achieved an exceptional correlation of .97, showing consistency between school and ATAR course examination marks. Physics at Warwick saw an average scaled score of 61.40 (one student achieved a scaled 75), an exceptional result for a first time teacher of the course and given that this was the first time that it had run at the school for many years. Moderation was -5.67 (Like schools = -6.80; DoE = 4.80). Students achieved a mean examination score of 54.68 (Like schools = 48.95; DoE = 56.84). 67% of students counted Physics as their best or second best score. Ben achieved these results by knowing the curriculum and the achievement standards, but worked exceptionally hard throughout two years to build student knowledge and application. This included running an additional one-hour class one morning each week. For a graduate teacher in only his second year, these results are particularly pleasing.

He has introduced a number of new strategies into the Science Department, including the development of STEAM challenges, inquiry based learning and Kahoot quizzes. The STEAM challenges involved the students coming up with real-life solutions to real-life problems, such as the 'ball size-separating machine' where the students had to design and build a machine that separated different sized balls into size order. Inquiry and collaboration skills are enhanced with students regularly recording and comparing data, thus replicating approaches that occur in industry or research laboratories. Kahoot has been used to assess prior learning, as an engagement strategy and to focus revision. A visit to any of Ben's classes will see students fully engaged, inspired and excited about science and their learning.

Ben has taken learning beyond the traditional classroom approach. To promote STEAM focused education in 2017, Ben collaborated with Jeremy Caspersz, TiC D&T, to implement a Year 7 Wind Turbine project. Built from the problem of students wishing to charge their mobile phones at school, Ben and Jeremy developed a program that saw the timetable collapsed for 1½ days with students working in teams with a mentor teacher to complete their part of the project. Groups included engineering, tower, charging unit, photography and media, creative writing, catering, art, logistics, enabling students to work in an area of interest. The project culminated in a presentation event, attended by parents/carers, which showcased each group's activities and the completed wind turbine. Ben's capacity to visualise and then implement such an initiative with Jeremy is indicative of his creativity and ability to manage a project of this magnitude. Most importantly, the project had the desired effect illustrating to students the importance of STEAM education, thus achieving improved educational outcomes for students.

Ben wants his students to engage in lifelong learning and to experience success - and they know it. He has supported the participation in the Synergy Solar Car Challenge and it is a credit to Ben's mentorship that the students placed second in the State in 2017. Ben extended the school's participation in 2018, coordinating the involvement of two Year 8 teams as well as hosting a semi-final at the school. This year he has commenced a new project, in collaboration with two other staff, to prepare a human powered vehicle for entry into the Busselton Pedal Prix this August. This project will see up to 25 students involved in the build, as drivers, media crew or in logistics support.

Professional engagement

Ben models effective learning. He used his attendance at PD such as SCSAs *New and/or inexperienced teachers of WACE Science courses* workshop, *Science by Doing* and the Future Science Conference, together with his membership of STAWA, to not only enhance his knowledge, skills and understanding, but also to build his network of support across the State. This was especially critical when re-introducing Physics at the school in that Ben was able to draw on a wide group of contacts when developing course materials or needing assistance. Ben willingly shares the resources that he has developed, together with the approaches and strategies adopted to enhance engagement and extension – indicative that he is very much aware of being part of a collegiate system. Awarded a Warwick SHS PL Scholarship for 2017, Ben used this opportunity to attend the National Science Teachers Summer School (NSTSS) in Canberra. This enabled him to engage in a professional dialogue about teaching and learning, be exposed to cutting-edge research, and explore new methods of engaging students in STEM at a national level and bring the ideas formed back to our school for the benefit of his colleagues and our students.

In addition to completing the required Graduate Modules, Ben was supported by the school to attend the *Classroom Management Strategies (CMS) Foundation and Instructional Strategies for Engagement* programs in 2017. This ‘foundation’ has enabled Ben to not only consolidate his teaching skills but also expand his repertoire of strategies and approaches. Ben utilises the strategies learnt not only in his own classroom, but also to assist other teachers. His past experience in the oil and gas industry has clearly helped Ben to have professional conversations with all staff confidently. His ability to mentor and enter into professional dialogue with colleagues reinforces our view that he will progress quickly to school leadership roles should he decide on this career pathway.

Ben is a member of the school’s STEAM Professional Learning Community and his implementation of a STEAM culture in his classes and projects has seen him become a leader within the school where staff, from across all learning areas, feel confident to seek his advice when implementing their own ideas to support this school priority. He provides regular updates to staff through PLC meetings, staff meetings and School Development Day workshops. Ben’s expertise is increasingly being recognised beyond the school. He presented at a Scitech TeachMeet event in June; will deliver two workshops to local primary schools on incorporating STEAM challenges in their classrooms in Term 3 and in September, will co-present a workshop on STEAM innovation at the STEM Education Conference.

Ben displays respect and professionalism in his interactions with students, colleagues, parents/carers and the broader community. Ben coordinates our weekly afterschool science club, where students learn to build drones, cars, rockets, boats and bridges; conduct science experiments; and design and construct bird and bat boxes for the Friends of Warwick Bushland. Parents/careers know the impact he is having on their children - in the words of one parent, *“Ben brings enthusiasm, laughter and positive energy to all he does. He is a powerful role model to the students of Warwick SHS.”*

Further illustration of the Ben’s successful community engagement and the positive student achievements that have resulted is his involvement at Perth Science Festival. Warwick SHS was invited by organisers to exhibit at the event, the only school to do so in 2017 and have been asked again this year, and this saw staff work with students to demonstrate science principles and showcase how students at the school are being prepared for STEM oriented careers to over 17 000 visitors. Not only did Ben contribute to the range of activities present he also manned the stall for much of the weekend.

Ben’s capacity to engage with members of the broader school communities within and beyond the classroom enriches the educational context for students. Ben has played a significant role in helping to organise the annual Warwick Science Fair, which sees over 200 Year 5 primary students in attendance. Additionally he organises the Year 4 Primary School STEAM Challenge at the school, with over 120 students participating in a two-hour workshop where they work together in teams on two activities. The success of these initiatives reflects Ben’s enthusiasm and passion for STEAM focused education, and enhancing transition pathways between local primary schools and Warwick SHS. Ben’s contribution to our school also extends beyond science/STEAM. He regularly attends staff and student social events and is a member of the school’s Relay for Life team. He is an outstanding contributor to our school community and we are very fortunate to have someone of Ben’s calibre as a teacher at the school. Ben Garnaut is a highly deserving candidate for the Beginning Teacher Award.