



ARC Linkage *Space To Grow* Project Newsletter Edition 13, August 2012

## Prof. Brian Schmidt, Nobel Laureate becomes *Space to Grow* Patron

**Prof. Brian Schmidt, Nobel Laureate\***, Australian National University astrophysicist and *Space to Grow* Patron, shares his thoughts on how teacher professional development, encouraging curiosity and the excitement of discovery are vital to Australia's future.

Science is all about curiosity and this curiosity-based knowledge provides the building blocks of future technological breakthroughs. It is not necessarily intuitive that technological revolutions are rarely manufactured, but rather emerge chaotically out of the forest of basic research, current technology, as a brilliant idea. Ultimately knowledge provides opportunity. Opportunity not just to go on the well-travelled road from point A to B, but rather to take a path of discovery to new places. This is the essence of science - a cycle where we learn new things about the Universe, we use this knowledge to transform our own world through innovation, and then use innovations to open up new discovery windows on the world.



*Prof. Brian Schmidt, Nobel Laureate\**, image courtesy of the Australian National University  
\*Read more [Edition 10](#)

### *... highly skilled science teachers are critical*

Australia's continued prosperity is not guaranteed - it requires strategic science and education policies that will enable our society to adapt to a rapidly changing world, developing innovations to maintain and improve our standard of living. Australia's greatest resource is its people and the education of our children is the single most important investment we can make in the future.

There is substantial evidence indicating that highly skilled science teachers are critical in determining education outcomes - more important than, for example: class size or quality of infrastructure. We should do our best to skill up teachers through professional development to ensure the science curriculum is taught as well as possible. This is not just making sure that our teachers know the facts, but are also confident enough in their scientific knowledge to share the excitement of discovery and the power that comes from systematic deduction of fact from evidence.

### *Kids are naturally curious and most love science...*

Teaching science successfully is all about connecting the wonder of nature that surrounds us to our daily lives. This can come from seemingly unimportant observations of the stars at night to the nature of things like electricity, which powers our daily lives.

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## Highly Commended by the 'Sleek Geeks'



Bathurst High School student Lauren Inwood has been researching open star clusters after her introduction to *Space to Grow* with A/Prof. David McKinnon in late 2010. A small group of students gathered to look deeper into science while trialling the rewritten project resources. Lauren became inspired and also keen to pursue further research. Her findings had experts interested, resulting in a collaborative paper that is currently under peer-review, followed by a Highly Commended 'Sleek Geeks' *Open Star Clusters* video entry, a frame from which is shown left.

Read more under *Professional Development* on Page 3



## Meet the *Space to Grow* Team

Dr. Lena Danaia was the nominated Post-Doctoral Fellow in the *Space to Grow* Project following a research path investigating science education across primary, secondary and pre-service teacher education. Now lecturing within the Faculty of Education at Charles Sturt University in Bathurst, Lena maintains her involvement in the *Space to Grow* project, further enhancing her previous research foci.



Originally training as a primary school teacher, Lena completed a Bachelor of Education (Honours) degree researching the impact of using remote telescopes and associated curriculum materials in primary schools. After teaching in schools within Australia and the United Kingdom, she undertook a PhD that extended her initial research to focus on junior high school science (Years 7-9). This examined school science students' perceptions of, and knowledge outcomes in, science at school and the pedagogies employed by their teachers.

In conjunction with her colleague and mentor, A/Prof David McKinnon, Lena has been recognised for outstanding contributions to learning and teaching at institutional and National levels. These include a joint recipient of a Faculty of Education Academic Excellence Award, a Carrick (now ALTC) Citation and an Australian Learning and Teaching Council (ALTC) Award for Teaching Excellence. Lena has commenced a Masters of Science (Astronomy), is an active member of the Mitchell Science Teachers' Association and co-supervises four PhD students working in science education.

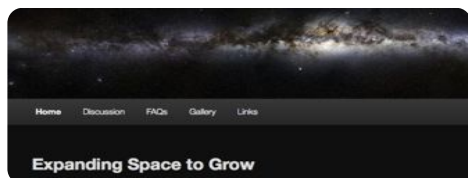
As a proud wife and mother, Lena notes one of her two children is showing signs of being a budding scientist and he is intensely interested in the Moon, observing it through David's telescopes!

## Feature Teacher – David's Research

**David Horton-James' motivation for taking up teaching was the declining number of students who were taking up science study in tertiary education. While this seems to be a major change of direction from his previous work as a Research Chemist charged with the preservation, care and exhibition of museum specimens, artworks and metal implements, promoting scientific research and education are the common links. In doing so, he has found a great personal reward in encouraging students in Science and Physics at Lithgow High School over the last 10 years.**

David motivates his students to be involved in research and appreciate where research can lead, and enjoys seeing the 'buzz' they get as they begin to learn, and then want to learn more and more. He uses *Space to Grow* as a tool to stimulate curiosity initially for deeper scientific research with his weekly group. David considers the need for pure research for its own sake to be as important as applied as some of the greatest discoveries arise from investigations in unusual areas. His former students recompense him with updates about their further higher degree science research progress in the wider world.

## Join the discussion



Ross Cutts, our Edition 12 Feature Teacher, invites teachers to register on the *Space to Grow* McMoodle site, which he set up for teachers to share, discuss and celebrate their *Space to Grow* experiences. See the link on our What's on News and Views website page or got directly to <http://mcmoodle.net/spacetogrow/>

## Date for your Diary

**20 October 2012, Astronomy Open Night** – Macquarie University Association for Astronomy and the Department of Physics and Astronomy are proud to present their 48th Astronomy Open Night, featuring an illustrated talk on *Planets and starquakes with NASA's Kepler space telescope* by Prof. Tim Beddin, viewing the night sky through up to 30 telescopes operated by both Macquarie University astronomers and amateur astronomers, planetarium, Laser Guide star and more. Advanced bookings are recommended.

# Prof. Brian Schmidt's Message as *Space to Grow* Patron

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Kids are naturally curious and most love science if we simply do not kill their interest by making it irrelevant and boring. In the process, we can teach our children to think through problems and learn the process of critical thinking. Not only will this provide the next generation of our nation's scientists and engineers, but it will also ensure we have a public that can thrive in what is an increasingly technologically driven society.

The *Space to Grow* project strongly plays to these ideals and vision. This is why I am delighted to be the patron of this important science pedagogy research project designed to attract and retain more high-school students into science.

## Professional Learning



Participants from the DET Western and CEO Bathurst regions, as well as two independent schools, met at Bathurst High School in June to learn the fundamentals of telescopes and colour imaging, as well as discovering some of the in-built teaching and learning techniques. An added bonus was Lauren Inwood discussing her research on *Globular Star Clusters*, indicating where the next phase of training on 'Star Cluster Photometry' could lead.

Geoffrey Hastings, Principal of Bathurst High School (pictured right, with Lauren and A/Prof. David MacKinnon, above) spoke to teachers on the beneficial impact that Lauren's research has had on other science students, which also demonstrates the influence that undertaking 'real' science investigation has.

### *'really, really exciting'*

On the success of her thrilling discoveries, Lauren's *Open Star Clusters* entry was Highly Commended the Australian Museum's Eureka 'Sleek Geek' competition <http://eureka.australianmuseum.net.au/news/2012-highly-commended-sleek-geeks> Lauren designed the concept, script, content and look, including her clarinet finale, then directed the video on filming day. Finding her *Space to Grow* research 'really, really exciting', she is honoured with the opportunities that have arisen as a result. Lauren also thanks and acknowledges David, Lena and Michael from the *Space to Grow* team for their support and mentoring with her research, plus their input and assistance with video compilation and filming.



*Image credits: middle row D. Evans, C. Dow (Bathurst), bottom row 3 – B Bannister (Dubbo)*



# 2012 National Science Week

## Indigenous Science at the Australian Museum

Aboriginal people studied the bright stars and 'dark spaces' for the purposes of navigation, calendars, food economics and social structure. Speakers from Arnhem Land, rural Victoria and Sydney showed how traditional knowledge has relevance to modern scientific research methods for positive community outcomes. Investigations covered traditional medicines and plant resources, control of feral flora and fauna, fire regimes and management, conservation and care of sacred sites, Aboriginal astronomy and archaeology. Chemistry, microbiology and aboriginal technology hands-on activities were part of the daily program. Click on the link for contact details and more information: <http://www.scienceweek.net.au/the-indigenous-science-experiencethe-australian-museum/>



L-R - Oliver Costello from NPWS Aboriginal Co-Management Unit on the *Hotspots Project* which integrates contemporary and Aboriginal fire practices, Yugul Mangi Ranger, Edna Nelson (L) and Karmelina Daniels (R) talk about the Aboriginal marriage and kinship system, Jeff Talbot presenting on the 'Boys in the Bush' project and site management guidelines in Mt. Kuring-Gai National Park. **Image Credits:** Web Video Productions

## Oakhill College Science Fair

Astronomical colour imaging by Year 11 students was one of many displays of experiments with their research methodologies for viewer voting and awards at Oakhill College. All the key ingredients were present to excite and inspire a love of science to entertain students and the general public with guest speakers from Taronga Zoo and slithering, crawling creatures for 'petting' plus chemistry demonstrations featuring mini-explosions, oozes and ice-cream making by Mr George Georgescu and Mr Peter Blanch.

**Image credits:** Sandra Woodward



## It all begins with curiosity....

While our daily-used technology has scientific origins (mobile phones, WiFi, televisions, remote controls, automatic doors, radar, medical imaging, lasers) how can curiosity for deep thinking and investigation be encouraged to guide our future, when answers are available at the click of a button? How was the aptly-named *Curiosity* (a 6 wheeled, 900 kilogram robotic rover) landed on the surface of Mars and what technology is required to operate it and transmit information back to Earth over the next two years?

The answers may start with education, investigation, collaboration and innovation, however long-term applications are only in the planning stages, and today's students have the opportunity to be a part of that next phase.



**Image credit:** <http://mars.jpl.nasa.gov/msl/multimedia/interactives/edcuriosity/index-2.html>