



ARC Linkage SPACE TO GROW Project Newsletter Edition 5 – June 2010

WORKING for CHANGE in SCIENCE EDUCATION



A/Prof. David McKinnon, project co-director and science education specialist for 35 years, has created a Vimeo guide to the project Research Methodology, now posted onto the Macquarie website. Teachers and students for Years 10, 11 and 12 in science and physics classes are encouraged to submit pre-intervention data prior to National Science Week (14-22 August) as a tangible contribution to the science education research. The Multiple-Baseline data are essential for comparing results between implementing and non-implementing student groups in the project, so more submissions equals better comparisons.



Head Teachers of Science, together with team members, have been working to maximise data collection and participation. The first of several planned key project events was held on 17th May at MacKillop College, Bathurst with around 100 Year 10 students participating in a full day of implementation. Rochelle Mutton and Sue Weekes from MacKillop College plus eight team members were involved. Rochelle is our Feature Teacher on page 2.



Paul Stenning, Education Officer from CEO Parramatta, also observed and assisted as a preamble to a team presentation for Head Teachers of Science in that jurisdiction on 21st June at the Aengus Kavanagh Centre, Mt Druitt. Teachers from Canobolas Rural Technology High in Orange and Lithgow High were also invited to attend. The newly-developed Star Cluster Photometry module and trialling the Salsa imaging software was on the agenda for both days. A follow-up training day to learn essential skills for implementing will be held early in Term 3. Paul and the team are also developing strategies and methods to individually support teachers with software and astronomy knowledge, plus planning and scheduling.

Also on 21st June, four DET Western Year 10 classes from Denison College Bathurst, worked through activities with Head Teacher of Science Craig Luccarda and project personnel at Charles Sturt University - see Other Implementations on page 3.



Selected photos of students, teachers and project team at MacKillop College on 17th May

Features: Page 2-3 Star Project Partner, Feature Teacher Page 3 Feature Teacher Followup, Other Implementations, Quick Quiz, Team Promoting Science Education, Back page Team Support, Resources, Quiz answers



Star Project Partner – CEO Bathurst



The Diocese of Bathurst covers an area from the Blue Mountains to the Western Plains in central New South Wales (NSW). The Catholic Education Office supports and services approximately 9000 students from kinder to year 12, with 3250 students in years 7 – 12. The four secondary high schools range in size from 380-1040 students, plus there are four kinder - year 10 schools (colloquially called 'central schools'). Schools of this system have had a long tradition of seeking excellence through practical and effective initiatives.

The 'Central West' of NSW is a scientific community with agriculture, engineering and mining having a strong influence. Siding Springs Observatory and Charles Sturt University campuses of Bathurst, Dubbo and Orange are all within the diocese boundaries, leading to a synergy with Space to Grow.

The project means a lot to our schools as participation rates of students in senior level physics, chemistry and advanced mathematics is less than desirable, like many rural schools. A specific taskgroup was established in 2008 to support and address this issue with the four senior high schools represented. The Space to Grow project strongly aligned with their aims. Phil Owen at La Salle Academy in Lithgow runs the project, supported 'on the ground' by Billinda Auld, La Salle's Mathematics and Science Taskgroup representative and Science Coordinator. Phil met with high school science coordinators and Head Teachers of Science for K-12 schools in early May to present the project and show how it maps to the curriculum. He then connected to the website to show some of the amazing images. His presentation received a lot of interest and was particularly well supported by Rochelle Mutton (see our 'Feature Teacher' following).

Phil uses his one day per week staffing allocation to establish and pilot the use of the Faulkes Telescope at La Salle, and then support the program expansion into other high schools and K-10 schools. He has been working on incorporating the Space to Grow lesson material into La Salle's Science program with ICT use, modelling, discussion and stimulus material to engage students. This program can then be modelled to other schools. Early in term 3, Phil and Vince Connor will be going 'on tour' to work more closely with schools.

Submitted by Vince Connor, Schools Consultant 7-12 and K-12

Feature Teacher

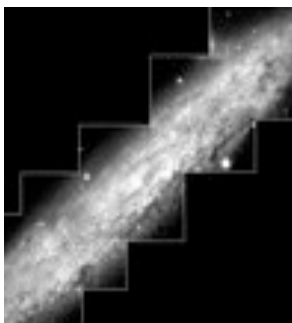


Rochelle Mutton, Head Teacher of Science, at MacKillop College, Bathurst, views the project as an opportunity to reverse the trend of declining Physics student numbers - currently 4 overall in Year 11 (partly using Distance Education) and Year 12. She attended two PD training days at CSU before the large-scale implementation with Year 10 students.

Rochelle with implementation posters presented by Prof. Quentin Parker on 17th May.

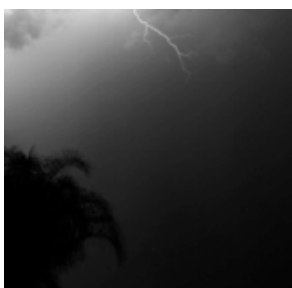
Rochelle was keen on introducing Space to Grow on a large scale, to provide all Year 10 students with the exciting opportunity to collect, manipulate and analyze 'real' scientific data. Some students could then be inspired to apply for Telescope Time, analyze data achieved to complete their Independent Research Project, and see Physics as an exciting and viable option for their HSC. All the Science teachers could benefit from viewing and experiencing module use also. Rochelle advised that the fantastic team support made it a wonderful experience on the day and teachers would now feel more confident to implement and use modules in their own classrooms.

Feature Teacher follow up



Sandra Woodward continues to work with Years 10-12 at Oakhill College. Years 11 and 12 students work in their own time, so there are regular meetings to plan and monitor their progress. The information, sample tasks and embedded links in the Introduction to the Faulkes Telescope module left them eager to work through Making Colour Images. Image Mosaics is next, again out of class. With such positive feedback, Sandra expects telescope time applications soon.

Other Implementations



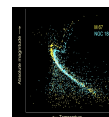
David McKinnon and Lena Danaia visited Bathurst High School 16th June to introduce the aims and resources to students. Four Year 10 Denison College classes then visited CSU in Bathurst with Head Teacher Craig Luccarda 21st June. David and Lena assisted as students worked through two modules. Craig also encouraged students to websearch suitable targets for telescope time proposals and increase research skills.

Jennifer Wickham at Orange High School, aims to 'ramp up' the pace with her Year 10 by term end and look at Faulkes Telescopes time options in term 3.

Caroline O'Hare at St Andrews College has advised her Year 10 class introduction went well and students became really involved, even those who were initially reluctant. Fellow faculty member, Jim Roseby, is preparing to roll out shortly.

Quick Quiz (answers back page)

1) What name is usually given to the type of image shown? **2)** Who is it named after? **3)** What does it usually represent? **4)** Where would our sun sit? **5)** What unit of distance is equivalent to 3.26 ly (light years)? **6)** What alternative names are given to the measurement of temperature that is equivalent to -273.15°C (-459.7°F)?



Space to Grow team promoting Science Education

Team members are promoting science education and the Space to Grow project locally and internationally!

David Frew visited Faulkes Telescope UK (FTUK) counterparts at Cardiff in early June to promote cross-project strategies and discuss resources for the project. His group presentation on Space to Grow was appreciatively received. Our respective projects were further discussed with individual staff members on site afterward.



A/Prof. David McKinnon, Dr Lena Danaia and Michael Fitzgerald will be presenting a talk on the Space to Grow project at ASERA from 30th June at Port Stephens. Michael will also present a project poster at the Astronomical Society of Australia meeting in Hobart from 4th July.

Rob Hollow will be presenting two workshops at the CONASTA conference in Sydney beginning 4th July in his role as Science Education Officer with CSIRO.

Team support always available



While considering how you will introduce the project into your science timetable, think of the fantastic project resources at your disposal via website, telephone, email, Skype and in person! Our team of science education and astronomy experts can help you by sharing their expertise and knowledge. Michael Fitzgerald is focussing on teacher Professional Development and he is keen to discover what individuals need to achieve the maximum training benefits and how these can be best supported in the classroom. Check his Ning blog to see where this search is leading.

New resources and online modules

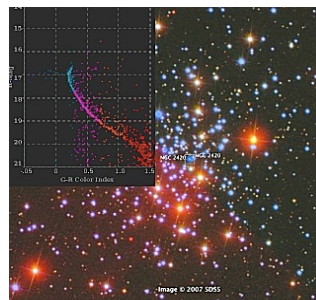
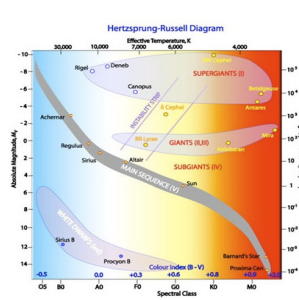
The resources on the Space to Grow websites continue to expand with the Vimeo guide to the Research Methodology, two new classroom modules (H-R diagram and Star Cluster Photometry) and the Stage 5 Curriculum map. Stage 6 mapping, Proper motion and parallax, plus Aboriginal Astronomy modules are underway.

Multiple Baseline, Multiple-Phase Data Acquisition - Space to Grow

Phase	Baseline	Phase	Baseline	Phase	Baseline
1	10000	2	10000	3	10000
4	10000	5	10000	6	10000
7	10000	8	10000	9	10000
10	10000	11	10000	12	10000

Abbreviated Stage 5 Curriculum Map

Year Level	Science	Mathematics	English	History	Geography	Art	Music	Physical Education	Health and Physical Education
Year 5	1	1	1	1	1	1	1	1	1
Year 6	2	2	2	2	2	2	2	2	2
Year 7	3	3	3	3	3	3	3	3	3
Year 8	4	4	4	4	4	4	4	4	4
Year 9	5	5	5	5	5	5	5	5	5
Year 10	6	6	6	6	6	6	6	6	6
Year 11	7	7	7	7	7	7	7	7	7
Year 12	8	8	8	8	8	8	8	8	8



Abbreviated Stage 5 Curriculum Map

Year Level	Science	Mathematics	English	History	Geography	Art	Music	Physical Education	Health and Physical Education
Year 5	1	1	1	1	1	1	1	1	1
Year 6	2	2	2	2	2	2	2	2	2
Year 7	3	3	3	3	3	3	3	3	3
Year 8	4	4	4	4	4	4	4	4	4
Year 9	5	5	5	5	5	5	5	5	5
Year 10	6	6	6	6	6	6	6	6	6
Year 11	7	7	7	7	7	7	7	7	7
Year 12	8	8	8	8	8	8	8	8	8

Educational Research Methodology Vimeo

The H-R diagram

Star Cluster Photometry

Stage 5 Curriculum module mapping

Quick Quiz answers

1) H-R Diagram 2) Ejnar Hertzsprung and Henry Norris Russell 3) Classify stars by luminosity, spectral type, colour, temperature, evolutionary stage 4) Roughly central as mass, spectral type, surface temperature, radius, luminosity are average 5) One parsec 6) Zero kelvin - absolute zero.

Images: TeacherFollowup: <http://lcoqt.net/en/image/space/ngc-253> Quiz: http://en.wikipedia.org/wiki/Hertzsprung-Russell_diagram p4 H-R Diagram - Rob Hollow CSIRO; Star Cluster Photometry - ngc2420 http://www.astro.washington.edu/courses/astro500/GoogleSky/sky_cmd_exercise.html

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