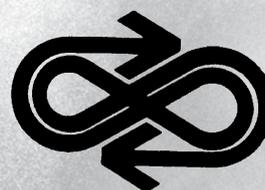


2014 Physics in General Science (PIGS) Conference



Friday Afternoon, 14th February, 2014, Monash University, Clayton, Victoria

A conference for teachers of Science in Years 7 to 10.

The conference caters for those:

- seeking to increase their confidence in teaching physics related topics,
- looking for new teaching ideas and resources.
- The Program has four sessions from 1:45pm until 5:30pm with 19 workshops specifically on physics aspects of Years 7 - 10 and another 12 of general interest across Years 7 - 12..

Conference Program

Program

1:15	Registration
1:45	Workshops: Session A
2:50	Workshops: Session B
3:50	Afternoon Tea /Displays
4:30	Workshops: Session C
5:30	Workshops: Session D
6:30	Finish

Wireless Internet and laptops at the Conference

Wireless internet is available to participants, a username and password will be needed. Some presenters have invited participants to bring along their own devices including laptops. Check descriptions below for (BYOD). To store laptops during the day, laptop lockers with power are available in the lobby of the S9 - S12 lecture theatres at no cost. Lockers need to be booked on the Application Form. Keys can be picked up at Registration.

Each participant will have web access to proceedings from the VCE conferences series as part of their registration.

The Physics Science Teachers' Conference is an approved professional learning activity.

Registration information, La Trobe University Map and all conference information is available on the **Science Victoria website: www.sciencevictoria.com.au/conferences.html**

Australian Institute of Physics (Vic Branch) Education Committee.

www.vicphysics.org

Science Teachers' Association of Victoria Inc.

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2014 Physics in General Science (PIGS) Conference 2014

Registration from 1:15pm

Descriptions of Workshop Sessions:

M: Yrs 7 - 10, G: Years 7 - 12, BYOD: Bring your own Device (optional)

Session A

1:45pm – 2:50pm

A1 What the BFS is it? An Approach to Developing Student Inquiry Skills

(M)

Robert Hollow, CSIRO Astronomy and Space Science

Backward Faded Scaffolding (BFS) provides an effective framework for developing student's inquiry skills. Structured laboratory tasks take students from novice learners through to independent investigators. By flipping the traditional approach and scaffolding tasks starting with a teacher-focused example on writing conclusions, we end up with students being able to pose effective research questions. This workshop introduces you to the concept of BFS and the research underpinning it. It then uses an astronomy context utilising freely available online data and tools to model the use of BFS within the classroom.

A2 Model Rocketry in the science classroom

(M)

Peter Razos, Trinity Grammar School

Model rocketry is an exciting way to present the science of flight and space travel. Participants will be encouraged to build and launch their own model rocket. We will discuss themes such as forces and energy transformation and see first hand the engaging nature of the resource. Online worksheets and curriculum material will also be presented and can be viewed at www.dynamicscience.com.au/tester enter as a student with the details below

A3 Astronomy Club - Activities For Starting One In Your School

(M)

Paul Fitz-Gerald, Ivanhoe Girls' Grammar School

Do your students ask you astronomical questions? Do you have some astronomically far out questions of your own? I do, so my solution was to start up an Astronomy Club. In this session I'll be sharing my experiences and a variety of activities with you that could be used to help you start an Astronomy Club at your school. All that's required is your interest and enthusiasm.

A4 Machines as an Example of Inquiry Unit Planning

(M)

Anthony Evans, Glenvale School

A complete package of teacher and student resources, along with advice and experiences in developing inquiry learning units. The unit involves students researching, planning, building and testing a "machine" and is suitable for all year levels.

A5 Toys, pracs, challenges

(M) Repeated in D3

Dianne Wilkinson, Box Hill High School

Students of all ages like to play. Practical work in science gives them the opportunities to self learn. Presentation of tasks involving familiar toys takes away the "too hard" stigma and offers the chance to explore, discuss and have fun. This hands-on workshop session on motion will present successful ideas used in classes ranging from grade 5 to year 12 (with increasing difficulties in the tasks set). The aim is to stimulate ideas for teachers to use in the classroom, either as single lessons, or as part of a course, to challenge and stimulate student interest.

A6 Paul Hewitt? Who is he and what is his connection with Conceptual Physics?

(G) Repeated in C5

Gary Cohen, AIP Education Committee

Is physics just about formulas, and are 'good' prac results the most important thing that students learn from their Physics lessons? What about the concept development that occurs with effective practical investigations and demonstrations? In this discussion session Gary Cohen will share some of his experiences based on many years teaching physics using analogies and imagery from real-world situations that can help students build a strong conceptual understanding of physical principles ranging from classical mechanics to modern physics. This session will give participants an insight into what Conceptual Physics is.

A7 Using Robotics and Space Science to Engage Students

(G) Repeated in D7

Milorad Cerovac, The King David School

Science, Technology, Engineering and Mathematics are generally recognized as being central to a country's economic prosperity. Ensuring that there is an adequate supply of STEM professionals in the future is an issue that must be addressed in the secondary school system. However, a significant challenge

exists as students continue to withdraw from the STEM subjects beyond Year 10. This workshop presents The King David School's approach of providing extended programs in robotics and space science, in partnership with university and industry mentors. This session will also outline ideas for planned future programs at the school. The AIP (Vic Branch) Education Sub-Committee Travelling Scholarship funded the Presenter's attendance at the 64th IAC in Beijing (September 2013).

A8 Promoting Rationality

(G) Repeated in B8

Ken Greatorex and Charles Tivendale, Australian Skeptics

There is a lot of pseudo-science out there. There is also much misdirection, both wilful and ignorant. This session will attempt to provide you with a range of practical and other activities in your field of study to assist your students to develop a rational approach to making decisions.

A9 Tour of 'New Horizon' Labs

(G)

Prof Kris Helmerson, Monash University

The New Horizons initiative is a platform for excellence in future manufacturing research and teaching. New Horizons aims to transform manufacturing in areas such as biomedicine, transport, aerospace and mineral processing. It will co-locate and integrate around 400 staff from Monash and CSIRO. Its primary focus is to bring together researchers to tackle some of the challenges in the areas of research, such as new sustainable means of generating energy, bringing the design and synthesis skills of engineers into the realm of biology and medicine, and developing new materials with much reduced friction at their surfaces. In particular, participants will tour the graphene labs and the Bose Einstein Condensate Labs. Prof Kris Helmerson, a noted physicist who has worked with the 1997 and 2001 Nobel Prize winners, will conduct the tour.

Session B

2:50pm – 3:50pm

B1 Physics in the National Curriculum Years 6 - 10

(M)

Colin Hopkins, Bialik College

A series of activities designed to engage students in Physics ideas in the junior school. This is designed for non-physics teachers teaching Junior Science. A resource package will be provided to participants.

B2 Introduction to Galaxy Zoo and Zooniverse

(M)

Jon Stevens, Haileybury College

A short presentation connecting the web based Galaxy Zoo and Zooniverse projects with the Australian Curriculum. Galaxy Zoo and Zooniverse are citizen science projects which give students a chance to analyse images of galaxies and help scientists with their work. Students may actually discover and name a new object in space. Perfect activity for spicing up your Earth and Space Sciences unit. A hands-on workshop will allow delegates to explore Galaxy Zoo followed by questions and discussion. The AIP (Vic Branch) Education Committee Travelling Scholarship funded the presenter's attendance at the Galaxy Zoo Conference in Sydney (2013).

B3 Useful Physics Demonstrations for Yrs 7 to 10

(M)

Paul Fielding, Billanook College and Paul Fitz-Gerald, Ivanhoe Girls' Grammar School

In this workshop we will show approximately ten physics demonstrations that help explain concepts across Year 7 to 10 to assist student understanding. Topics include magnetism, light, nuclear physics, electricity, sound and forces.

B4 A representational construction approach to teaching forces and astronomy

(M)

Peter Hubber, Deakin University

Recent Australian Research Council (ARC) funded classroom based projects exploring the role of representation in teaching and learning science have produced a 'guided inquiry' approach, called Representation Construction, which has proved successful in terms of improved learning outcomes for students. This session will outline the main features of this approach that has

an emphasis on student construction and negotiation of representation drawing on findings from the research into the teaching of forces and astronomy in the new Australian Science

B5 Teaching Astronomy to Year 10 with lab based practical work.

(M) Repeated in D5

Russell Downie, PLC

Too often teaching Astronomy means lots of bookwork and memory and no prac because surely it requires night work. For a number of years we at PLC have been teaching Cosmology / Astronomy to year 10s where all the emphasis is on practical work that we can do during the day, in the lab or outside. This session will present what we do. The ideas are simple, cheap and rich in scientific concepts. If you want to teach a unit of Astronomy this session will help.

B6 A Hypothetical Planet

(G) Repeated in D6

Ken McGregor, formerly RMIT

Just what might the world be like inside a small hollow spinning planet? What if it was at an equal distance from the Sun as the Earth but was positioned diagonally opposite? Although a hollow Earth has been disproved since the 18th century, it is still instructive to imagine what such a planet might be like; its gravity, atmosphere and weather. Imagine and science can help to conjecture such a planet, and devise some tests her inhabitants might try to probe their world.

B7 Beyond Zero Emissions - Seriously cutting Australia's greenhouse emissions

(G)

Keith Burrows, BZE, AIP Education Committee

Beyond Zero Emissions is a non-profit research and education organisation. Its goal is to transform Australia from a fossil fuel, emissions intensive economy to a 21st century renewable-energy-powered economy. So far it has released three 'Zero Carbon Australia' plans - on electricity generation, carbon neutral buildings and sustainable transport. More are in progress. Much of the content relates well to sections of the junior and senior science curricula. Presentations suitable for school use are available; either for use by teachers in school or BZE volunteer presenters. In this session we look at ways in which it can enhance the curricula.

B8 Promoting Rationality

(G) Repeated in C8

Ken Greatorex and Charles Tivendale, Australian Skeptics

B9 Victorian Young Physicists' Tournament

(G)

Dan O'Keeffe Australian Institute of Physics (Vic Branch) Education Committee

The Victorian Young Physicists' Tournament (VYPT) is a competition for Year 10 science and 11 physics students established by the AIP (Vic Branch) Education Committee. In the course of the year, in teams of three, students carry out three experimental investigations that relate to Units 1 & 2 content, then later in the year in December, present and defend their findings in scientific discussions with other teams. This session will outline the topics for the year, the support for teachers and students and advice from teachers who entered teams in previous years. Video footage from the previous competitions will also be used to show what the students do. The value of the tournament is that it is team based, focuses on experimental investigations and encourages communication skills.

Afternoon Tea/Displays
3:50pm – 4:30pm

Sessions C and D continued
over page →

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Session C

4:30pm – 5:30pm

C1 Physics Practical Activities for Year 10 Science

(M) Repeated or continued in D1

Dan O'Keeffe, AIP & Helen Lye, ACER

A hands-on, self paced session in which participants work through a series of activities on electronics and DC motors. There are sufficient activities to do over the two adjacent sessions, D1 and E1. Participants can attend either or both sessions.

C2 STELR - energy activities for 7 - 10

(M)

Christopher Bowen, Caulfield Grammar School

STELR (Science and Technology Education Leveraging Relevance) is a national secondary school science education initiative of the Australian Academy of Technological Sciences and Engineering (ATSE). The program is a hands-on, inquiry-based program designed for Year 9 or Year 10 students, on the theme of global warming and renewable energy. A range of directed and student-designed practical investigations is an integral part of the program. This presentation will look at how to adapt and utilise the equipment from the STELR project to investigate Energy through the curriculum in years 7 to 10, and beyond.

C3 Language modelling in developing a conceptual understanding in Physics

(M)

Dr Murray Anderson, Camberwell Grammar School

In this workshop a discussion about the use of language and the role it has to play in the development of a conceptual understanding in Physics will be given. The session will be reflective in nature and detail a personal journey in the art and science of teaching Physics.

C4 Easy and Engaging Light Pracs

(M) Repeated in D4

Spiro Liacos, Cheltenham Secondary College

This hands-on session will introduce you to a series of practical activities that cover Reflection and Mirrors, Refraction and Lenses, and Total Internal Reflection. You will be provided with all the prac sheets that you need to teach the topic of Light to Year 9s and you will have a chance to carry out the pracs.

C5 Paul Hewitt? Who is he and what is his connection with Conceptual Physics?

(G) Repeat of A6

Gary Cohen, AIP Education Committee

C6 Lessons from America: a success story in high school physics education

(G)

Barbara McKinnon, John Monash Science School

The last two decades have seen the rise of the "Modelling Instruction" pedagogy for high school Physics in the USA. Significant gains in student conceptual understanding have been reported by schools applying this approach. In addition, the method appears to increase student engagement and participation in higher level physics courses. The success of the approach has even inspired the development of "modelling instruction" curricula for Chemistry and Biology. The presenter attended a three-week teacher-training workshop in Mechanics modelling instruction in July 2013. In this seminar she will explore the basis of the success of the approach and the implications for the Australian setting.

C7 Solar Challenge Motivates Learning and Application of Science Principles and Process

Suitable - Years 7-10

Paul Wellington, Victorian Model Solar Vehicle Challenge

Students who participate in the Model Solar Vehicle Challenge at Scienceworks in October are highly motivated to learn when given the challenge of making products which work, especially when there is a competition with a chance to represent Victoria at the end. Model solar cars and boats provide an exciting introduction to solar energy and concepts including energy, motion, and electrical circuits. The presenters will discuss educational, motivational, organizational and technical perspectives of the Challenge.

The workshop will assist teachers to build and test their own boats or kit cars and obtain details of available resources and sources of assistance.

Session D

5:30pm – 6:30pm

D1 Physics Practical Activities for Year 10 Science

(M) Repeat or Continuation of C1

Dan O'Keeffe, AIP & Helen Lye, ACER

A hands-on, self paced session in which participants work through a series of activities on electronics and DC motors. There are sufficient activities to do over the two adjacent sessions, D1 and E1. Participants can attend either or both sessions.

D2 The Science of Magic

(M)

Peter Razos, Trinity Grammar School

Magic has always fascinated us and done properly can develop into a great unit of work in science where physics and chemistry takes on a whole new meaning. This workshop is based on a semester length, year 9-10 unit of work at Trinity Grammar. We encourage teachers who like to think outside the square and who would like to be more engaging in the science classroom to attend. It is guaranteed that participants will come away, if not with an entire new unit of work, with ideas to engage and motivate their students. Much more will be made available and we will discuss how the ASC is integrated in the Science of Magic. A great way to start and see if this workshop can truly benefit you is to go online and login with the details below. Check it out by visiting www.dynamicscience.com.au/tester. Enter as a student with the details below: organisationid=dynsci password= robots.

D3 Toys, pracs, challenges

(M) Repeat of A5

Dianne Wilkinson, Box Hill High School

D4 Easy and Engaging Light Pracs

(M) Repeat of C4

Spiro Liacos, Cheltenham Secondary College

D5 Teaching Astronomy to Year 10 with lab based practical work.

(M) Repeat of B5

Russell Downie, PLC

D6 A Hypothetical Planet

(G) Repeat of B6

Ken McGregor, formerly RMIT

D7 Using Robotics and Space Science to Engage Students

(G) Repeat of A7

Milorad Cerovac, The King David School