

Science on the Oval:

A guide for doing primary science in school grounds.

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Science on the Oval (SOTO) Handbook

The Science on the Oval (SOTO) Handbook is a resource package of practical, engaging and conceptually sound, hands-on science activities derived from the Science on the Oval initiative supported by an Australian Schools Innovation in Science, Technology and Mathematics Project Grant. Science on the Oval was a partnership project between the School of Education, James Cook University, Cairns and Whitfield State School and Balaclava State School, Bellenden Ker State School, Kuranda District State College and Machans Beach State School.

Pre-service teachers from the School of Education, James Cook University, Cairns developed, planned and conducted four days of hand-on science activities for students from preparatory to year 7 at the Whitfield State School (May 2006 and April 2007), Kuranda District State College (September 2006) and Bellenden Ker State School (May 2007). This handbook is a result of their work.

The aim of the Science on the Oval project is to introduce physical and chemical science concepts to early childhood, primary and middle school students in the familiar context of school grounds. Every activity has been trialed with hundreds of students at SOTO days. Most of the activities are also suitable for the classroom and all activities are designed to be carried out in a half-hour time slot.

The handbook is designed to assist teachers incorporate more science into their weekly programs and to take advantage of the facilities and spaces in school grounds. Taking students outside expands possibilities for exploring physical and chemical science concepts in interesting and engaging ways. If you are seeking the shining eyes, happy faces outcome for science learning, take your class outside and try these activities.

Level Descriptors

The SOTO activities are organised in three levels. The levels are linked to years of schooling and the outcome levels in the *National Scientific Literacy Progress Map*, which was developed for the Year 6 national assessments of scientific literacy.

Many of the activities are suitable across more than one level.

SOTO Level	Years of Schooling	National Scientific Literacy Progress Map (MCEETYA, 2005)
Lower	Prep - 3	<1-2
Middle	4-5	2-3
Upper	6-7	3-4

Activities Description

All the activities assembled in the SOTO handbook are the work of James Cook University education students who have participated in Science on the Oval events over the past four years. Each activity has been conducted successfully at one or more SOTO event.

The original source of the material referred to or used in the activities has been acknowledged where possible.

Each activity can be run as part of a SOTO day or as a classroom science demonstration. While some activities require specific props they are all enhanced by having visual aids e.g. posters that illustrate and expand on the associated scientific concepts.

Safety Issues

Each of the activities in the handbook has been tested at Science on the Oval events. However, to identify and minimise potential risks, each activity should be assessed by the teacher for suitability to a specific group of students and location.

The following guidelines, adapted from material published by the Primary Connections Project, ¹ will help to minimize risks.

- Be aware of the school's policy on safety in the classroom.
- Teachers should review each lesson prior to teaching.
- Check students' health records to ascertain potential problems such as allergies.
- If you are unsure about the safety of an activity, use it as a demonstration only.
- Caution students about potential dangers before they begin an activity.
- Clean up spills immediately as slippery floors are dangerous.
- Instruct students never to taste, smell or eat anything unless they given permission.
- Discuss and display a list of safe practices for science activities.

¹ The Primary Connections: linking science with literacy units are published by the Australian Academy of Science www.science.org.au/primaryconnections

Teacher Section

Overview

Frequently in the classroom, science is not recognized as a core discipline nor given the time and attention it deserves. A Science on the Oval Day is a great way for teachers to immerse their students in the neglected discipline, and expose them to a vast selection of learning opportunities. Through a creative and practical 'hands-on' approach, students will find a Science on the Oval Day engaging and fun.

The Teacher Section is designed to assist teachers in planning, hosting and evaluating a Science on the Oval Day. It has been broken up into sections which detail; Pre Activities, the Event and Post Activities. The Pre Activities section describes the processes and events that need to happen in preparation for a Science on the Oval Day. The Event section explains some tips and ideas for making your Science on the Oval Day run smoothly and productively for the students who are attending. Finally the Post Activities section provides a variety of activities that support and guide further learning opportunities as a result of a Science on the Oval Day. Please note that the contents of all three sections are a guide and should not limit each teacher's creativity in their own circumstances.

¹ The Primary Connections: linking science with literacy units are published by the Australian Academy of Science www.science.org.au/primaryconnections

Pre Activities

A successful Science on the Oval Day requires planning and organisation. The size and scope of your particular Science on the Oval Day will determine what kind of Pre Activities, and the extent of those activities, you will need to undertake.

Science Investigations and Facilitators

Essentially, a Science on the Oval Day consists of students moving through science investigations so it is imperative that the investigations are numerous, varied and, of course, educational. Each investigation will need to have a nominated teacher, university student or senior student to run it (the facilitator) and such nominations should be arranged early on. Ideally it would be beneficial to have a number of university students facilitating each investigation so that they can practice their skills in supporting and guiding students in smaller groups. This would also allow teachers to take the larger roles of coordinating the science investigations and the movement of students between investigations. This, however, may be difficult or somewhat impossible in some areas due to the distance between schools and universities or other tertiary institutions. It is imperative that a timetable is organised so students move between investigations smoothly and orderly to minimise behavioural issues.

An excellent way to organise a Science on the Oval Day is to have senior students in the school prepare, organise and run the various science investigations for the rest of the school. This way, a Science on the Oval Day could be used as a culminating activity to a science/mathematics unit (see below).

As a matter of practicality, when organising your science investigations, remember to group them so that aerial investigations are positioned away from students and buildings, and water based activities are near taps and hoses for easy use and cleaning.

Assessment for a Current Science Unit

A Science on the Oval day can be used as a great culminating activity for a science unit. Senior students can choose a science concept from their unit and further explore and share the concept through investigations at the Science on the Oval Day. Students would have to learn the processes for presenting an investigation to other people as a team, therefore employing their oral literacy skills. There are literally hundreds of different learning opportunities for students when planning a Science on the Oval Day, including taking part in fundraising and resource making. Not only is this a fun hands-on way to culminate a science unit but it is a great way to integrate a variety of outcomes through the one unit.

Resources/Costing

Hosting a Science on the Oval Day requires a large number of resources as all of the activities are designed to be hands-on. Furthermore, your students will probably want to take something home, such as sherbet or slime, which they make themselves. This means that a Science on the Oval Day can be quite expensive and you may need to seek extra funding to pay for the resources.

The easiest way to help recuperate the costs of a Science on the Oval Day is to charge each student an admission fee. This charge is usually quite small and can provide enough resources so that every student is adequately engaged in the science investigations. Alternatively, you could approach your school's P&C committee and ask for financial support.

Further, you could locate a local Council member or business to sponsor your Science on the Oval Day. This is a great way to bring the local community into the school. Sourcing grants can also help the expenses of the day.

Your Science on the Oval Day Program

Developing a program can be one of the most challenging steps in planning a Science on the Oval Day and will be largely dependent on the size and nature of your particular Day. The primary deciding factor will be the anticipated number of students who will be attending. For larger schools the day might need to be broken into sections with the junior school attending in the morning sessions and the senior school attending throughout the afternoon. Your program will also need to consider the time factor required for the number of activities and the time needed for each one so that students move between science investigations in a logical and efficient manner. This is most important in circumstances where aerial or water based investigations are taking place away from other investigations.

Advertising

One of the most beneficial consequences of hosting a Science on the Oval Day is receiving positive feedback from the local community. A Science on the Oval Day is a perfect opportunity to advertise the school by inviting the media and showcasing the excellent teaching and learning that is occurring. The presence of the media in the school also increases student engagement as most students like to show off their skills to the wider community.

(Remember you will require media consent forms for each child in this instance).

Building Partnerships

In addition to the various benefits for your students, hosting a Science on the Oval Day also provides an opportunity to build supportive and collaborative partnerships with neighbouring schools. You may wish to consider inviting the students and staff from your neighbouring schools to promote good practice and participation to a larger group of students.

Furthermore, involving your neighbouring schools is a great way to share the role of host as it enables the participating schools to take turns at hosting the Science on the Oval Day. The easiest way for this to occur is to have a Science on the Oval Committee consisting of representatives from each of the participating neighbouring schools.

The Event/Day

When your Science on the Oval Day arrives you will already have done most of the hard work. This section briefly describes some ideas and strategies to help make sure your Science on the Oval Day runs smoothly.

Dress Up/Clothing

Experience has shown that students are instantly engaged and become more motivated and eager to participate when the people running the science investigations are appropriately dressed up in costume. Such costumes do not need to be elaborate, a simple science coat or police uniform would suffice. You might like to encourage participating students to dress up as science based characters by offering prizes for the best dressed. While dressing up is not essential it does set the tone for your Science on the Oval Day.

Grouping

Grouping of students is one of the most important parts of making a Science on the Oval Day run effectively. If the groups are too large, students become disengaged because they receive limited chances to participate in the science investigations. Groups of six or seven students seems to be the most effective for enjoyment and subject retention as they allow students to actively participate in the investigations and

engage in inquiry based learning. It also allows greater quality interactions and timelier discovery of the concepts being investigated.

Facilitators

The role of a science investigation facilitator is one of the most difficult to do during a Science on the Oval Day as the facilitator is responsible for engaging students through science inquiry. This can be achieved through using different questioning strategies. The correct use of questioning can make the difference between a boring or exciting Science on the Oval Day for the students and has the potential to limit any behavioural disturbances.

It is important to remember when designing your questions that they are open ended so that students are encouraged to investigate, analyse and evaluate different science concepts. A facilitator will find it greatly rewarding to see students engrossed in science investigation through the use of clever and constructive questioning.

Post Activities

The learning is not necessarily over once your Science on the Oval Day has ended. Since you and your students have spent considerable time and effort in organising and hosting your Science on the Oval Day, this section suggests some activities for students to undertake afterwards.

Evaluation

One of the most important things for schools and students to do after hosting or attending a Science on the Oval Day is to evaluate the day. This is generally achieved by students conducting a survey of the day by using questionnaires or an interview process. It is important to receive this feedback from all participants including; students, the people running the science investigations, co-coordinators/facilitators, parents, visitors (if possible) and other community members. These results can be collated so that improvements or changes can be made for future Science on the Oval Days.

Writing Activities

There are numerous writing activities that can be undertaken after a Science on the Oval Day depending on the student year level and the purpose.

For lower grades a recount is an excellent genre as they can discuss the things they enjoyed and their favourite activities. For upper grades other genres such as newspaper reports and critiques are more enjoyable and challenging. Publishing these genres in the local newspaper or newsletter is also a great way to motivate students to write and share with the local community.

Summary

As evidenced by the number of considerations and suggestions set out above, planning and hosting a Science on the Oval Day takes a lot of time and effort. So that your Science on the Oval Day is successful, ask yourself the following questions:

- Who is going to run your activities?
- What activities are going to be run at the science day?
- How are you going to pay for the resources and expenses?
- Have you designed a program for your science day?

- Have you invited the community to your science day?
- Are the media attending your science day?
- Do you have parental consent to have students photos placed in the media or television?
- Where are you going to place your activities?
- Are your facilitators dressing up in costumes that relate to their activities?
- How have you grouped your students?
- Are you inviting any other schools?
- What post activities are the students going to do?

We hope you take up the challenge of hosting one of these motivating and rewarding days so that students can actively participate in the joys of science in an interesting and exciting manner. Good Luck!