



The Reasons for the Seasons Learning Story 2013

A Museum Victoria Strategic Partnership Program

Overview

Scienceworks partnered with Year 7 teachers from Manor Lakes P-12 College to assist with the development of an activity based workshop called *Reasons For The Seasons*. This Scienceworks workshop was designed specifically to engage Year 7 Science students in a *student-centred, exploratory approach* to the learning of Earth and space Science where their understanding of the Seasons was challenged. The Year 7 students were organized into small groups and worked on one of four activities, collecting data to share at the end of the session. The students were asked to provide feedback on the effectiveness of their activity after the session. Teachers were also asked to complete a pre and post survey to communicate their understanding of the seasons and assist Scienceworks educators to address any misconceptions.

Purpose

The purpose of this partnership was to develop and trial a student-centred learning activity that could assist with the teaching of Earth and space science as per AusVELS standards of teaching and learning, address common misconceptions held by teachers and students regarding the seasons, thereby building teacher capacity and to model an activity based approach to the teaching of science. The Victorian Department of Education knows that that well-trained teachers have the greatest impact on lifting student outcomes. This partnership addresses this need by explicitly training teachers in Astronomy with the aim of improving the standards of educators to improve student learning outcomes. The program on offer at Scienceworks also provides visiting students time to explore and discuss the Earth - Sun relationship, whilst modelling a hands on exploratory pedagogy.

Learning outcomes

The Reasons for the Seasons program supports the teaching and learning of Earth and space science specifically :

Where students can begin to describe that predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the Sun, Earth and Moon. ([ACSSU115](#) of the AusVELS standards).



*Students working on activities at Manor Lakes.
Source: Museum Victoria*

Learning story

Early in 2013, the science coordinator at Manor Lakes P-12 College was approached by Scienceworks staff to form a partnership whereby the development and evaluation of a new student centred program at Scienceworks could be undertaken. The collaboration would also provide the opportunity to provide professional development to the MLP12 Year 7 staff.

The program, *The Reasons for the Seasons* was developed to allow Year 7 students to explore by manipulating models how the seasons are caused by the tilt of the Earth's axis. This was done through student-centred problem solving and modelling experiments. The experiments included:

- a) investigating heat/light distribution across an Earth globe
- b) measuring the length of day and night on an internally half lit Earth globe
- c) tracing the apparent path of the Sun from a space perspective
- d) observing patterns of shadows at different times of the year (winter and summer).

Students were guided by written instructions and diagrams. Observations made by each group were shared verbally to the whole class. Students were then led by Scienceworks staff in a guided discussion to apply their observations to an Earth perspective, as opposed to a space perspective. While trialing these workshops at Manor Lakes most students initially stated that the seasons were caused by the distance of the Earth from the Sun. As discussed above, this is a common misconception. At the end of the learning sessions, more students were able to describe that the seasons were caused by the tilt of the Earth's axis. They were also able to verbalise observations such as:

- "in summer it is hot because the sun is high and in winter the sun is low"
- "the sun goes along different paths (in the sky) in summer and winter"
- "since the Earth is on a tilt it affects how much sun hits the Earth changing the seasons"
- "the axis is always on an angle and how the Earth rotates on the axis"
- "because of the curve of the Earth the light of the sun spreads out"

An exciting aspect of this partnership was the opportunity to support generalist teachers who had



been called upon to teach Science to Year 7 students. We determined via a teacher questionnaire that some MLP12 *teachers* held the common misconceptions that Seasons on Earth were caused by the elliptical shape of the Earth's orbit and the distance of Earth from the Sun. The reason for these misconceptions is most probably due to everyday experiences that confirm that temperature increases the closer an object is to a heat source and decreases as it gets further away.

The MLP12 teachers also were asked to complete this workshop and reflect on the pedagogical approach adopted. They corrected their scientific understandings and also stated that they would be more confident in teaching via activity based programs rather than presenting just theory on a topic.

Challenges

Some of the challenges encountered during this project included:

- writing clear, succinct instructions that Year 7 students could interpret easily and quickly given the limited time available,
- designing the activities so that students can engage without seeking too much support from staff/teachers.



Scienceworks staff member concluding session with students. Source: Museum Victoria

Conclusion

The partnership with teachers and students from Manor Lakes Secondary College resulted in students and teachers having a better understanding of what causes the seasons on Earth. We were able to model an activity based approach to the teaching of science which the teachers reported as useful. Scienceworks educators were able to develop a program that addresses specific misunderstandings often held and expressed by teachers and students alike.