

# The State of Science

By Frankie Bray

**In the midst of speculation that the future of Australia's workforce is in danger due to the lack of students choosing to study maths and sciences in senior secondary school and tertiary study, Chief Scientist Professor Ian Chubb has released the 'Health of Australian Science' Report.**

In 2011, a corresponding study was commissioned by the Office of the Chief Scientist in order to 'develop a clear understanding of Year 11 and 12 science in Australian schools and the potential issues involved'. The study was funded by the Australian Government.

In order to conduct the study of senior secondary science, the research team did a number of things. Surveys of Year 11

and 12 science and non-science students in NSW, SA and ACT were conducted on a random basis; senior science teachers in the same states were surveyed by telephone; focus groups were held; and reports, literature and curriculum documents from state, national and international levels, were studied.

From this research, the team developed two pictures – first, a picture of the ideal (what we want for our students) and secondly, a clear appraisal of what is actually happening.

## Ideal Picture

The ideal picture is described in the report as a list of 'themes', under a number of headings;

## Students and their curriculum

Theme 1: The science curriculum is relevant to the needs, concerns and personal experiences of the students.

Theme 2: The teaching and learning of science is centred on inquiry. Students investigate, construct and test ideas and explanations about the natural world.

Theme 3: Assessment serves the purpose of learning and is consistent with and complimentary to good teaching.

## Teachers and their profession

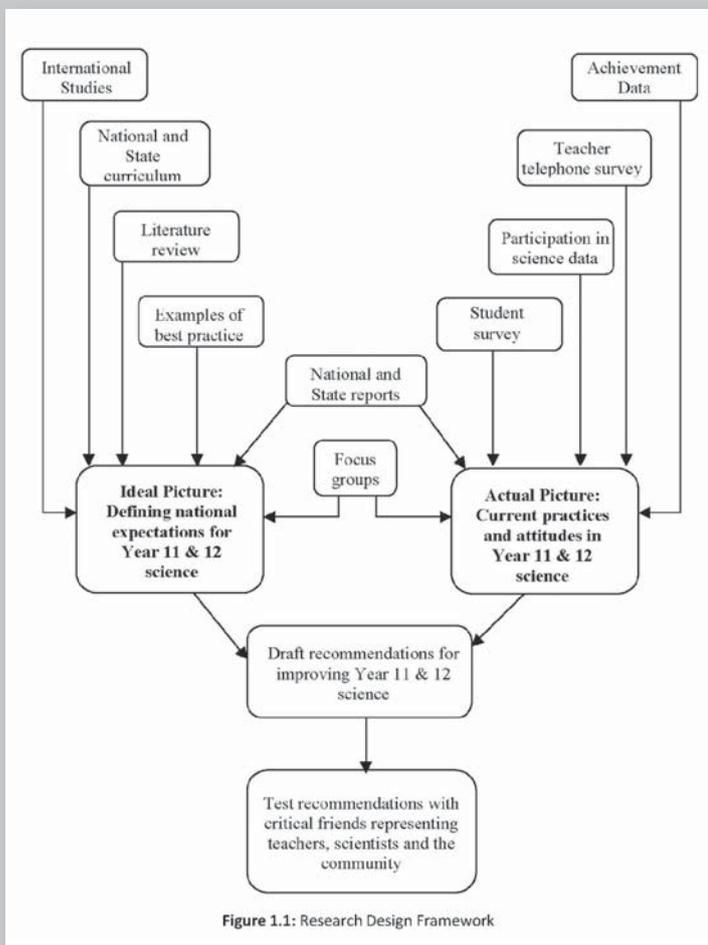
Theme 4: The teaching-learning environment is characterised by enjoyment, fulfilment, ownership and engagement in learning and natural respect between teacher and students.

Theme 5: Teachers are professionals who are supported so that they can reflect and build the understanding and competencies required of best practice.

Theme 6: Teachers of science including Year 11 and 12 have a recognised career path based on sound professional standards endorsed by the profession.

## Resources for Teaching and Learning Science

Theme 7: Excellent facilities, equipment and resources support teaching and learning.



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Theme 8: Sufficient time is available by which teachers can prepare, teach and assess student science learning.

### *The Value of Science Education*

Theme 9: Science and science education are valued by the community, have high priority in the school curriculum and science teaching is perceived as exciting and valuable, contributing significantly to the development of persons and to the economic and social well-being of the nation.

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### **Actual Picture**

When reporting on the actual picture of science in Year 11 and 12 today, the report focussed on 5 different dimensions of the school experience; the students, the curriculum, the pedagogy, the teachers and the resources.

#### *The Students*

The most notable finding under this heading is the dramatic fall in the number of students studying science overall. Between the early nineties and today, the number of Year 12 science students has dropped from 9 out of 10, to around half. Although the number of students has dropped radically, those remaining have a positive view about science and believe the science they experience is enjoyable and in keeping with their expectations for the future.

#### *The Curriculum*

Current science curriculum, according to the views of the teachers and students, is overcrowded and content-laden, as a result of its preparatory nature – it is seen as mostly having been constructed to groom students for university. There is little flexibility, and courses are perceived to be conceptually difficult.



#### *The Pedagogy*

As a result of the content-laden curriculum, science in Year 11 and 12 is taught in a traditional way. Research revealed that

- 73% of students spend every lesson copying notes from the teacher
- 65% never or seldom have choice in pursuing areas of interest
- 79% suggested teacher demonstrations occur often, very often or always.

Teachers revealed in focus groups they have concerns about the demands placed on students and teachers by practical work, which tends to involve students following specific instructions to achieve known results.

#### *The Teachers*

According to the report, Year 11 and 12 science is taught by the most qualified and experienced teachers. In the

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telephone survey, 75% of teachers indicated they had a Bachelor of Science.

#### *The Resources*

Teachers most commonly reported time and resource restraints as limiting their teaching. Significant pressure on teachers is caused by the content-laden nature of the curriculum.