



# Executive Summary

## Background

The authors of *The Status and Quality of Teaching and Learning of Science in Australian Schools* (Goodrum, Hackling & Rennie, 2001) emphasised the importance of ensuring that “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” (p. 150).

Based on this report, the Commonwealth Government initiated a three-year National School Science Project. One of the aims of the project is to promote awareness of science education, and on this basis, the Commonwealth entered into a contract with the Australian Science Teachers Association (ASTA) to develop and trial a science awareness-raising model. A separate and later part of this strategy is to develop and disseminate awareness raising resources based on the model.

The ASTA Science Awareness Raising Project aimed to develop, trial and evaluate a science awareness-raising model that can be used by a diverse range of schools and their communities to identify, document and promote literacy in ways that are appropriate and connected with the real life circumstances of each community. In particular the Project aimed to promote greater understanding in the educational and broader community of why science is important, why time is spent on it at school and why scientific literacy is a desirable outcome of schooling.

## Scientific Literacy

The project is about increasing the community's awareness of science, what science is and what science can do. The project is not about teaching science facts to the community. The key to the ASTA project is in the definition of scientific literacy and what that definition means.

Rennie, Goodrum and Hackling (2001) provided this definition of scientific literacy:

“Scientific literacy is a high priority for all citizens. Scientifically literate people are interested in, and understand the world around them; engage in the discourses of and about science; are sceptical and questioning of claims made by others about scientific matters; are able to identify questions, investigate and draw evidence-based conclusions; and make informed decisions about the environment and their own health and well-being.” (p.455)

The definition provides a starting point for identifying characteristics of people who are less scientifically aware and those who are more. The project therefore aimed at devising a means, or model, of moving people from being less to more scientifically aware.

## Development of the ASTA Science Awareness Raising Model

The central part of the ASTA project is the Science Awareness Raising Model. The model is a short series of steps to develop and implement a science-related project together with a set of resources to provide guidance.

The model was based on a comprehensive review of literature and of science awareness-raising activities carried out, especially in Australia.

The literature search showed some projects have attempted to promote scientific literacy in the community. Those deemed to be most successful in changing people's knowledge and ideas about science were those which engaged people in a two-way dialogue between scientists/specialists and lay people.

The notion of a two-way dialogue is important to the ASTA project. The model developed is interactive where members of both the school and the community must engage jointly in a project for it to have any chance of success.

For this to be achievable it was recognised that there was a need to provide some general

organisational principles in working with the community and managing a project. As a consequence a Draft Package was prepared for this purpose.

## Draft Package

The Draft Package contained an introductory section describing the aims of the project and its background, a process guide and a number of printed resources. The process guide shows the four phases envisaged for the community science awareness raising project, the kind of activities to be undertaken and who would be responsible for them, together with a list of prepared resources. It provides tools and resources to implement the model.

Once developed the ASTA Science Awareness Raising Model was field tested in different communities and revised in light of evaluation and feedback.

## Project Management

The ASTA Executive Director and the Project Management Team managed the project. This team had a number of tasks, namely research; development of the model and its resources, the Draft Package; selecting and overseeing the community projects; and the evaluation of the Model and the Package.

## Selection of Local Projects

Community projects were selected so that there was diversity in the nature of the community, rural, urban and regional city, the kind of project being proposed and its links with science. Consideration was also given to existing or possible relationships and partnerships within the community and the type of outcome that was being proposed. Preference was given to those with the greatest potential to meet the project aims.

The ASTA Science Awareness Raising Model was

trialed in seven states and territories: Queensland, Australian Capital Territory (ACT), South Australia, Tasmania, Victoria and Western Australia and while no nominations were received from New South Wales, a suitable project was found. Despite vigorous attempts, no trial project was implemented for the Northern Territory.

The Community Projects selected were:

### ACT

Cook Primary School & Canberra High School,  
*Native Grasses of Mt Painter*

A survey of grasslands to determine native and introduced species.

### New South Wales

Mt St Benedict College,  
*The Conservation of the Biodiversity of the Endangered Sydney Blue Gum High Forest*

Studying the science for rehabilitation & maintenance of ecosystems.

### Queensland

Palm Beach-Currumbin State High School,  
*A Clean Currumbin Creek*

Studying the science for managing waste into the creek system.

### South Australia

Valley View Secondary School,  
*Biodiversity of Anstey Hill*

Informing the community about the biodiversity of Anstey Hill.

### Tasmania

New Norfolk High School,  
*New Norfolk Air Quality*

Setting up a system to measure air quality daily with a view to challenging heating methods in the Derwent Valley area.

### Victoria

Ovens College,  
*Wangaratta Common Native Grassland Reserve*  
 A biodiversity study of the northern plains eastern grasslands in Wangaratta to assist with their protection.

### Western Australia.

Eastern Goldfields High School, South Kalgoorlie Primary School and Kalgoorlie Primary School,  
*Mt Walton Intractable Waste Disposal Facility*  
 Assisting community understanding of the science of intractable waste.

The successful trial projects were provided with the Draft Package, funds and support and assistance for their schools to work with their local communities on projects pertaining to local and hence meaningful issues that required science understanding. The ASTA Project Management Team structured a mechanism for the Local Leaders, those implementing the projects. Each state and territory Science Teachers Association (STA) organised a STA Coordinator whose role was to act as support for the Local Leader and assist in communications between the Local Leader and the ASTA Project Management Team.

Integral to the success of the local project was the establishment of the Community Reference Committee (CRC). The membership of the CRC was to represent those of the local community that had a stake in the issue that was at the core of the local science awareness raising project. It was also meant to contain the skills and expertise that would assist the Local Leader in achieving the aims of the project.

## Overview of Data Collection

Assessing the impact of the ASTA Science Awareness Raising Project was expected to be difficult. This was because the impact had to be measured at the community level and not at the

school level which is much easier. Measurement had to be consistent across the community projects, which might be quite different. Further difficulties were expected, as the process had to rely heavily on the busy Local Leaders for data collection on projects that were relatively small in duration. Also the project timeline did not allow for more than the assessment of short-term impact.

Therefore several methods were used to collect a range of data. Pre- and post-project interviews with the community were the primary data source from a representative sample. This was augmented by letter surveys to parents of school children and their neighbours at the end of the project. Other relevant evidence came from interim and final reports prepared for the local project by the Local Leaders. Information was gathered from the STA Coordinators from a personal viewpoint and a final written report. It was recognised, however, that the communities' views would be central to determining the impact of the ASTA Science Awareness Raising Model.

The surveys had as their basis the definition of scientific literacy and science awareness. Therefore it was determined that the interviews would focus on the extent to which members of the community

- (i) understood what science is about,
- (ii) believed that science is useful to find answers for problems in the community,
- (iii) understood why science is taught in our schools and its value to students,
- (iv) are aware of the community project about science, and
- (v) understood the science-related issues and science knowledge associated with the project.

Change in any of these characteristics would be an indication that the Science Awareness Raising Model had some impact. Local Leaders were asked to select a representative sample of community members, ranging from people almost certain to be involved in the project to those who may be

involved peripherally. The data was coded and analysed to obtain overall patterns of the results.

Letter surveys were used to increase information from parents, who were likely to know about the project, and from non-parents, who were less likely to know about it. These respondents could represent the wider community. Again the data collected from the open-ended questions was coded and analysed.

The main collection of feedback about the project came from the Local Leaders. Their final report of the project was the most comprehensive. In addition a format was prepared requesting each Local Leader to make evaluative comments on each part of the Draft Package to provide specific feedback to assist in its revisions.

## Case Studies

Each state and territory project is described in a separate case study. The case study provides background, detail of how the project was implemented, strategies used for raising community awareness, project outcomes and a reflection by both the Local Leader and the STA Coordinator on the success or otherwise of the project. The case study also incorporates the community feedback and research findings for that project.

The success, or otherwise of the state and territory project in raising science awareness in its community was influenced by the type of project issue, the local, social and political environment and the ensuing relationships that developed in that environment and the project management skills and style of the Local Leader and STA Coordinator especially in the establishment and integration of the Community Reference Group in the project implementation.

## Conclusions

The research and evaluation indicates that the model and the Draft Package have generally had an overall impact on the community project outcomes.

*Overall the model and the package combination worked well. In very general terms, the success of the project could be directly related to how closely the model and package were followed. Chapter 9, page 110.*

There is no doubt that the community-based projects were differentially successful. This variation in success provides powerful information about the value of the model overall and the factors associated with success. Two projects were considered overall to have made a large impact on their communities. These were Tasmania and Western Australia. It is notable that in Western Australia the understanding of the science behind the project decreased indicating that people felt that they knew less about the issue, rather than more. That is, people became more aware of the complexity of the issue. This seems to be a function of the complexity of the project, which the community knew very little about at the beginning. It should also be noted that the findings for Western Australia were based on a very small sample size.

Overall the NSW project was judged to have a medium to large effect and the Victorian project a small to medium effect. The South Australian project seemed to have impact only in terms of people's awareness of the project and not the science but it did show changes in people's understandings about why science was taught in schools.

It is clear that the projects had great value for the students who were involved in them. However, the purpose of the ASTA Science Awareness Raising Project was for the school to work with the community to increase the community's awareness of science. From this point of view some projects were more successful than others. Their success was due to the adoption and appropriate adaptation of the model and the use of supportive documentation, the Draft Package.

## Adoption of Project Management Skills

Given the nature of the model, it became apparent that the model is fundamentally the adoption of project management skills by schools and the

community to work together on science related issues.

Project management experience is not an area of expertise generally associated with teachers at the school level as evidenced by the problems encountered:

- unrealistic allocation of resources both human and physical
- the non-issuing of invoices for funds
- not allocating money in the budget to reduce stress on the teacher or not spending it when it was allocated
- infrequent reportage to the STA Coordinator and/or Project Management Team and
- complications in meeting scheduled timelines.

The project management skills at and between the national, state and local levels impacted on the local projects. These were skills that related to planning, timing and implementation.

The duration of the entire project spanned over twelve months. During that time there were a number of personnel changes at all three levels of management that impacted on the entire project. Contingency planning for long term projects is essential. However, within the length of the project there were many phases to implement such as research, preparation of the Draft Package, the establishment of reference committees, selection of STA Coordinators and Local Leaders. This meant that for some local projects there was only a short time for implementation. Planning for longer lead times would have alleviated this problem.

There were also large numbers of groups and individuals involved. The provision of a communication schedule at the initial stage to assist with regular updates between all levels of the project to ensure two-way communication would have been beneficial.

The ASTA Science Awareness Raising Model is also about developing relationships within and between all groups and levels involved. A visit to the CRC

from a member of the ASTA Project Management Team at crucial times such as strategic planning or report or budget preparation may have been of great assistance.

The early research highlighted the need for interaction between school and community. The Community Reference Committee (CRC) was included in the model to facilitate such interaction. State/territories such as New South Wales and Tasmania that had properly established and functioning CRCs had the greatest impact on their community. Where the composition of the CRC included members in position of authority, greater impact on the community was evident.

While some state/territory trials had CRCs that met regularly, they recognised that the CRC could have been utilised more. Western Australia did not have a CRC. The under utilisation of the CRC was often a function of Local Leader style.

Where the Local Leader dominated or tried to take on all tasks of the project there was less impact on the community than from those projects that had Local Leaders that led a team of people and had interactions between students, community members and organisations.

Some Local Leaders took a school or inward looking focus. Their projects had less impact on the community. These leaders reflect the traditional view that project work is additional to classroom work. The leadership style may be a product of the well-established culture of schools where the core business is student and not community education. However, if students are to become scientifically aware adult members of the community, then the school culture needs to develop structures and processes that further enable interaction with the wider community and industry while they are still at school. This means that more projects of this nature should be integrated into the school's teaching and learning program.

*This was a worthwhile exciting and engaging project BUT it needs to be embedded as a valued part of curriculum not an added extra to be squeezed into an already overcrowded curriculum. Local Leader ACT*

Teachers therefore need to embrace these projects as an integral part of their teaching practice.

To assist teachers, schools and community in making this cultural shift, further work needs to be done. The areas requiring further development are the concepts of scientific literacy, the characteristics of a scientifically aware person and the processes and tools of project management for developing scientific literacy.

### **The Package**

The Package is the resources and tools for schools, teachers and the community to adopt and implement the ASTA Science Awareness Raising Model. The Package needs to be in a user-friendly format for ease of use and accessibility. With these criteria in mind plus the feedback from Local Leaders and STA Coordinators, the Package has been restructured, the model revised and included in this report.

## **Recommendations**

### **Recommendation 1**

**It is recommended that the Commonwealth continue to promote and support schools, teachers, communities and industry to increase scientific literacy and science awareness through the adoption and adaptation of the Australian Science Teachers Association (ASTA) Science Awareness Raising Model and Package.**

#### **Suggested actions**

- 1.1 It is suggested that the Commonwealth provide funds and assistance to ASTA in 2003 to explore through professional development with schools, teachers, communities and industry, how to use the model and the package so that there would be enough lead time for viable projects to be prepared and integrated into the school teaching and learning program for 2004.

- 1.2 It is suggested that the Commonwealth provide funds and assistance to ASTA in 2004 to project manage and evaluate the model and the package with a view to increasing scientific literacy and awareness and the amount and kind of science in the community projects.
- 1.3 It is suggested that the Commonwealth provide funds and assistance to the ASTA Project Team in conjunction with experienced and successful Local Leaders and STA Coordinators to provide mentoring and assistance to schools, teachers and communities on scientific literacy and awareness.
- 1.4 It is suggested that the Commonwealth provide funds and assistance to ASTA in 2003 for the promotion and marketing of the ASTA Science Awareness Raising Model and Package to the wider community and industry so that projects could be initiated outside of the school environment.
- 1.5 It is suggested that the Commonwealth, through inter-and intra-departmental collaboration promote the ASTA Science Awareness Raising Model and Package.

### **Recommendation 2**

**It is recommended that the package and model be put up on the World Wide Web to facilitate ease of access and uptake of the model and package to raise science awareness.**

#### **Suggested actions**

- 2.1 It is suggested that a suitable web designer be engaged to work with the ASTA Project Management Team to enhance the model and the package onto the ASTA web site so that is formatted for ease, speed and flexibility of use.