

## REMSTEP project report template

---

### Project overview

#### *Project name:*

- ASELL for schools in Collaboration with REMSTEP

#### *Who was involved?*

- Peta White (Deakin Ed), Kieran Lim, John Long (Faculty of Science ...), Ian Bentley (Research Assistance)

#### *What was done (in broad terms)?*

The ASELL for schools project workshops where scientists work with secondary school teachers and students to refine practical activities based on inquiry principles. This workshop model for developing exemplar materials has been refined, with the involvement of REMSTEP, to foreground three significant changes to the national ASELL approach: 1) a focus on contemporary science and the involvement of science researchers, 2) a focus on authentic scientific practices and their social import, 3) the involvement of pre-service teachers in the workshops, and 4) the inclusion of representation construction inquiry approaches to reflect contemporary understandings of scientific knowledge building practice. Within the project, which is ongoing, to date there have been 8 workshops, presentations at teacher conferences, and the development of 10+ investigative activities linked to contemporary science.

### Project rationale: what is the intention?

#### *Is there a theoretical basis or model, or literature that informed the project?*

The theoretical basis lies with inquiry pedagogies that reflect contemporary understandings of science epistemic practices, drawing on the work of scholars such as Latour, Lemke, Gooding, and the work of Prain, Tytler and Hubber more locally.

#### *What gaps do you see are addressed with this project?*

The need to enhance the practical support of inquiry processes in schools, that reflect how contemporary science is practiced, and contemporary science ideas such as those relating to immunology, or composite materials, or energy efficient processes.

#### *Project activities*

- See the report of a focus group meeting below.

### Results

#### *Experience of participants*

What was the experience of PSTs or science and mathematics students, school students, teachers, scientists, teacher educators?

What evidence is available to identify the experience? (surveys, notes, video, etc?)

No direct evidence but anecdotal evidence from the workshops and testimony from the ASELL team (see focus group quote below) show enthusiasm by teachers and school students for the ASELL workshop process.

PSTs have been involved in two aspects of the ASELL Schools project in Victoria. For the *Acids and Metals* practical activity, a PST was directly involved in the development of the practical activity. He worked through the practical activity as it was done by the school and identified ways the activity could be improved.

PSTs have been participants in each of the ASELL workshops. They have benefited from the experience of working side by side with practicing teachers; gaining insight into the way teachers think and the content knowledge of practicing teachers. In addition they have been exposed to practical activities with an inquiry and contemporary science focus and engaged in reflection on what makes a good laboratory learning activity.

### *Project outputs*

What resources were produced and what is their quality (and where can they be found)?

ASELL / REMSTEP practical activities will be placed on the REMSTEP website as well as the ASELL website. The resources have been well received by teachers and students and enabled PSTs to engage with teacher education professionals and scientists in the production of quality curriculum. The REMSTEP/ASELL team have defined the ingredients of a quality activity as:

- include elements of science inquiry
- relevant to the students
- link to contemporary science and/or industry
- address science as a human endeavour and science understanding components of the curriculum
- include a practical challenge
- include a representational challenge

Evidence for the quality of the resources can be gauged by the quotes below, from a focus group discussion with members of the ASELL team. The partnership is focusing on activities representing an enhanced form of inquiry that includes contemporary science practices, science as a human endeavour, and contemporary understandings of scientific knowledge building practices.

The *Composite Materials* laboratory activity arose from ReMSTEP. This activity has become an exemplar used at a number of ASELL Schools workshops in Victoria.

The contrast between ASELL Schools Victoria with ReMSTEP can be seen in the difference between the composite materials activity and the *Baggy Science* activity that had been an exemplar used in Victoria, and is still used in other states.

While the *Baggy Science* activity concentrates on aspects of inquiry, including careful observation, there is no link to contemporary science. It also doesn't fit well with the Science Understanding or Science as a Human Endeavour aspects of the curriculum.

Other activities such as the *Metals and Acids* activity developed in Victoria have been infused with ReMSTEP ideas. The school from which this activity originated said that the activity hadn't worked and that students were not engaged by it. The technical aspects of the activity were refined so that it did work and it was given a contemporary science focus and a relevant context.

Another activity in which ReMSTEP's influence can be seen is in the 'scientist's session' with students at the workshops. Before the ReMSTEP partnership, the scientist's involvement was more related to careers, was more opened-ended and much vaguer. While careers in science is still considered, the focus is now on what the scientist does in his or her current research.

What understandings or models have resulted, concerning how to engage PSTs with contemporary science and mathematics practice?

- The refinement of inquiry practical work through teacher and PST and student workshops is an innovation that has proved quite powerful in refining classroom activities.

*Project outcomes: What were the outcomes for the different players?*

Is there evidence of a cultural shift in the way education and science faculty staff inter-relate as a result of this project?

What have research scientists or mathematicians gained by participating in the REMSTEP project? Have their views about teaching and learning science and mathematics changed as a result of the project?

- Yes, Peta White has been working very closely with Science faculty staff in organizing this collaboration and the scientists have achieved significant changes in their understandings of inquiry pedagogies. The quotes below come from a focus group of the ASELL team responding to the value of the link with REMSTEP:

The partnership with ReMSTEP has had a significant influence on the approach taken by the Victorian team of ASELL Schools project and the practical activities being produced.

Evidence of changes can be seen in differences between the Victorian Node's approach before and after the formation of the partnership with ReMSTEP. It can also be observed in the difference between what other ASELL nodes are producing as practical activities and what the Victorian Node has produced.

Before the establishment of the partnership with ReMSTEP, the focus had been on laboratory activities that were scientifically sound and applied good pedagogy. However, the generation of student interest and relevance were not prominent. Since the formation of the partnership, the Victorian Node has focussed on the inclusion of contemporary science and industry links and the development of science conceptual learning. The involvement of ReMSTEP in ASELL Victoria has changed the priorities and sharpened the focus.

There has been an attempt to integrate representational challenges into the laboratory activities although there is still work to be done in this area. This was not a goal before the partnership with ReMSTEP and is not evident in the approach of other nodes.

What have science or mathematics undergraduate or HDR students gained by participating in the project? Is there evidence of a shift in science or mathematics students' perception of teaching as a worthwhile career path?

- N/A

What evidence is there of improved learning and engagement of PSTs, or of teachers, as a result of the project? What did PSTs learn about the nature of science, or how to incorporate science/mathematics practices into the curriculum?

The activities have been successful in that they have been taken up by a number of schools (mostly anecdotal evidence). Feedback from teachers via surveys has shown that teachers have found the workshops and activities enjoyable and very useful.

What has been learnt about the efficacy of incorporating contemporary science/mathematics practices in the school curriculum? What evidence is there of improved learning and engagement of school students, as a result of the project?

- Students in the workshops have been very engaged and teachers have been extremely positive about the process. We do not however have objective data on this. See below.

What principles can be taken from the project concerning processes for bringing contemporary science and mathematics research and development practices into teacher education?

- Putting science and education staff together with teachers and PSTs and students is a very powerful method of creating and refining school activities that reflect contemporary science practices.