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Background

- The schooling system in Australia comprises government schools (65% of students attend), Catholic schools (20% of students) and independent schools (15%)
- Over at least the last 20 years, there has been an increased focus on Professional Development (PD) and Science Education in particular
- There has been a change in the ways that PD has been conceptualized with a shift in language to Professional Learning (PL). PL is seen as a genuine way of developing teachers' professional knowledge as opposed to mandated changes through PD

Policy

- Science teaching and learning has constantly been reviewed but the overall findings continue to be similar:

[the] actual picture of science teaching and learning is one of great variability but, on average, the picture is disappointing ... In some primary [elementary] schools ... it is generally student-centred and activity-based, resulting in a high level of student satisfaction. When students move to high school, many experience disappointment ... Traditional chalk-and-talk teaching, copying notes, and “cookbook” practical lessons offer little challenge or excitement to students. Disenchantment with science is reflected in the declining numbers of students who take science subjects in the post-compulsory years of schooling. (Goodrum, Hackling, & Rennie, 2000, p. viii)

Recognizing and responding to the challenge

- There has been a long-standing ‘push to fix science’ teaching and learning: development of summer school programs; curriculum documents; short term science T & L programs; etc. in response to well recognized differences in science in elementary, secondary and tertiary settings
- 2012 Australia’s Chief Scientist allocated M\$60 government funding for a range of STEM projects to boost the status of science (*specifically linked to other government departments in order to build momentum for change effort, see for example, www.deewr.gov.au and www.innovation.gov.au. and www.chiefscientist.gov.au.)*

Development of a model: Science Teaching and Learning (STaL)

- Started by the Victorian Education Department (1999) as the Science Extended Professional Development Program working with university Science Education partner (Monash)
- Based on key features of PL: placing teachers in position of learners; responding to teachers' pedagogical concerns and issues; challenging existing practices; major focus on generating knowledge of practice; treating teachers like professionals
- Education Department squeezed program financially, quality compromised in search for increased participant numbers at low cost, program ceased after 3 years

Catholic Education Office (Melbourne)

- CEOM established Science Reference Group and developed policy for science based on concerns for the:
 - nature of support for school leadership
 - role of the science co-ordinator
 - standard of science taught
 - level of student engagement in science
 - declining level of interest in science in senior years
- STaL taken up by CEOM as a response to these needs. CEOM agreed to the principles underpinning the program
- CEOM saw a need to pay serious attention to the value of developing teachers' knowledge of practice. STaL was further developed and refined and became a vehicle for challenging existing science teaching and learning practices and encouraging the development of new knowledge of practice through case writing and sharing.

STaL program structure

- 5 day residential program conducted over a school year
- 2 x 2 days, 1 x 1 day
- Critical friend – visits all participants before the program and after each 2 day residential block
- Final day is a case writing day; cases then edited, published, launched and celebrated
- Program organised in city hotel not a school site, high economic cost but illustrates valuing on a scale teachers never experience
- Participants (capped at 35) elementary and secondary science teachers, all volunteers, must have school leadership support, must be minimum of 2 per school (to develop ongoing shared experiences and support)
- Program conducted from 2005 – present

Impact

- Cases book published each year
- Teachers proud of their efforts and being authors
- Deeper understandings of science teaching and learning
- Schools demonstrate high demand (and commitment) to be involved in STaL
- Teacher leadership in schools
- CEOM developed stronger policy and practice around Science as a consequence of involvement in STaL – leadership program offshoot of STaL
- Elementary teacher nominated for Prime Minister's award for excellence in science teaching
- Australian Research Council grant
- Scientific Literacy book (Sense 2011)
- Research papers (journals & book chapters)

Conditions for change

- Major commitment by CEOM, schools and participating teachers
- Acceptance of PL approach and underlying STaL principles
- Funding consistent and not compromised
- Case writing day – whole day for structured reflection a new experience for teachers
- Critical friend – continual follow up and thoughtful probing of teaching and learning
- Participants, CEOM, Program leaders in a relationship as a team
- 2 or more participants from each school, schools committing to be involved over a number of years (Elementary in particular)
- Residential nature – social and intellectual development important to program
- City hotel – explicitly valuing teachers' involvement (i.e., quality venue)
- Teachers as published authors
- Exploration of individual teachers' pedagogical issues and concerns
- Leadership in schools important
- Research aspects highly regarded as further valuing of STaL by university partner