ReMSTEP
Reconceptualising Mathematics and Science Teacher Education Programs

REMSTEP project report: Contemporary Science Schools

Project overview

- Project name: Contemporary Science Schools
- *Who was involved?* Dr. Peta White and 10 science lead teachers 5 local primary schools in Burwood. In addition, PSTs attended as volunteers in a series of science week activities.
- *What was done (in broad terms)?* Supported curriculum development in the schools emphasizing contemporary science by forming a network with each of the teachers in the 5 schools. Met regularly (e.g., 1-2 times per term) to discuss how to infuse science in schools. Topics included inquiry through representation construction, science week, 3D printing, new resources, investigations, etc.

Project rationale: what is the intention?

- *Is there a theoretical basis or model, or literature that informed the project?* This is about forming networks across schools that cross personal-professional divide and are sustainable. They add value to the everyday teaching of science in schools. In particular, the inclusion of a contemporary science theme and interactions with scientists offers renewed enthusiasm.
- *What gaps do you see are addressed with this project?* Schools aren't talking to each other. This year, the team focused on holding meetings at each of the different schools. Teacher appreciated seeing different schools, learning about the types science equipment available and how they were stored, and learning about science program offered. The initial intent was to infuse this project with PSTs, through a Deakin science and sustainability club. The purpose was to host science and sustainability events at the schools where PSTs could attend, providing benefits to both PSTs and the schools. This is still in development. The Contemporary Science side of the projects is also still under development, and in need of connecting with scientists and industry with the schools. At this point, the program is more schools focused. For example, supporting the theme of Robots, Drones & Droids required more targeted work to help the teachers become more confident with these topics.

Project activities

- *What was the nature of the activities – provide examples*. The network meets regularly in schools to learn about and practice science activities relevant for primary school settings.
- *What was the nature of engagement of PSTs or teachers with contemporary science/mathematics practices?* PSTs: During Science Week 2015, a number of volunteer PSTs conducted Science Week activities at 3 of the 5 schools. Teachers: We formed an effective network with strong and consistent representation from all 5 schools (note this project began with 4 fours and an

additional school joined). There is always representation from each school at every meeting.

- *What aspects of science/mathematics practice were represented to the PSTs? How was this orchestrated? In what sense do you regard this as innovative or significant?* The awareness of the collaborative nature of networks, and their value as a classroom teacher, which is also reflective of how science as a discipline is practiced.
- *What changed curriculum / classroom practices are envisaged, flowing from the project? By what means were these changes supported?* There is more confidence in offering science in these schools. This is exemplified by the types of conversations teachers have in presenting and sharing resources, and demonstrating activities they have themselves tried.
- *What opportunities were there for science/mathematics students (undergrad or HDR) to reconceptualise their perceptions of school science or mathematics learning and teaching?* N/A

Results

Experience of participants

- *What was the experience of PSTs or science and mathematics students, school students, teachers, scientists, teacher educators?* Particularly for the teachers and teacher educators, the experience of sharing classroom practice was positive. This is evidenced by the fact that the school network is now taking on planning and sharing arrangements independent of the Deakin staff.
- *What evidence is available to identify the experience? (surveys, notes, video, etc?).* As there is no ethics is place to formally survey school teachers, only anecdotal conversations are available.

Project outputs

- *What resources were produced and what is their quality (and where can they be found)?* The ongoing, Professional Learning Network, as well as a Scootle community.
- *What understandings or models have resulted, concerning how to engage PSTs with contemporary science and mathematics practice?* There is a need for a student club. We currently have capacity to engage PSTs in extracurricular activity, but need to find an efficient way to make that happen.

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?* A shift is evident in how the universities interact with the local schools. These schools were initially chosen because they already had relationships with Deakin, accommodating school-based teaching. The range now includes: schools where that is no longer happening to schools where an additional 2 or 3 research projects are taking place. There is a full range of experiences with Deakin in these schools.

Patterns of involvement of staff (generally involving 2-4 staff depending on the workshop activity) in activities such as family science nights or digital literacy projects demonstrate that Deakin academics are better prepared to engage with teachers in the schools.

- *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?* Teachers in these schools are now self sufficient in terms of organizing workshops / PD events, and have shown willingness to be involved in further project applications. Six volunteer PSTs involved in a family science night event, as with the PSTs involved in science week activities, were enthusiastic and committed and expressed, in de-briefing discussions, very positive responses to the engagement with contemporary activities such as robotic and drone explorations, and activities involving problem solving. A number have been involved in multiple REMSTEP activities.

Concluding discussion

Challenges

- *What was the nature of challenges to successful implementation?* Getting principals to invest in staff development took some effort, whereas engaging the teachers has been relatively easy.
- What changes were made, from which we can learn?

Impact

- *What is the short/medium term impact of the project (ongoing processes, commitments, existence of resources, over a 1-3 year projection)?* The impact has been significant for these 5 schools.
- *What are the longer-term implications?* We anticipate continued positive outcomes by maintaining this effective network and expanding to other schools.

Sustainability

- What has been learnt about processes for incorporating contemporary science and mathematics practices in teacher education?
- *In what sense is the project sustainable?* Towards the end of 2016, all schools in this network have agreed to participate in a collaborative grant application for $50,000 from the Australian Government that will support network focus on digital technologies, for the next 2 years. This follows on from one of the 2016 Science Week themes “Robots, Drones & Droids’, which gave teachers the confidence to shift their focus to digital technology. This indicates schools and teachers value their Network and can pursue relevant outcomes from this collaborative approach.

Scalability

- *What is the possibility of the project processes and outcomes being reproduced at scale?* Part of the value of keeping a smaller network, is to be able to engage people at more personal level. Hence, there is less incentive to grow the network beyond a certain size. However, part of the digital technologies grant involves a dissemination strategy to local schools around digital technologies.