The National Science-Technology Roadshow Trust

Curious Classrooms

2014-2015

The journey so far

Curious Classrooms (CCL) is a Todd Foundation supported project that has essentially been running since 2012. The project aimed to match the science needs of two primary school clusters in South and West Auckland with community-based science providers who worked alongside teachers to deliver a 'wow science' experience for students.

The following Todd Foundation statement frames the purpose and outcomes of the CCL project.

The Curious Classrooms Challenge:
"Science is at the heart of everything this country must do" – but many students are turned off science before secondary school.

Curious Classrooms Success Factors:

- Primary school teachers are confident to teach science that 'wows' the students and is well aligned to the curriculum.
- There is buy-in and support from school leadership and Board of Trustees.
- Families/ whanau / community are actively involved and inspired about the possibility of science for their children.

Curious Classrooms expected outcome:
Primary school aged students are engaged and interested in science and learning outcomes improve.

CCL science experiences were tailored to the school's needs to ensure that they were relevant and engaging for the students. Science providers included the Science Roadshow, Auckland City Council (zoo, botanic gardens and other council run education centres), Starlab and Stardome.

The outcomes for the project for these first two years included:

- A stronger partnership between schools and science providers;
- Providers being responsive to the individual needs of schools rather than delivering a pre-set programme with little or no follow-up;
- Providers sharing of science tools and techniques with teachers; and
- Providers delivering 'wow Science' experiences for students which were highly engaging.

Project evaluation findings from these two years identified, and continued to highlight, the importance of education sector practices needed to sustain high quality science learning in schools to complement these externally provided experiences. These included:

- School leadership – high level and visible support for science teaching and learning by senior leadership (principals) and at least one designated middle leader of science to lead and coordinate science learning programmes in the school;
- Ongoing science-specific professional learning and development (PLD) to build teacher confidence to teach science in *The New Zealand Curriculum* (NZC), and with a focus on the science

contextual strands and capabilities derived from the Nature of Science strand;
- Effective school systems for sustainability which include planning and review, allocation of personnel (as above), commitment to science resourcing, and developing and maintaining relationships with providers.

As a consequence of the findings from the first two years of the project, the aim of Curious Classrooms 2014-2015 became:

To generate 'wow' hands-on science experiences in primary schools that inspire curiosity and fosters understanding, investigation, communication and participation in science for their students

Going forward 2014/2015

Overall, (and for reasons of sustainability) the CCL project wanted to see significantly more exciting and engaging science lessons in classrooms (or schools settings). To address some of the issues raised in previous years, but still giving focus to 'wow science for students', the project was extended with the aim of:

- assisting teachers to maximise the benefits of a 'wow" *provider* experience; and
- transferring much of the responsibility for 'wow' and other engagement and/or support activities from the *provider* to the *teacher* (noting that the provider can still be involved but at the behest of the teacher/school); and teachers' would be supported to develop some basic skills and confidence to achieve this.

What worked well from a project management perspective?

1. *The provision of intensive science professional learning and development (PLD):* Schools were enthusiastic and appreciative of the Sir Paul Callaghan Science Academy PLD provided. Teachers from the course became Alumni academy and have ongoing use of and access to resources, and the network of academy teachers. Much of what was covered in the course showed in the schools' unit planning.
2. *Project expectations and commitments*: the requirement to develop of long term plans and unit plans – albeit there was substantial variation in style, the ways links were made to *The New Zealand Curriculum*, and the nature and range of identified resources and activities. The evidence suggested that schools were making a good start on these.
3. Engaging the Project Evaluator early in the project and using her to review the materials produced by schools. The feedback process via face to face meeting and where possible interviewing some of the students was very worthwhile.
4. Schools receiving some money to invest into their science learning programme for direct benefit to their students. Some have used the money to pay for trips, others for classroom science resources.

Challenges experienced and responded to

When selecting schools or sites for projects:

- Be convinced that the school principal is fully supportive of the project and will take an active interest thereby ensuring appropriate resources/staff allocations are made and agreed milestones are met.
- Be aware of other priority areas of schooling that the school is currently required to respond to and other initiatives being implemented, that may compete with the project (eg literacy and numeracy projects); and the many and varied 'routine' activities (eg. ERO, staff changes) being faced or managed by each school leader that may also impact on the project – especially in smaller schools.

While implementing the project:

- Be prepared to hold schools accountable to agreed expectations and outputs
- Develop the project in phases. Require individual school planning to be completed in the first phase which is then checked against project criteria before proceeding to the next phase.
- Visit schools and witness first-hand what is/isn't happening. Remain cogniscent of potentially changed circumstances…
- Keep track of changes to school personnel directly involved with the project and be proactive in identifying how continuity of the project will be sustained within the school(s).

- Be prepared to provide sufficient opportunity for professional learning for teachers (and school leadership) as an integral part of the project.

When partnering with providers

- Ensure that the science experience provider understands and is prepared to adapt their service to meet the needs of the school and students.

Evaluating the project:

- Develop the evaluation method and measures integral to, and at the same time as, the project plan.

Evaluation of project outcomes

Data for evaluation came from the documentation schools submitted (their unit and long term planning) and from in-school visits to interview the principals, lead teacher(s) and students about the project. All information collected was analysed in relation to a series of evaluative questions. The overall successes are summarised as follows:

Features of successful CCL schools:

Strong leadership

- At both senior and middle management levels.
- Learning priorities are clearly identified and implementation support such as time allocations (eg for co-construction of activities for learners with other staff or in-house PLD) and monetary investment.
- Overview of science learning in the school and planning ahead; prepared to make strategic resourcing decisions.
- Used the Academy resources as the basis for developing their own school programmes, adapting them to meet the needs of learners in their school.
- Ensuring the production of units of work and plans were explicit in their science and addressed NoS and the science capabilities and that student learning in science could be reported.

Engagement in PLD

- Externally provisioned PLD is accessed as available and as required by science lead teacher(s).
- PLD for all staff is led by science lead teacher(s) based on externally provided PLD.

Curriculum design and planning, including specific Science Unit(s)

- Curriculum design and planning reflects the school's curriculum (in context of their community).
- Science planning includes consideration of the way all of the following come together: science capabilities (NoS), NZC contextual strands (either as topics or themes), teaching approaches (pedagogy consistent with the NZC, including e-learning), developing students key competencies needed for science learning, developing students literacy in science, examples of learning activities (or reference to these in teachers resources), suitable resources, and opportunities and ideas for collection of evidence of learning (assessment for and of learning).
- Overall, provide high quality learning opportunities that make meaningful and relevant connections between the science capabilities and the learning context.

Planning sustainability 5 year plan

- Plan provided coverage and repetition of the science capabilities (NoS) and coverage of topics/themes derived from all of the contextual strands.

Relationships with providers and 'wow' experiences

- The community-based science Provider(s) is selected provides a science experience relevant to the planned learning.
- The learning experiences required are negotiated with the provider (the one-size fits all package is not accepted).
- Utilise field trips and 'wow' events to engage parents.

In addition successful schools also:

- Added curriculum value to their field trip experiences eg for learning in social studies, writing, mathematics and statistics, or technology.
- Leveraged off CCL success to include further science 'wow' experiences (for example one school took a group of senior students to Tiritiri Matangi –an island bird sanctuary in the Hauraki gulf), other schools engaged with local community projects around protecting local streams and areas of conservation interest.

Resourcing

- Accessed options for little to no cost science experiences.
- Budgeted for consumables and non-consumables, and developing a sustainable system for keeping non-consumable resources orderly and easily available/able to be moved across classrooms.

Assessing student learning

- Made a commitment to gathering evidence of student learning that could be reported to parents as part of overall student achievement and progress.

Engaging parents and whanau

- Considered ways and made use of opportunities in the project to engage parents and whanau specifically in science related activities.

End of 2015

All students have had at least one 'wow' experience delivered by external provider(s) and have engaged in enriched science learning experiences in their classrooms, delivered by their teachers. Without exception teachers report that their schools have been abuzz with science and students have expressed a real eagerness to do more.

Teachers have:

- been exposed to the intended meaning of science in *The New Zealand Curriculum* and the obligations and pedagogical opportunities offered by the Nature of Science strand, including ideas on assessment and unit planning;
- had networking and sharing opportunities with other schools;
- experienced workshops from providers to help them maximise the learning opportunities inherent in the provider programming;
- become more adroit at negotiating with external providers of science learning outcomes from visits; and
- presented more engaging science lessons in their classrooms and schools (in many instances a school wide topic focus).

Schools have:

- within the overall time frame of the project, been able to access the resources and experiences offered through CCL at times when it best suited them to engage.

Providers have:

- been more receptive to school requests for particular programme emphasis;
- actually ventured out and into schools (ie outreach when this is not the norm); and
- run special sessions for staff in schools.

In a nutshell…

CCL has provided significant impetus for change in all of the CCL schools. At the start of the project many schools taught little or no science and now they are really enjoying what they are doing and seeking to do more.

Having funding to pilot various mechanisms and procedures has been invaluable to those entities (schools and providers) who took real advantage of the opportunities it afforded them. The inducement of a 'wow' science experience for students initially helped bring the teachers along (ie if the students were to have opportunity to participate in a science event, then the teachers were encouraged to find out a more). With the provision of PLD and associated access to providers through CCL, teachers gained confidence to teach more engaging and appropriate classroom science. They also came to recognise the benefits of including the experiences offered by an external provider and how to negotiate with these providers the outcomes they wanted for their students.

The 11,733 students (cumulative total) from all these participating schools are the major beneficiaries of CCL. With opportunity for greater engagement in science learning, and access to appropriate learning activities and experiences that allow them to achieve in science, as well as sustain their interest, the aims of the CCL project have been fulfilled. And with the growth in teacher confidence and experience there is the promise of much more to come for students in these schools.