# Science professional learning and development (PLD)

Sabina Cleary

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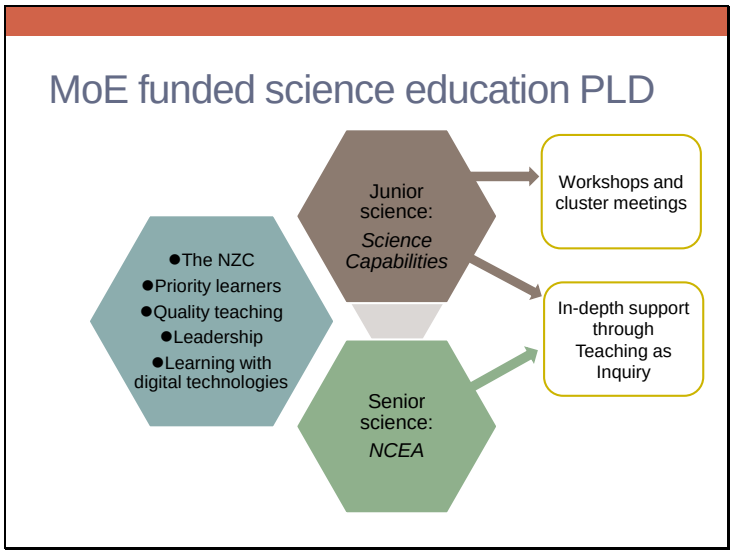


MoE has identified five outcomes that underpin all PLD provision
Junior science focus is on developing programmes using the Science Capabilities Framework - workshops, cluster meetings & in-depth based around TAI
Senior science focus is on improved outcomes for NCEA – in-depth based around TAI

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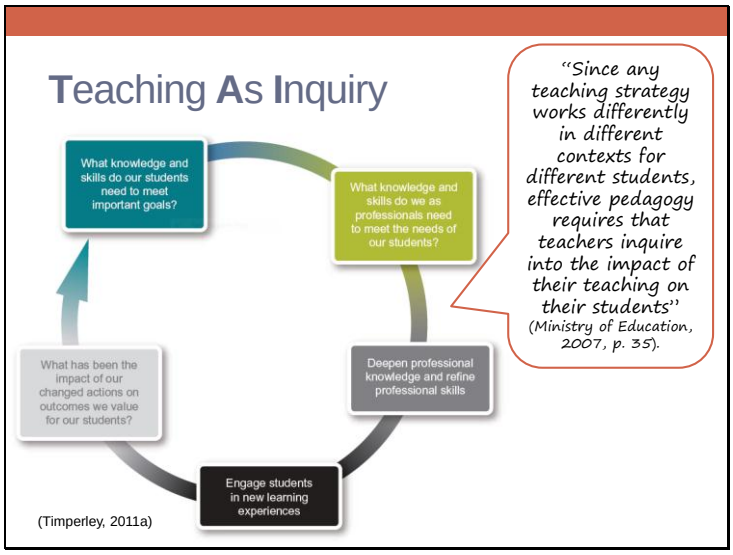


Teacher inquiry and knowledge-building cycle to promote important outcomes for students – underpins PLD approach
Relevant to own self as a teacher, and to the students you are teaching

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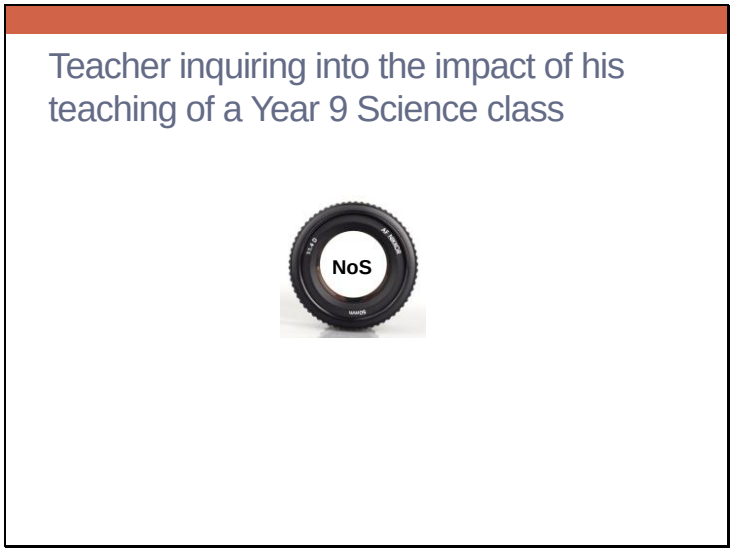


Example One

Inquiry focussing on students knowledge, skills and capabilities needed to understand how science and scientists work
[use 4-6 students as 'reference students']. Students chosen are 'priority' students. These include many Māori and Pacific learners, those from low socio-economic backgrounds, and students with special education needs as well as English language learners.

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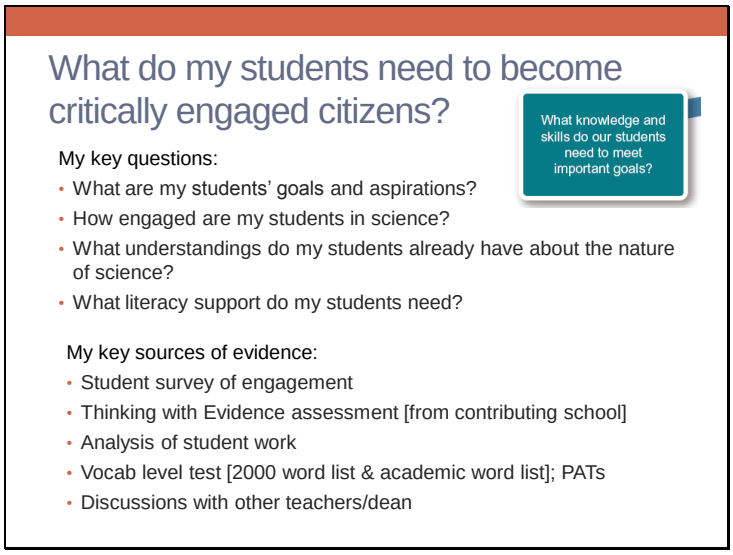


The first step is having an in-depth look at the reference students; finding out about their strenghts and needs in relation to the valued outcomes.
It's important to really delve deeply here. Much of the data needed might already be available in schools; other data that might not have been collected before might need to be considered – particulary making contact with whānau.

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Don't see relevance of science – even those wanting to have a career in hairdressing for example
Lack of evidence around NoS – note this has also been a finding with many teachers in their inquiries; prompts the question "Does this lack of evidence suggest that we are not actively planning to develop this knowledge in our programmes?

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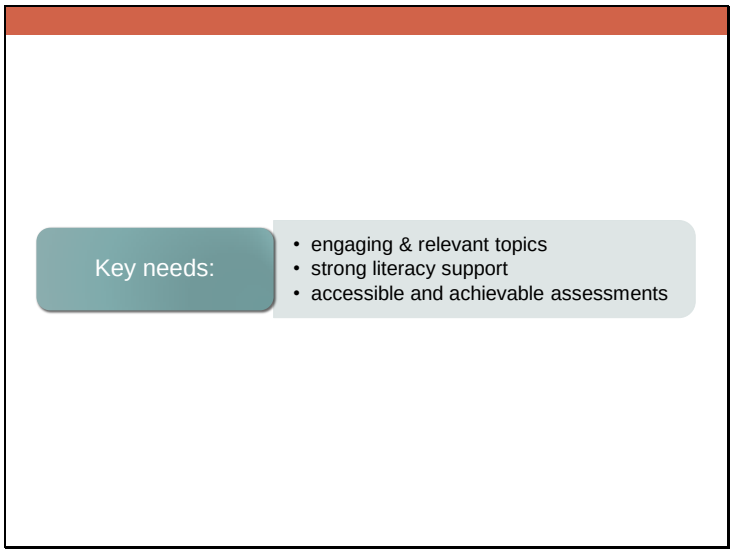


Need “hooks” – they [students] need to see what’s in it for them; also need to be smart about developing knowledge & skills that we know they will need [this might be different to what we might have thought in the past in a traditional science programme]
Need support to access the vocabulary of science
Students should not be given assessment that they will fail time after time – if these students struggle with literacy we need to find ways that they can successfully demonstrate their knowledge and skills and thinking

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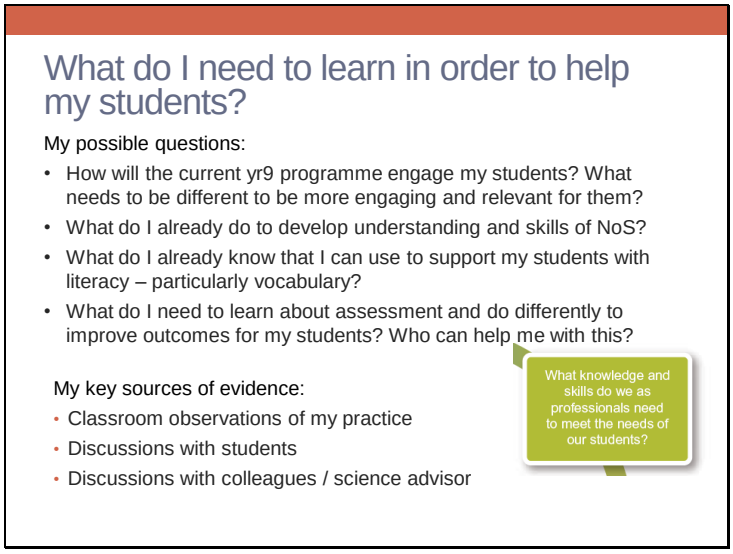

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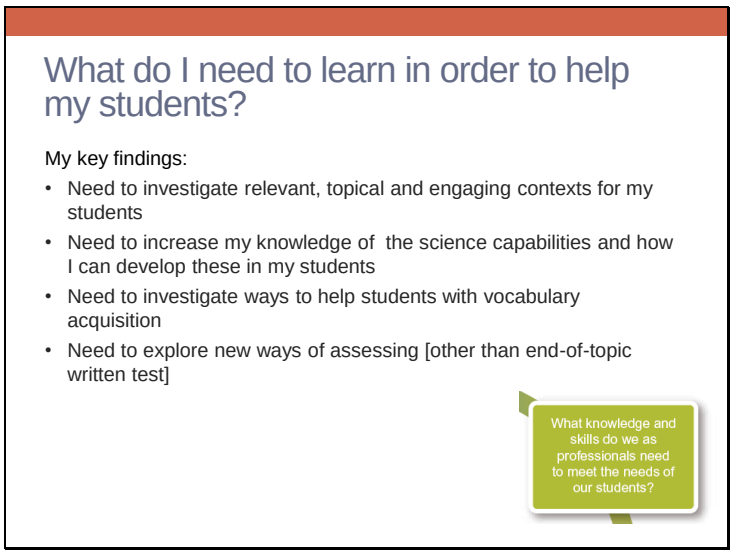


Note: this step is easy to skip over – easy to go straight from student needs to thinking about trying something new: important to slow down and take the time to analyse own knowledge, skills & practice in relation to the identified student needs and build from there.

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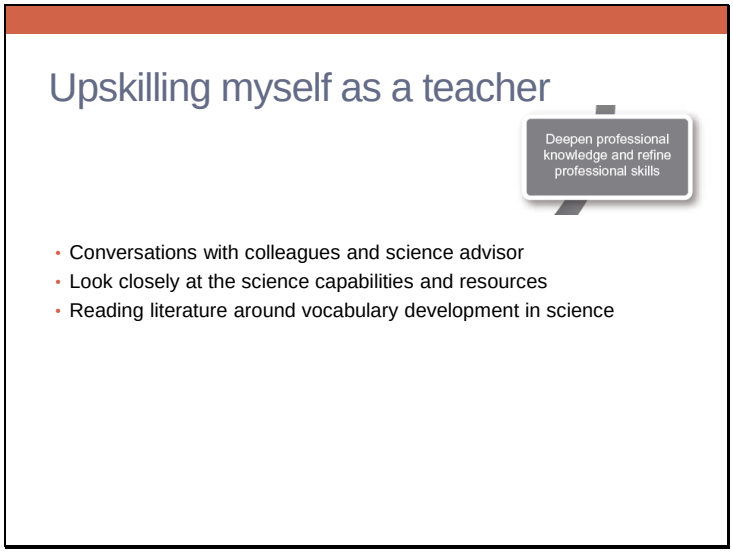


Important to consider where to go for support to upskill: colleagues in own school and other schools, science advisors/facilitators

Possible sources of evidence:
Evidence about what is most likely to meet my students' needs (eg school success stories, research, professional learning conversations)

This is where the big R comes into play to a large extent – important to look to education researach literature here so that current, sound pedagogy is developed

Note: initially we found as facilitators that it was easy to skip dimensions 3 & 4 [finding out about teacher knowledge & skills and deepening knowledge & professional skills] – this led to teachers trying strategies & approaches that might have missed the opportunity of building on current strenghts, and did not uncover underlying beliefs & practices.
These steps are vital if long term changes in practice are to occur.

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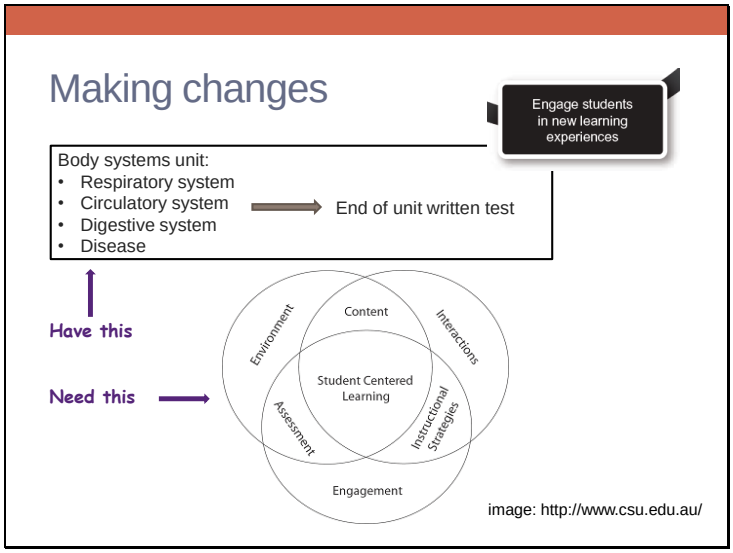


Looked at next unit of work – fairly traditional unit with content firmly at the heart of the unit. As this was not going to be engaging or achievable for the students in that class there was a need for significant change

Needed to develop a new unit of work that will engage students, be relevant to them, be achievable and allow them work collaboratively and develop science capabilities.
Also needed to develop new ways of assessing outcomes so that students can demonstrate their thinking

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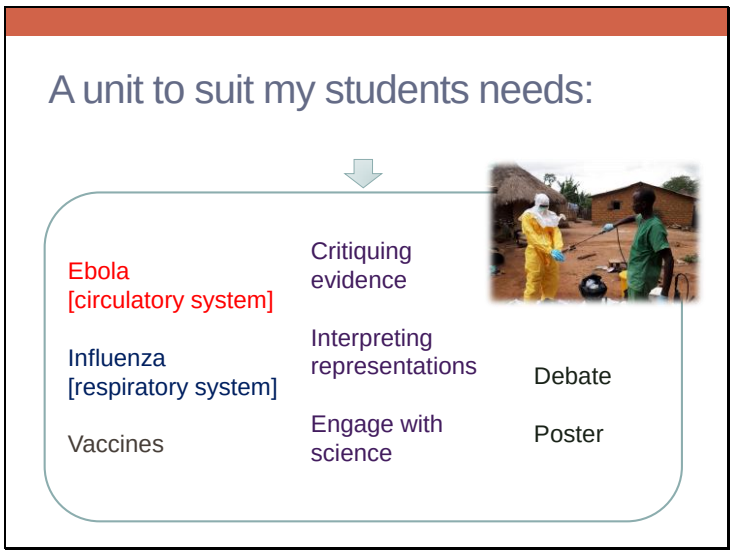


Outline of the unit

Learning about infectious diseases (ebola & influenza) and how they affect the body (circulatory & respiratory systems)
How these might be treated and prevented – vaccines
Developing understanding of importance to critique evidence (esp re vaccines), of how representations are used in science (information about ebola, representations of circulatory & respiratory systems, of viruses)
Engaging with science – developing a resource (poster) that will be useful in the community
Survey students and families about beliefs around influenza vaccination
Debate (groups) – "should we get the flu jab?" – seek help from English teacher to develop debate skills
Poster – informative poster about influenza (e.g. transmission, effects, treatment & prevention) for a specific target audience (e.g. primary school, doctors office, marae)

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## What happened?

What has been the impact of our changed actions on outcomes we value for our students?

Still to see the outcomes from this .....

Key thing here is to keep a record of what is happening: look at listen
Student feedback – verbal and/or written; observations; attendance etc
Keep reflections of own thinking about the new unit

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## Teachers inquiring into the impact of their teaching of a Level 1 NCEA class


Example Two

Inquiry focussing on students in 'alternative science' classes – i.e. students who need extra support to achieve NCEA Level 1 in science
[use 4-6 students as 'reference students']

Five teachers, in four schools, with similar findings from dimension 1 [What knowledge and skills do our students need to meet important goals?]

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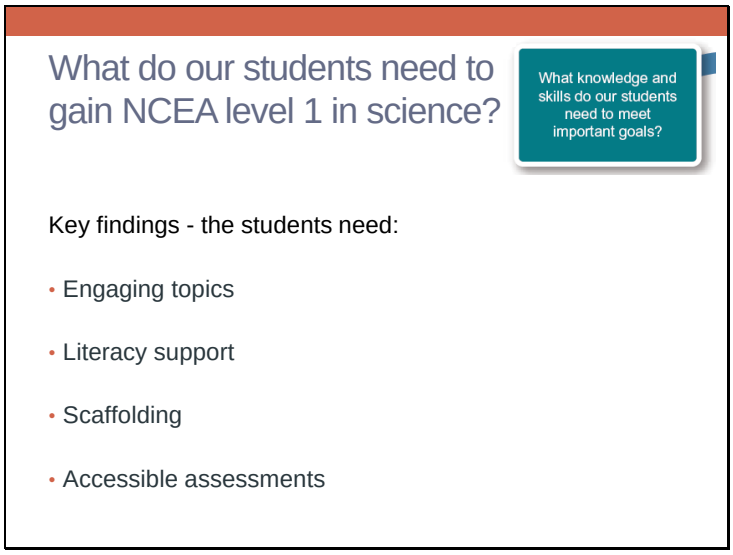


Went through similar process as the teacher in the first example – thinking about what the valued outcomes were for the students, and what the strengths and gaps were for the students

These were common/overlapping findings in several schools

- Found that students were disengaged with science to a large extent and had not experienced success in the past
- Students did not have expected levels of vocabulary – some in the 2000 word test [particluarly ELL's]; many in the academic word list
- Evidence that the students needed support to understand the content, and support to unpick assessments and with writing answers

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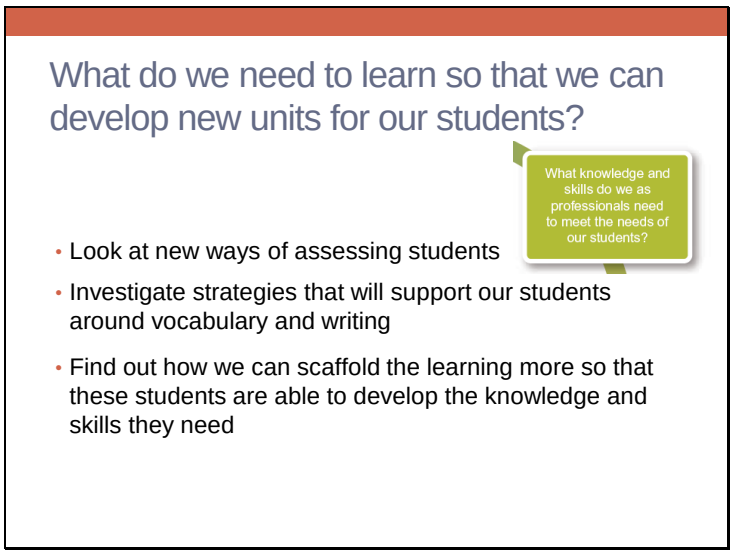


Again, looked at own practice – findings again were similar; although different teachers had different levels of knowledge and skills in understanding of literacy support, using different forms of assessment, scaffolding learning
Some had been involved in the indepth pld previously and were more familiar with teaching as inquiry

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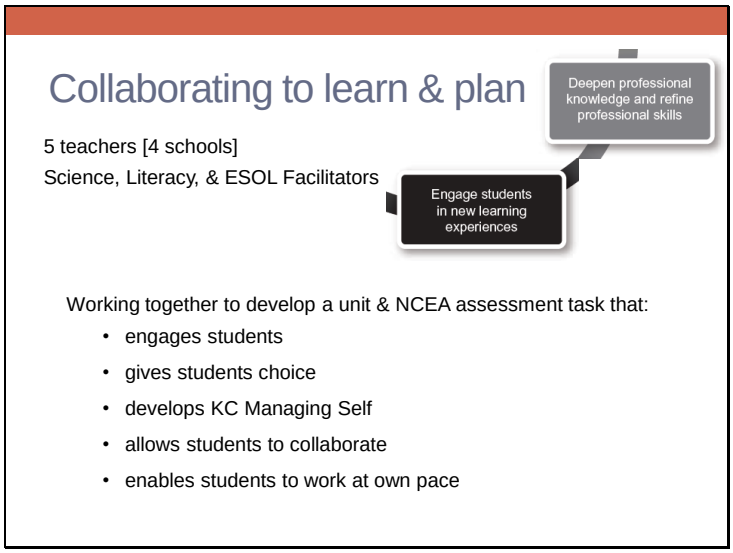


AS90946 Investigate the implications of the properties of metals for their use in society
Day working together (in the holidays!!) - great discussions, sharing of experiences, challenges, ideas to co-construct a portfolio unit – powerful professional learning conversations
Followed by individuals contributing parts to build the unit
Further developments to refine/tailor to suit needs of students in each school
Also sharing continual development of unit, feedback, feedforward

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## Impact?

What has been the impact of our changed actions on outcomes we value for our students?

on students

- mixed levels of engagement; some very engaged and enjoyed working at their own pace
- most enjoyed the element of choice; some students struggled with decision making
- majority liked presenting work as a poster rather than written test or report

on teachers

- enjoyed something new
- enabled them to more easily identify students with strength or need around self-management
- challenging at times to support those students who were less engaged and/or less capable of more self-directed learning

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## Moving forward

How do I support students who lacked the required level of self-management skills?

How do I help those studetns who still were not engaged in the unit/science and don't think it relates to them?

My students need help with writing [especially explaining & discussing the science concepts]

I need to remember not to try / change too many things [for me and for my students] at once

Reflecting on what worked well and why? What needs to be developed further? What do I need to learn about before next time? – i.e. leading into another cycle of inquiry.

Caution: finding a balance – this was a large change in approach for many – literacy/vocabulary support took a back seat in some cases – that's fine – the teacher needs to scaffold thier own learning and trialling of new approaches too!

Guskey (2002) : model of teacher change:
PD → change in teachers classroom practices  change in student learning outcomes  change in teachres' beliefs and attitudes

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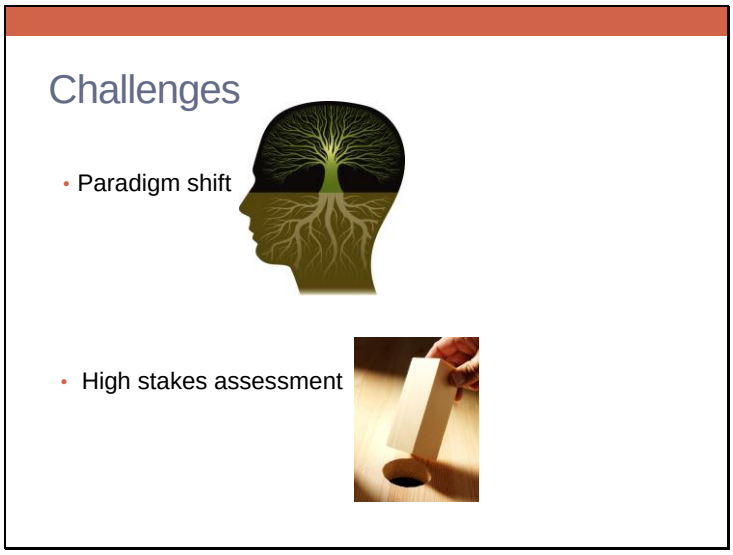


Paradigm shift: change focus from content only to developing science capabilities (nature of science)

Tension between curriculum and high stakes assessment (NCEA) – moving forward so that NCEA is used to compliment teaching and learning programmes rather than drive them

Both tied to perception of purpose of science education – for citizenship vs for career

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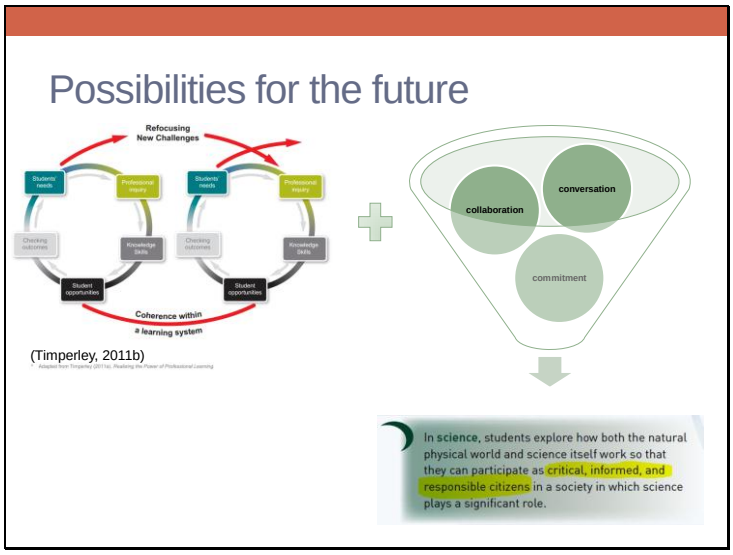


Keep the vision of a critical, informed and responsible citizen in focus

Experiment through reflective cycles – big R and little r

- collaborate with others in & out of own school – including science community, education research community
- continual conversations to clarify thinking, support, challenge
- commitment required

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## Bibliography


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- Timperley, H. (2011a). A background paper to inform the development of an Australian professional development framework for teachers and school leaders. Retrieved from Australian Institute for Teaching and School Leadership website: http://www.aitsl.edu.au/verve/_resources/Background_paper_inform_the_development_of_national_professional_development_framework_for_teachers_and_school_leaders.pdf
- Timperley, H. (2011b) *A background paper to inform the development of a national professional development framework for teachers and school leaders.* Australian Institute for Teaching and School Leadership. Available from: http://www.aitsl.edu.au/professional-learning/resources.html