

PRIMARY TEACHERS AUTHENTIC EXPERIENCES OF THE NATURE OF SCIENCE BY DISTANCE LEARNING

Open Polytechnic
K U R A T I N I T U W H E R A

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In 2012 the Open Polytechnic launched a unique NZQA approved Level 7 Primary Science Teaching programme to improve the science knowledge, competence and confidence of primary teachers to teach science.

This was a response to a number of studies, such as the Trends in International Mathematics and Science Study (TIMSS) and the Education Review Office (ERO) Science in The New Zealand Curriculum report, which raised a number of concerns. The ERO Chief Review Officer highlighted the lack of teacher confidence and capability in teaching science, and the limited opportunities for high quality professional development in science.

As a means of providing professional development as well as a specialist science qualification, the Certificate and Diploma programmes provide working teachers with an opportunity to experience the nature of science. The assessment tasks and course design provide multiple sources of data to explore how teachers perceive science and science education.

An analysis of over 200 samples of work from around New Zealand indicated a number of trends. For example, teachers experiences of science at secondary school significantly biased their expectations of what investigating in science should be like.

With the recent announcement of the multi-million dollar investment for teaching and leadership, cost-effective, personalised professional development is an issue that requires more discussion. Rather than using 'experts', is becoming a better science educator something that needs to be experienced and personalised? Does online learning support teachers in remote or isolated communities? How does the Teaching Perspectives Inventory tool inform us about the 'right' way to teach science?

Examples of the issues raised by teachers with an analysis of common themes will be

discussed.

Overview...

- Introduction
- The Science Problem
- Providing a solution and a qualification
- Teachers experiences of the nature of science
- Trends and issues
- Implementing insights and perspectives of teaching
- Why sending in 'experts' won't work; the power of the TPI and raising the quality of teaching

Who am I...

- Programme Leader / Lecturer
- Primary Science Teaching
- Primary Mathematics Teaching
- Registered teacher
- Scientific research and industry experience
- Ministry of Education eLearning Fellow
- Microsoft Innovative Teacher



For me, being a child of the late 60's and early 70's, scientists were heroes, not lab geeks or nerds!

They were fit, athletic, and knew how to throw a knock-out punch and woo the ladies!

Science was cool, immensely exciting and called upon the cunning and creativity of its heroes to save the situation!

As a research scientist with industrial experience who retrained as a teacher, it has been interesting to note the assumptions about science that many of my colleagues have. Even at Secondary level, hearing that "science is rather dry and boring" from other science teachers was not unusual.

How many of you have a vision of what a "typical" scientist looks?

How many of you would doubt that school children could ever contribute anything meaningful to the scientific community?

Don't you need a degree to do that? And a lab?

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September hot topics

Picaxe chips - more powerful but still suitable for young and older students at low cost; [learn more here...](#)

ULearn 2013; workshop showcasing the use of **digital multimeters as inexpensive data loggers** for primary and secondary science and mathematics classes [teaching ideas and how-to videos](#)

FEE FREE study for Primary teachers - become a confident and effective science teacher with course fees paid if you enrol in the [Graduate Certificate in Primary Science Teaching](#)

Fun experiments / technology - [for teachers, parents and students](#)

SEARCH / index
everything in one spot!

Email: admin at nexusresearchgroup.com

From 1997 - 2004 Michael and Christine Fenton ran New Zealand's only school-based research organisation on a voluntary basis in their "spare" time. The Fentons have had many years industrial

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When I first entered teaching I decided to keep hold of my own authentic experiences in science...so the first school-based research group was founded in 1997. My wife Christine Fenton and I encouraged students to "Question everything".

This was not a science club...but a chance for students to work in an authentic setting with authentic roles and responsibilities to publish findings, attend conferences, and even have some fun learning!

www.NexusResearchGroup.com



Why do I believe our children at Primary and Secondary level have so much untapped potential?

Part of this comes from being a scientist, part comes from being a parent, but most comes from believing that science is as simple as “noticing something worth noticing”...and then finding out more.

I build a lot of my own science equipment, largely by trial and error, and try to link it with ICT to make some interesting and very cool projects. Imagine making a heart beat sensor for 20 cents, and seeing your own heart beat on a computer screen!

What if you made this into a game using free game design software, and teach your class how to do this for themselves!



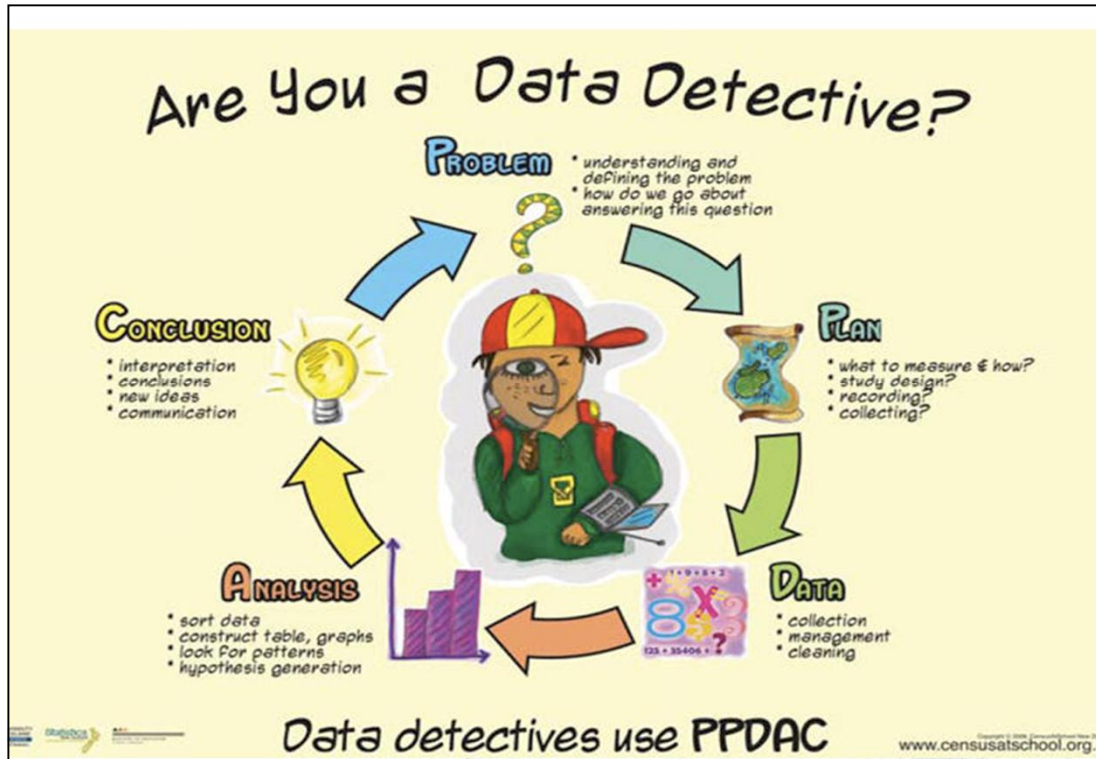
How about using movies and science fiction to engage students in learning about space and MRS GREN?

What does a space suit do (and did you know a Dalek is a space suit for an alien life form, not a robot?)

What about links to mathematics? Isn't maths one of the sciences?

You can't do science without noticing something about size, shape, proportion, number, etc.

And a 10 year-old student had her science fair project mass-produced by the National Foundation for the Deaf;
children can make a difference!



Mathematics and science, as a process in schools, follow a similar cycle; looks a lot like the traditional “scientific method”

Primary teachers often report they don’t have time for science; why not use science activities to develop authentic numeracy skills?

Datalogger substitute...\$10 multimeters



- Key competencies
- Higher level thinking
- Practical skills assessment
- Research!
- Real investigations!
- Cheap
- Robust
- Simple to use; Yr1 –Yr13

<http://nexusresearchgroup.com/technical-data/multimeter-sensors.htm>

For more about authentic science, using inexpensive equipment students can take home, to embed numeracy skills.

Richard Feynman – you can't fool reality....

"It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong."



Why is authentic science important?

Why is hands-on science important?

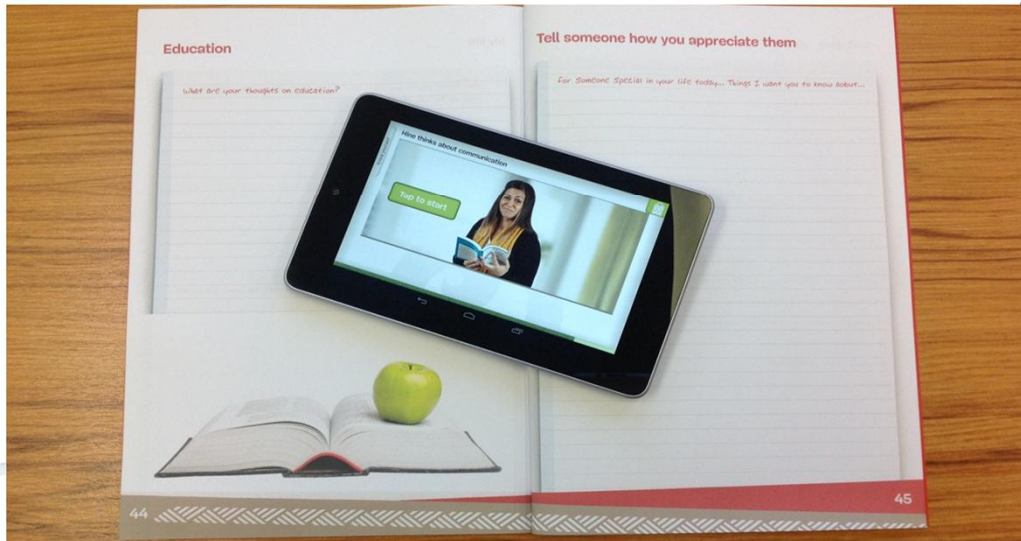
Don't we have iPads, and we say "go to the library to research..."

Is our teaching fit for purpose? The Science Problem...



Our track record indicates iPads, BYOD and the internet are just 'information' which is not the same as knowledge or understanding.

When “research” is not what it seems...



Far too many low quality science sites.

Teachers often share resources, perhaps unaware of factual inaccuracies, health and safety issues, etc

Tablets and other BYODs; “digital classrooms”

Google Nexus 7



The Nexus 7 is a tablet computer designed and developed by Google in conjunction with Asus. It is the first tablet in the Google Nexus series. The Nexus 7 features a 7-inch (180 mm) display, an Nvidia Tegra 3 quad-core chip, 1 GB of RAM, and 8, 16 or 32 GB of internal storage. Originally released as a WiFi-only tablet, a 3G Cellular version has been released.

SPECS		
Tablet	Android 4.1	Released 2012-07-13
1.30GHz Nvidia Tegra 3	1GB RAM	16GB ROM
1.2MP	HSPA+	7" - 1280x800
4325mAh battery	340 grams	

ICT, eLearning, etc, has its place, but does a disservice to science.

NZ education under-performing - Parata

JODY O'CALLAGHAN

Last updated 13:39 12/12/2012

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New Zealand's education system is falling behind in science and maths, says Education Minister Hekia Parata.

The latest international studies show New Zealand's education system has persistent signs of under-performance, Education Minister Hekia Parata says.

The Trends in International Mathematics and Science Study and the Progress in International Reading Literacy Study, completed between November 2010 and October 2011 for years 5 and 9, show New Zealand failed to rank higher than 15th out of more than 60 countries.



There were marked drops in maths and science achievement, particularly at middle primary school level. And there were no improvements in reading literacy.

Ms Parata said the results, published last night, served as a wake-up call. "While we have a good education system overall, there are persistent signs of under-performance."

Pupils were either standing still or falling behind in reading, maths and science, and it was "seriously worrying".

She wanted improved teaching quality and leadership, and more attention paid to a child's transition from one level of schooling to the

"Must try harder"

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Science too important to be optional

Last updated 07:41 23/09/2013

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OPINION: Not every New Zealand pupil studying science can expect to match the achievements of Lord Rutherford or Sir Paul Callaghan, just as not every pupil studying English can expect to write like Katherine Mansfield or Janet Frame.

That does not mean the study of either subject is futile. However, it does mean the assessment systems that are used need to recognise pupils' wide range of abilities. Those used for English have taken steps to do that. Science should follow.

Some schools are no longer making science mandatory at Level One of NCEA, and the Secondary Principals' Association has warned the Education Ministry others will follow unless there is some recognition

Science being marginalised...how much science will our citizens have to debate issues and problems they will face? Not much....!

Content /context strands - increasingly out of date

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Today's Science News

Sunday, July 6, 2014

Featured Research

from universities, journals, and other organizations



Doing Something Is Better Than Doing Nothing for Most People, Study Shows

July 3, 2014 — People are focused on the external world and don't enjoy spending much time alone thinking, according to a new study. The investigation found that most would rather be doing something — possibly ... [full story](#)

Top Science News

- > Frozen World Orbits in a Binary Star System
- > Scientist Revise Timeline of Human Origins
- > Archaeopteryx: First Show Off, Then Take-Off
- > Ocean On Titan Could Be as Salty as Dead Sea
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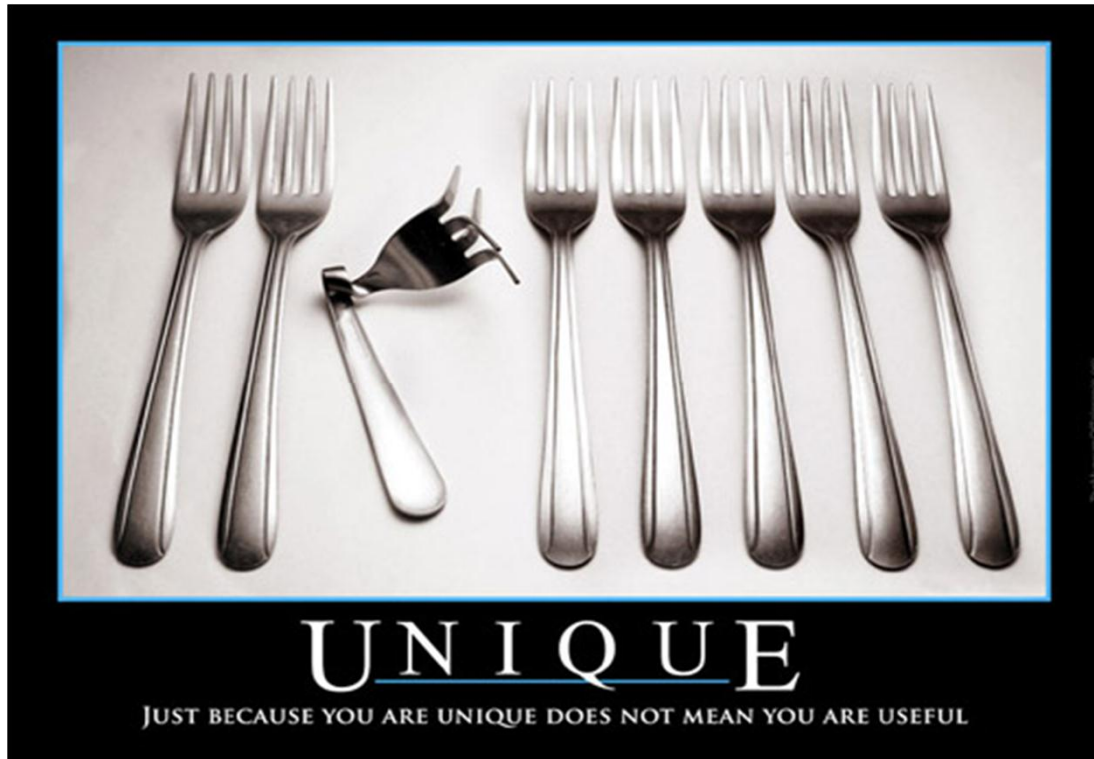
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- > Doing Something Is Better Than Doing Nothing
- > Dissolved Iron in N. Atlantic Traced to Sahara
- > Whales: Big Impact On Oceans, Carbon, Fisheries
- > More Left-Handed Men Run in Winter: Hmmm?

Curriculum was always a subset of knowledge.

Must do better than use the old 'we can't cover everything' excuse

Traditional silos of knowledge such as biology, chemistry and physics as taught in schools no longer match the way science is done now.

The Secondary / High School system is too tied to NCEA; so if you want to revamp science, it is at the Primary level where the greatest impact can be made.



I have heard many that the NZ education system is unique....

The science curriculum came out when?

- 2007; 7 years ago
- Most schools in the 2010 ERO report were at the **beginning stages** in developing their science programmes.
- Many staff reported that science had, in recent years, been less of a school priority. They pointed to the emphasis placed on numeracy, literacy, inquiry learning, assessment and information communication technologies (ICT) initiatives as having impacted on the quality and quantity of science taught.
- iPad obsession – stops students engaging in the real world (ULearn13)

The 5 Capabilities too?



Primary Science
Teacher Fellows

Adding more things to think about; adding confusion for teachers that have had little if any science PD.

A solution... Graduate Diploma in Primary Science Teaching

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In 2012 the Open Polytechnic launched a unique NZQA approved Level 7 Primary Science Teaching programme to improve the science knowledge, competence and confidence of primary teachers to teach science.

2013; all course available for delivery.

2 Certificates make up the Diploma

Certificate in Primary Science Teaching (Curriculum) focuses on improving classroom teaching and learning; most teachers will complete this

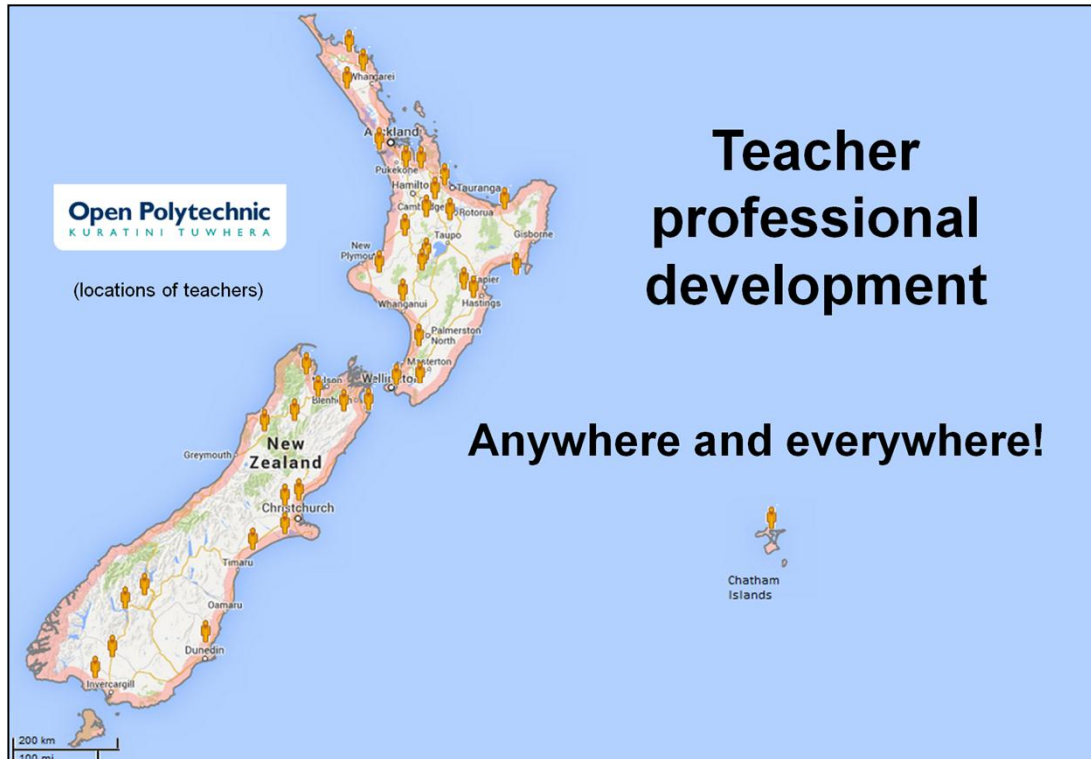
Certificate in Primary Science Teaching (Leadership) focuses on leading and championing science in the school and wider community; some teachers will complete this (and gain the Diploma)

Graduate Certificate in Primary Science Teaching (Curriculum)

Qualification structure

This qualification is made up of five compulsory courses.

COURSE CODE AND NAME		LEVEL	CREDITS
Compulsory			
All Courses are required			
76301	Science behind the Living World	7	10
76302	Science behind the Material World	7	10
76303	Science behind the Physical World	7	10
76304	Science behind the Planet Earth and Beyond	7	10
76305	Doing Science to Teach Science	7	20



The challenge... “Seeing things differently yet?”



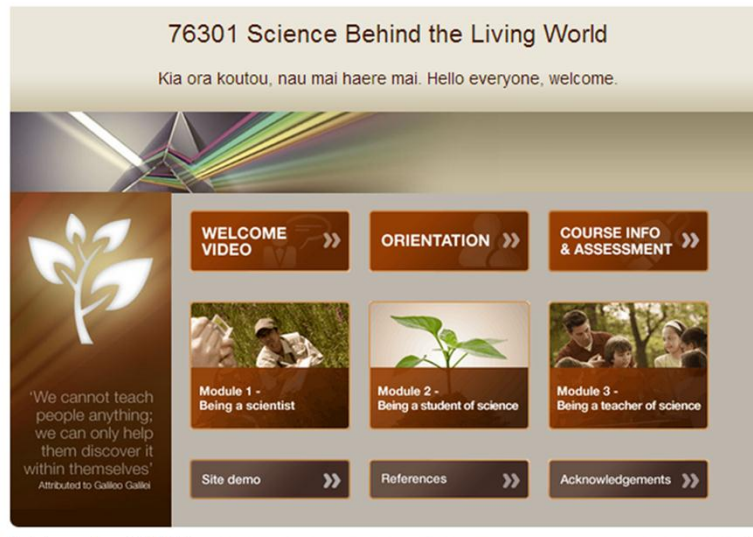
It can let us see things in different format, arrangements and groupings.

Just like we do not buy a shovel then look for excuses to dig holes.

These courses enable working teachers to experience science, becoming enablers, so their students, as future citizens, experience what it means to be ‘scientifically literate’ citizens.

This is far more important than wanting more engineers or doctors.

A closer look at NoS in action



The course design for the first compulsory course – very hands-on focus throughout.

The first module asks teachers to do an act home investigation

The second module provides content knowledge, eg, what are cells?

BUT, there is a mix of read, view, do

Each course covers a different aspect of NoS; Living World looks at “Investigating in Science”

So in the second module , each chapter finishes with practical ideas suggesting how this knowledge, eg, about cells, could be rediscovered by students.

By the numbers 2012 - 2014

- 2013 first full year all courses on offer
- 7 trimesters so far for 76301
- 17% male
- 7% Maori
- 8% British/Irish
- 14% under 30
- Almost 2/3 40+

N = 165
completed

An analysis of all the offerings of the first compulsory course was carried out.

Later, a comparison of scores across the four context strands for content knowledge was completed.

Of the 165 individuals in the 7 trimesters, older teachers make up the majority of the participants, and other figures follow trends in the teaching workforce (sources for workforce figures MoE, no up to date data available though) .

Reasons for enrolling

- To gain confidence to do practical work
- To gain content knowledge
- School focus on raising profile of science
- Learn about the Nature of Science
- Learn about the 5 Capabilities
- Career progression

Teachers in the courses have multiple opportunities to participate in forums.

They include

- “ An introduction about yourself (what do you hope to achieve, etc)
- “ What is ‘science’
- “ What does it mean to do ‘research’
- “ Ways of investigating in science

An analysis of 165 individuals indicated that responses could be grouped into just 6 categories.

Assumptions about science

- Science only happens in a lab
- Science is serious, can't be fun or enjoyable
- Science is not creative
- Science has nothing to do with numeracy or literacy, needs its own time slot
- Mad Science! & Fizzics – enthusiasts that muddy the waters
- You need a lot of equipment
- Must follow the Scientific Method
- Fair Tests are the only way to do science

Teachers in the courses have multiple opportunities to participate in forums. They include

- “ An introduction about yourself (what do you hope to achieve, etc)
- “ What is 'science'
- “ What does it mean to do 'research'
- “ Ways of investigating in science

Teachers are heavily influenced by their experiences of science at school (a small number have a science qualification up to NCEA Level 3 or even fewer have a degree that include some Biology)

There is a lot of 'baggage' being brought to the classrooms and the course. The 'typical' mad scientist was a common example; Sheldon Cooper from 'Big Bang'; you can't be high achieving without being deficient in other ways.

“Fizzics” as a fun chemistry activity, which has nothing to do with physics;

If a teacher is not confident, they will avoid doing any science.

If a school does not deliberately have science as a focus, teachers who want to do

science may not be able to implement change in their classroom.

Assumptions about primary students

- Children can't understand science concepts (note: SciDaily article)
- Children can't do research
- Children need to know content first
- Anything children discover or notice has been seen before
- Children cannot contribute anything meaningful to science
- Children find science hard
- Science is for older children

An analysis of teachers that responded to any of the forums

- “ What is ‘science’
- “ What does it mean to do ‘research’
- “ Ways of investigating in science
- “ The role of enquiry in science

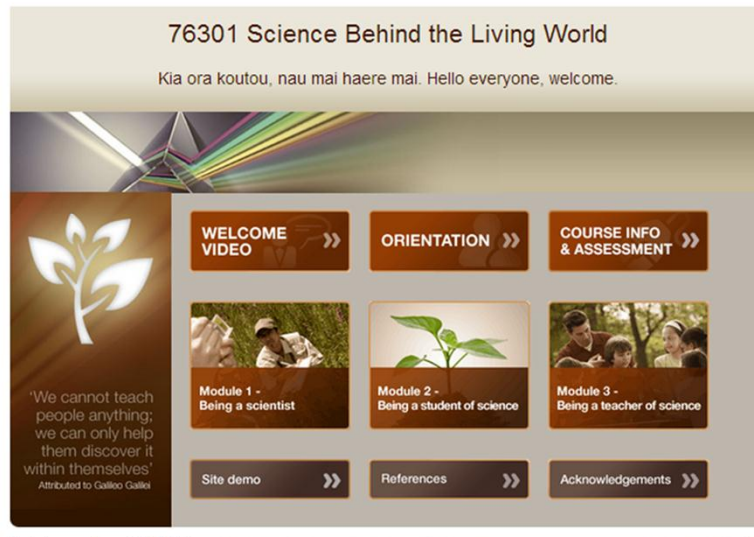
indicated that comments about why science is hard fell into 7 main categories.
Most of these individuals held multiple views

It is interesting to note the following Science Daily item in contrast to teachers beliefs about childrens' abilities and what children are actually capable of;

“Kids understand complex scientific concepts far beyond what anyone expected”

<http://www.sciencedaily.com/releases/2014/03/140311123818.htm>

..and then they get their hands dirty...



This course, one of five in the Certificate (Curriculum), has a specific five-week focus on doing authentic investigating in science.

It is a chance for teachers to reflect on their beliefs and assumptions after engaging with the Nature of Science “Investigating in Science”

PDF

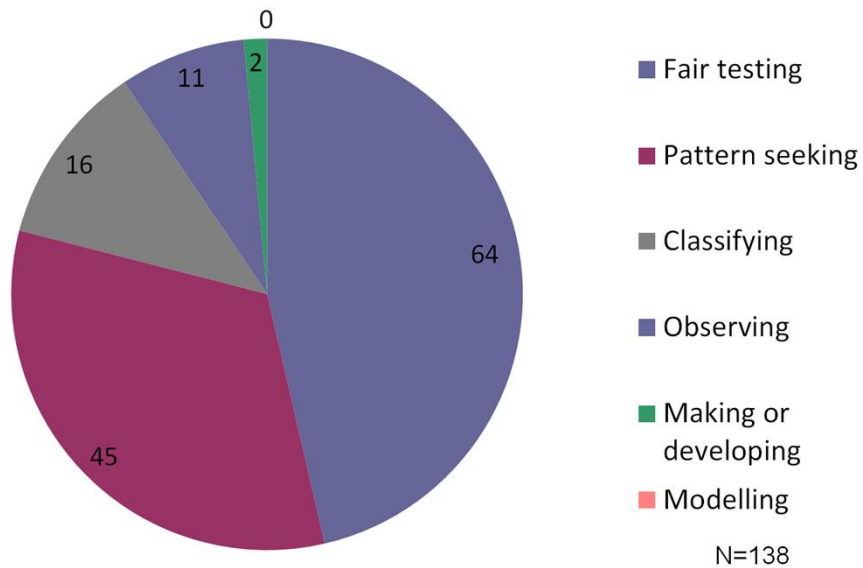
- Strategies for investigating in biology
- <http://nexusresearchgroup.com/downloads/Strategies-for-investigating-Biology.pdf>

There are 6 different strategies highlighted in the PDF provided in the course, with other supporting material.

Access to a tutor by phone, email or skype to clarify concerns or thinking.

An analysis of 138 projects submitted for marking indicated a bias for just two strategies...can you guess what they were?

Investigations; strategies for investigating in science



An analysis of 138 projects submitted for marking indicated a bias for 'Fair testing' and 'Pattern seeking'

As teachers engage in other courses, and have another chance to carry out another investigation, teachers generally have more confidence to try alternative approaches including 'making things and developing systems'

Strategies for investigating in science

- 7 trimesters so far for 76301
- Fair tests; plant growth/seed germination, fruit ripening, celery in water
- Observing; cats, dogs, birds. ants, root growth
- Pattern seeking; changes in time - sleep logs, feeding times, hands sweats, energy drinks & caffeine (effect on heart rate), stress on heart rate, other - fingerprints
- Classifying; biodiversity, bird types, leaves

There were a number of very good investigations done, regardless of the strategy used.

Coming up with the initial idea was a challenge for some; 'science is noticing something worth noticing'

Many activities would be worth presenting at SciCon or publishing.

Still a presumption that a high school or university lab report was required, in spite of a detailed marking rubric with support in the course material.

Reluctance to 'let go' of preconceptions about doing science.

New thinking about science

- Science is just noticing something in particular that is worth noticing
- Research is more than reading books or going online
- You can't do science without counting, measuring or noticing proportions; maths is the language of science
- There is so much happening in the world!
- Fair tests are just one of the ways scientists investigate
- TIME...I rush my students as I am busy ticking boxes

Common comments / reflections about the process of investigating....

Issues when investigating in science

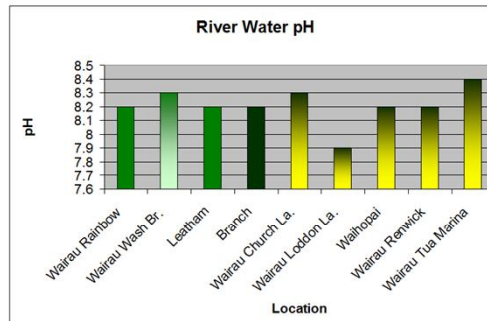
- Health & Safety awareness is low; mouldy bread common, scaring children with popped balloon and measuring heart rate (as young as 3!)
- Some resistance to following guidelines and policies; “we have always done this” mentality
- Pattern seeking; changes in time - sleep logs, feeding times, hands sweats, energy drinks & caffeine (effect on heart rate), stress on heart rate, other - fingerprints
- Poor practice perpetuated by Science Fairs, eg, Stuff article about “foul-mouthed Coppers and their dogs”

Some concerns

Health and Safety is a BIG issue, so we now have specifically forbidden certain investigation topics.

What is happening in schools is a concern!

Growing expert science teachers



“Having a mission to accomplish, collecting data and using equipment made me feel like a professional scientist .“

Plenty of examples of ‘getting hands dirty’ from practical work.

Authentic activities lead to authentic learning in mathematics

Sense of accomplishment and science is “less scary now”

Developing new attitudes to teaching & learning



"I think the facts and the
"doing" go together, especially
for kids at school....

...This course is a blessing
because I'm now getting to do
the practical stuff and see the
link between the two."

Reflections on content and the process of learning content start to come together.

All teachers are asked to reflect on this in the course.

Developing new attitudes to teaching & learning

<u>Whole class</u>	Pre-test	Post-test
Minimum	0	6
Lower Quartile	1	9
Median	2	11
Upper Quartile	3	12
Maximum	4	13

(Test out of 13 marks)

“I need a range of different activities based on the same context to enable my children to practice their new skills and consolidate their new knowledge in a variety of ways.”

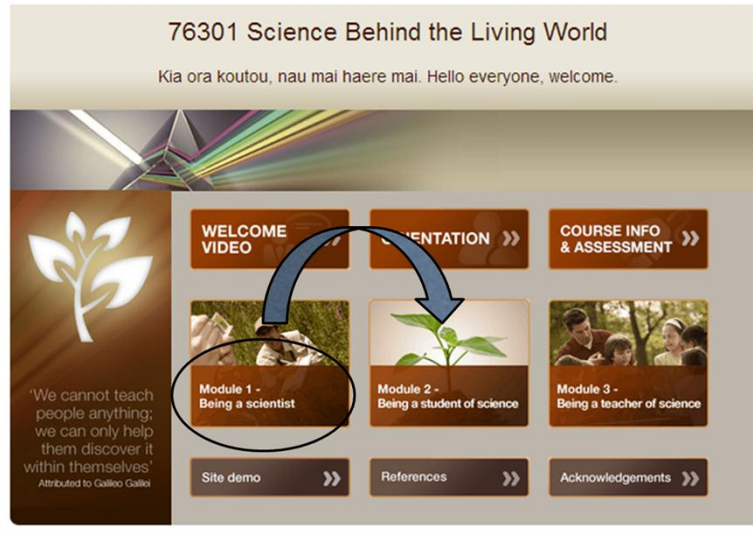
Confidence in doing science by practical work in first four courses is put into practice in the 5th course 76305 “Doing Science to Teach Science”

Write a science unit, teach unit, evaluate effectiveness.



All teachers who engage with the course and reflect on their journey report a real sense of satisfaction....

A closer look... Graduate Certificate in Primary Science Teaching



The course design for the first compulsory course – very hands-on focus throughout.

The first module asks teachers to do an act home investigation

The second module “Being a student of science” provides content knowledge, eg, what are cells?

BUT, there is a mix of read, view, do

Each course covers a different aspect of NoS; Living World looks at “Investigating in Science”

So in the second module , each chapter finishes with practical ideas suggesting how this knowledge, eg, about cells, could be rediscovered by students.

Context strands 2012 – 2014

- Content knowledge average scores ranked highest to lowest
- 7 trimesters so far for 76301, less for others

1. Living World (90%)
2. Planet Earth & Beyond (87%)
3. Material World / Physical World (80%)

Equivalent to Year 9

A comparison of scores across the four context strands for content knowledge was completed (this content knowledge is assessed at the end of module 2 “Being a student of science”).

Figures are average scores out of 100.

In general, teachers find LW and PEB ‘easier’ than the other context strands.

This seems to match the contexts teachers prefer to teach in schools at Primary level

What they learn in private becomes public

76305 – Doing Science to Teach Science

Summaries of Five Teaching Perspectives, Daniel D. Pratt and John B. Collins

- Transmission
- Apprenticeship
- Developmental
- Nurturing
- Social Reform

www.teachingperspectives.com/

Describing the relationship between the teacher, the content and the learner

With the recent announcement of the multi-million dollar investment for teaching and leadership, cost-effective, personalised professional development is an issue that requires more discussion.

Rather than using 'experts', is becoming a better science educator something that needs to be experienced and personalised? Does online learning support teachers in remote or isolated communities? How does the Teaching Perspectives Inventory tool inform us about the 'right' way to teach science?

In 76305 we put what the teachers have discovered about the Nature of Science into practice, taking the learning they did at home in private back into the classroom.

We start with recognising that teaching itself is based on our assumptions and beliefs about learning and our intentions for our learners.

If we have a 'baggage' we bring to science education, do we also have other 'baggage' we bring to teaching?

Teaching Perspectives Inventory

This 15 minute questionnaire can help you collect your thoughts and summarize your ideas about teaching.

Teaching Perspectives Profile: Individual

Participant: Glen Munro
ID Number: 000833273647

Item	Apprenticeship	Developmental	Traditional	Social Reform
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
4	1	1	1	1
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86	1	1	1	1
87	1	1	1	1
88	1	1	1	1
89	1	1	1	1
90	1	1	1	1
91	1	1	1	1
92	1	1	1	1
93	1	1	1	1
94	1	1	1	1
95	1	1	1	1
96	1	1	1	1
97	1	1	1	1
98	1	1	1	1
99	1	1	1	1
100	1	1	1	1

Online quiz, simple multi-choice

Answer with a class in mind

Automated analysis emailed to you with breakdown of dominant perspectives used with that class (age group)

Includes an analysis of how well your beliefs about teaching and your intentions for learning match your actions

Transmission

Effective teaching requires a substantial commitment to the content or subject matter.

- ❖ Good teachers have mastery of the subject matter or content.
- ❖ Good teachers take learners systematically through sets of tasks that lead to content mastery.
- ❖ Good teachers are enthusiastic about their content and convey that enthusiasm to their students, and for many learners, they are memorable presenters of their content.

First of the five perspectives;

NO ONE PERSPECTIVE IS THE “RIGHT” ONE!

Apprenticeship

Effective teaching is a process of *enculturating* students into a set of social norms and ways of working.

- ❖ Good teachers are highly skilled at what they teach.
- ❖ Good teachers know what their learners can do on their own and what they can do with guidance and direction

Second of the five perspectives;

NO ONE PERSPECTIVE IS THE "RIGHT" ONE!

Developmental

Effective teaching must be planned and conducted “from the learner’s point of view”.

- ❖ Good teachers must understand how their learners think and reason about the content.
- ❖ Good teachers work hard to adapt their knowledge to each learner’s level of understanding and ways of thinking.

Third of the five perspectives;

NO ONE PERSPECTIVE IS THE “RIGHT” ONE!

Nurturing

Effective teaching assumes that long-term, hard, persistent effort to achieve comes from the heart, as well as the head.

- ❖ People are motivated and productive learners when they are working on issues or problems without fear of failure.
- ❖ The more pressure to achieve, and the more difficult the material, the more important it is that there be such support for learning.
- ❖ Good teachers promote a climate of caring and trust, helping people set challenging but achievable goals, and providing encouragement and support, along with clear expectations and reasonable goals for all learners.

Fourth of the five perspectives;

NO ONE PERSPECTIVE IS THE "RIGHT" ONE!

Social Reform

Effective teaching seeks to change society in substantive ways.
From this point of view, the object of teaching is the collective rather than the individual.

- ❖ Good teachers awaken students to the values and ideologies that are embedded in texts and common practices within their discipline.
- ❖ Good teachers challenge the status quo and encourage students to consider the how learners are positioned and constructed in particular discourses and practices.
- ❖ Students are encouraged to take a critical stance to give them power to take social action to improve their own lives; critical deconstruction, though central to this view, is not an end in itself.

Fifth of the five perspectives;

NO ONE PERSPECTIVE IS THE "RIGHT" ONE!

Surely social reform, 'challenging accepted wisdom' is what science and NoS are all about!

Empowering quality teaching using different perspectives

Knowing one's teaching perspective and what our strengths are is important as they can influence the way we teach.

As a result of the TPI inventory it was highlighted for me that I have certain strengths and perspectives and this can influence how I approach my teaching; yet these perspectives and viewpoints may not always be best for my students

With just-in-time professional development support this teacher is moving into the world of action research

Empowering quality teaching using different perspectives

The Developmental domain was also a dominant domain in my TPI

As I plan my science activity, I want to think about how I use questions, both for a range of purposes, but also to reflect on whether who and what questions are asked, reflects an inquiry and student centred classroom.

Although my beliefs, intentions and actions scores are close in this domain, I think that my belief about the importance of questioning and who is doing most of the questioning, is not matched enough by the actions that I take.

Teachers are guided to use new tools that they can engage with to raise the quality of teaching in their classrooms.

Developing the 'expert from within'

Another example of thinking scientifically ... 'noticing something worth noticing'

Empowering quality teaching using different perspectives

Over all the perspectives, the greatest changes were in my Intentions scores. All of these increased. This suggests to me that this paper may have made me more aware of what my intentions are when planning science activities.

I think this is because I am thinking more about what is the actual science learning that I want the students to gain and also referring much more to The Nature Of Science and thinking about these Learning Outcomes too.

This is just the first tool teachers are introduced to in 76305

For many this tool explains why they find outside experts of limited use; their differing perspectives have not been taken into account and/or one 'right way' of teaching is promoted.

Empowering quality teaching using different perspectives

I found the TPI survey to be an interesting and valuable activity. It has made me reflect on my own deeply held beliefs about teaching and how these filter through into my practice, often unconsciously.

In particular I wanted to ensure that students were given control over the focus and direction of the fair test investigation they would plan and conduct. In my previous teaching, investigations were teacher directed and all students would conduct the same activity using a prescribe method.

A cost effective means to start a discussion on what 'quality teaching' means for teachers and learners.

Scalable solutions to meet a national need

Open Polytechnic
KURATINI TOWHEKA

- Study while you work
- Study anywhere
- Study any time



- Supporting government priorities in primary education
- Transforming classroom practice, creating science leaders

Fascinating stuff so far. I really like the way this material is presented ...”

The Certificate in Primary Science Teaching (Curriculum) is a Level 7 NZQA registered qualification.

With the announcement of the \$359 million ‘Investing in Educational Success’ programme this year, just \$2 million invested in Primary Science would produced about 1000 QUALIFIED primary science experts nationally.

Imagine what that could do!

Most of the 76305 tools are applicable to raising achievement in literacy and numeracy too.

Empowering teachers in science is more than being told what to do, and raising the quality of teaching in science impacts on other priority areas.

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K U R A T I N I T U W H E R A