MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

This newsletter and the Secondary Student Achievement Professional Learning and Development initiative is funded by the Ministry of Education. The providers are The University of Auckland and Te Tapuae o Rehua consortium.

National Newsletter: All Sciences including Agricultural and Horticultural Science

Information and resources for middle leaders in secondary schools | Term 2 2014

Tena koe, Greetings to you all, Kia orana, Fakaalofa lahi atu, Malo e lelei, Talofa lava, Talofa ni

Update on sciences for term 2 2014

Schools who attended the national workshops have had a chance to explore the Science Online site on tki. The next step is for all science departments across New Zealand to engage effectively with the Science online resources:

- The Science Capability Framework and support resources,
- The Science Community Engagement summaries and
- The E-in Science discussion paper.
- The URL is http://scienceonline.tki.org.nz/

You could begin using the discussion questions provided with the resources on incorporating the ideas into the science programmes as a department.

Science lends itself well to the consideration of the **Digital Technologies and future-oriented science education discussion document.** As a department an approach suggested by some enterprising schools was to engage students in exploring some of the more than 1000 science Apps available free to identify the best App to use to monitor an aspect of science.

For example: Find an App that will monitor sound levels in a classroom, or can be used to compare the effectiveness of methods used to reduce sound pollution. This could lead to groups in a class developing investigations into controlling sound pollution using decibel meter Apps downloaded free to a phone, i-pad or tablet. One teacher commented, "Decibel 10th works well for this and it's a lot easier than setting up and using a single hand held or data logger decibel meter for a whole class." Other teachers suggested using light meters, magnetometers, signal generators, oscilloscope, white goods, speed recording timers, OPSM Eye Check, heart rate monitor, alongside the usual suggestions of quizlet, Google sky maps, Chemistry Quiz, and periodic table Apps.

Using these approaches in class can help to support students to effectively use and develop knowledge, skills and understandings of a range of digital technologies. Within this learning is the need to build awareness of the responsible use of digital technologies, including digital citizenship and self-regulated learning. The key point made by teachers was that the onus does not have to be on the teacher to find the Apps - use the students to find them for homework – as long as the teacher has made the requirements of the App clear to students.

As a science department you can reflect on ways to better use the resources available to both teachers and students with the "bring your own device" mode. Remember that for schools where few students have access to digital devices, even an additional 2 or 3 in a class can lead to more engagement with science as students explore the capability of their device and share with others.

It is now up to teachers to seek new ways to incorporate use of these readily available science Apps into science teaching and learning. Access this document at: http://scienceonline.tki.org.nz/New-resources-to-support-science-education

Science National Co-ordinators

Northern and Central North regions National Co-ordinator
Mikhal Stone
University of Auckland
m.stone@auckland.ac.nz
Mob: 021 1871 664

Central South and Southern regions National Co-ordinator
Kate Rice
University of Otago
kate.rice@otago.ac.nz
Mob: 021 793 771

Science Regional Facilitators

Northern region
Ian McHale
University of Auckland
i.mchale@auckland.ac.nz

Natalie De Roo
University of Auckland
n.deroo@auckland.ac.nz

Central North region
Simon Taylor
University of Auckland
sp.taylor@auckland.ac.nz

Central South region
Stephen Williams
Te Tapuae o Rehua
stephen.williams@otago.ac.nz

Southern region
Sabina Cleary
Te Tapuae o Rehua
sabina.cleary@canterbury.ac.nz

Central South, Southern regions
Judith Bennetts
Te Tapuae o Rehua
judith.bennetts@canterbury.ac.nz

Quality teaching supports priority learners

Term 2 may be short, but having got to know your learners, now is the time to provide quality teaching based around effective pedagogy to support your identified priority learners. Set up a Teaching Inquiry where you focus on addressing the needs of a focus group of priority learners.

Identify the strategies that are most likely to help these students to progress in their engagement and learning in science. Put these strategies into practice and build the students' capability to reflect on their learning and take actions to think critically about the new ideas. For these learners it is likely to involve a shift from dependent learning to independent learning which requires a teaching process that begins with:

- **Modelling** by the teacher
- Moves to **joint activity** with teacher and students completing a task together
- Progresses to a series of **scaffolded activities** using support processes and/or structures of planning frames that build student capability of both individual and groups
- Then **students lead the selection** and discussion of the process/structures appropriate for the task
- Finally students are able to engage in **independent activity** without the help of the teacher or group - however there is usually class or group discussion prior to commencing the task.

The exemplars of student responses available on the NZQA website provide a useful tool for modelling an appropriate response to students. Use these with students to explore how well the exemplar response addresses the question. In addition, identify the science terms used as well as the gaps in the exemplar responses. As scaffolding, students can then plan answers to a similar question to developing a response.

It is important to remember that many students have different ways of learning so may need to engage in the process of constructing suitable responses by observing you as teacher actually writing the response and sharing the thought processes you go through during the process!

Further approaches to quality teaching and learning can be explored as a department using the Effective Pedagogy section of the New Zealand Curriculum pages 34 to 36 for discussion starters.

Programme design - using contexts to promote student learning success

Following last term's newsletter, the Science facilitators have come across some great examples of learning contexts being used in Year 11 Science. One school has used a range of contexts including i-pods and hearing loss; nuclear disasters; explosions; and pandemics as foci for Level 1 science learning. Removing the focus from the achievement standard has led to more engagement with the science and better achievement in the assessment task when it is carried out.

Another school has focused science teaching and learning in Level 1 science around the hangi, examining the science processes involved in both the making and cooking. Students have explored the best fuels to use as well as monitoring the temperatures the rocks and food inside a hangi reached. They have also looked at food safety practices linked with preparing and cooking food in a hangi. Student interest and achievement has been high using this context as they were involved in making decisions about the focus for their science learning for the year.

These examples support the use of a familiar context to locate the concepts to be learned. However the process used must also involve having clear learning outcomes that are shared with students, alongside clear criteria for success both for each lesson and in the assessment tasks.

Links and resources

The Science Teaching and Learning Guide Part 2
This guide is now live on:
http://seniorsecondary.tki.org.nz/Science
The new sections cover learning programme design, connections and pedagogy.

The Agricultural and Horticultural Science Teaching and Learning Guide
The link for this guide:
http://seniorsecondary.tki.org.nz/Science/Ag-and-hort-science

Literacy and Numeracy page on NZQA site
There is a new Literacy and Numeracy landing page live on NZQA.

It was developed in order to have all of the information from NZQA and TKI sites accessible in one place - worth bookmarking for easy access.
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/literacy-and-numeracy/

Secondary Student Achievement professional development

The Secondary Student Achievement professional development is funded by the Ministry of Education. The Government goal is that 85% of all 18-year-olds will have achieved NCEA Level 2 or an equivalent qualification by 2017.

Support is available to all middle leaders in the form of workshops/ clusters and e-newsletters in every learning area and in a range of subjects. Intensive, in-depth support is also being provided for selected schools or departments allocated by regional Ministry offices

Science in the New Zealand Curriculum

In preparation for 2015, a review of Year 12 programme design might be a possible focus. Focus discussion around your students currently in Year 11 and their potential learning pathways for Year 12 and 13.

- Do all students need to study full science courses in Chemistry, Physics, Biology and Earth & Space Science in Year 12 and 13?
- How many students progress through from Year 11 to study a full science course at tertiary level?
- Is the programme provided appropriate for most students?
- Would a composite course containing a mix of Chemistry and Biology; Physics and Earth and Space Science; or Biology and Physics better provide for many students' future pathways?
- What considerations are important considering the possible careers open to these learners?
- What Science options are considered important to include when looking at the Youth Guarantee recommended subjects?
- Did you realize that careers in hairdressing recommend achievement of some Level 2 Chemistry achievement standards as well as some Biology standards?

Leadership in science classrooms

The quality of the relationship between the teacher and the student is the key to the success of the teaching.

So as term 2 begins, here is a reminder of Louise Stoll's summary of the key influences on enhancing leadership for learning. She reiterates that the individual teacher is at the centre of leading learning as their key role is to "engage in and sustain continuous learning" (p.3).

In addition she stresses four key aspects that are at the heart of "leadership of and for learning". Being cognizant of these might help each teacher lead the learning in their classroom. These aspects are:

- "*Don't lose sight of your learning vision."* Have "high expectations for the learning of all – teachers, leaders and students*" (p.5)*
- *"Engage hearts as well as minds: create the right emotional learning climate."* Here the focus is on "building trust and openness that celebrates success and deals effectively with power conflicts between teachers, students and leaders" (p.5)
- *"Become learning experts: build an inclusive learning community."* This involves a focus on "understanding the learner and how learning takes place", and then "determining what kind of teaching is appropriate" (p.6)
- *Practice organizational learning."* This is about "continuous reflection on the existing environment and creatively incorporating ideas form external sources to your own context and need – both looking backwards and looking forwards" (Stoll, pp. 5-7)

Keeping these four aspects in mind will help science teachers understand the current focus on professional learning and development.

The change in the needs of the 21st century learner in Science who has a wealth of technological tools at their fingertips means that to lead learning in Science classrooms teachers must be prepared to continually adapt.

Only by doing so will teachers be able to ensure there is "pupil learning of the highest quality" (p.8). Stoll's paper is readable and has useful reflection questions on which to base department learning. (Stoll, L. *Enhancing Internal Capacity: Leadership for Learning).* Downloaded from:

http://www.nationalcollege.org.uk/media/604/DF/enhancing-internal-capacity.pdf

Links to moderator newsletters

Remember to keep up with these for latest information on the assessment tasks and achievement standards.

Agriculture/Horticulture
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/ag-and-hort-science/moderator-s-newsletter/may-2014/

Biology
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/biology/moderator-s-newsletter/may-2014/

Chemistry
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/chemistry/moderator-s-newsletter/february-2014/

Earth and Space Science
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/earth-and-space-science/moderator-s-newsletters/may-2014/

Physics
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/physics/moderator-s-newsletter/february-2014/

Science
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/science/moderators-newsletter/february-2014/

Clarifications
Also refer to the clarifications for science:
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/science/science-clarifications/

For more information refer to the NZQA Best Practice Workshops page.
http://www.nzqa.govt.nz/about-us/events/best-practice-workshops/

Youth Guarantee and Vocational Pathways

The profile builder on the website allows a student to enter their achievement standards in all subject areas to be recorded and shows how these relate to the six broad employment sectors.

Several of these sectors link students to the need to achieve credits in science subjects. Information about jobs within sectors can then be explored.

Keep up to date with the section for Educational Providers by visiting

http://youthguarantee.net.nz/start-your-journey/

In addition, explore some of the new assessment resources prepared for the six pathways categories of the Youth Guarantee. These can be used by schools, and do provide a different slant to assessment contexts.

http://ncea.tki.org.nz/Vocational-Pathways-Internal-Assessment-Resources

Science subject area alerts

First up, a reminder to check out the Assessment Specifications and Clarifications provided by moderators on both TKI and the NZQA site before using a task in 2014. Newsletters from all moderators have been posted for term 1.

In addition there are still some NZQA workshops available in 2014, consider attending either the Best Practice workshop or the Connecting with Contexts workshop. This generic workshop provides teachers with the skills to modify existing assessment resources to better meet the needs of students.

The subject-specific Best Practice Workshops, Making Judgments, continue to be offered and are aimed at increasing teachers' confidence to make assessment judgments in their subject area. Just a reminder that these workshops are dependent on sufficient registrations being received early by NZQA, so register now. As some have been cancelled due to low interest, they may no longer be available in your area. For more information refer to the NZQA Best Practice Workshops page:

http://www.nzqa.govt.nz/about-us/events/best-practice-workshops/

Teachers of Agriculture and Horticulture, Biology, Chemistry, Physics, Earth and Space Science alert

SCICON 2014 – Wild Science

This year SCICON is in Dunedin in July and registration is now open.

This national conference for all Science educators is the best way to keep informed of current trends in Science, as well as in the teaching and learning of Science. A range of national and international speakers will share keynotes on current science issues.

Workshop streams are offered for all Science learning contexts, plus a separate Earth and Space Science day on Thursday 10th July. Share your great ideas with other teachers by offering a workshop or seminar session.

Join the great group of teachers attending this experience in Dunedin from July 6th to 10th at Otago Boys' High School.

Register now at:
http://wired.ivvy.com/event/AKB002/

Literacy in Science

Ideas on approaches to use in science can be found on Literacy Online on TKI:

http://literacyonline.tki.org.nz/Literacy-Online/Secondary-Literacy/Teacher-needs/Literacy-in-the-learning-areas2/Literacy-in-Science/Teaching-Inquiry-Planning-to-meet-student-needs

A sample unit plan for Material World can also be found at:

http://esolonline.tki.org.nz/ESOL-Online/Teacher-needs/Teaching-and-learning-sequences/Units/Secondary-mainstream

Reminder

Register now for NZQA's Best Practice and Connecting with Contexts workshops available at:

http://www.nzqa.govt.nz/about-us/events/best-practice-workshops/

Secondary Student Achievement - Science national workshops

Progressing Junior Science: Exploring Nature of Science; Science Capabilities; Literacy in Science; Scientific Literacy.

These national workshops were held in term 1**.** The national workshops focused on developing Junior Science programmes to engage students to lead to improved success for all.

The introduction to the new resources available on Science Online and discussion on ways to use these effectively led to sharing of Apps suitable for use with students in Years 7 to 10.

For those who attended these workshops, remember to activate your invitation to the Nature of Science VLN group so you can share resources with the National Coordinators and with others.