

These national newsletters are produced by the Secondary Student Achievement national facilitation team, as part of supplementary PLD support for schools, from 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 3 2015

Tēnā koe, Greetings to you all, Kia orana, Fakaalofa lahi atu, Mālō e lelei, Talofa lava, Talofa ni. Welcome to the Sciences newsletter for term 3, 2015.

In this issue:

- Effective pedagogy: providing sufficient opportunities to learn.
- Teaching and learning for research.
- Innovative stories from schools with Science Capabilities and Level 1.
- Resources.
- Subject specific alerts.

Effective teaching and learning provides sufficient opportunities to learn

This aspect of effective pedagogy is underpinned by the principles of high expectations and learning to learn, while also providing opportunities for students to develop key competencies of thinking and using language, symbols and texts.

Engaging with new learning in different ways builds student confidence

Students learn best when they are given opportunities to encounter, explore and engage with new concepts and learning in a number of different ways. This includes giving students time to discuss, share, read and write using new vocabulary, concepts and ideas.

How might I do this?

Students produce either a visual/aural/written evidence-based conclusion as a group, to their learning about a local issue that could include individuals promoting a personal response if justified.

Using effective learning processes – doing less but deeper

Students learn most effectively when they have time and opportunity to engage with, practice, and transfer new learning. Encountering new learning a number of times and in a variety of different tasks or contexts will help students learn effectively. Although this may lead to the teacher covering less content, students will learn the concepts covered to a greater depth. This approach will provide students with greater opportunities to assess their own learning and provide feedback to each other on their learning.

How do might I do this?

Students need to explore new vocabulary in a topic, learn meanings, use the vocabulary in sharing ideas and talking through their new learning; write sentences using the new terms; use the terms and draw links between ideas using the vocabulary.

What this might look like?

Use a learning context relating to the local area where students consider possible changes in use of land currently under primary production. Students would explore the socio-scientific issues in promoting the building of a wind farm in the area. Opportunities would be provided for expert groups to:

- Read about social and scientific issues of wind farms.
- Talk to energy consultants about the issues of wind farms.

Discuss ideas on both sides of the issues relating to establishment of wind farms.

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“Exploratory Talk”

For more detail on “Exploratory Talk” go to:
http://www.corwin.com/upm-data/23512_01_Mercer_Ch_01.pdf
and
<http://www.slideshare.net/margarubiosoto/exploratory-talk-in-professor-neil-mercer>

Providing sufficient opportunities to learn

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In introducing a new topic students should use a summary text to identify terms (vocabulary) they know that others might not, and terms they don't know. The list is then shared and in groups possible meanings are discussed, glossary developed.

Consider using some of the following approaches to provide students with a range of opportunities to build both understanding of concepts and engage with the scientific language and ways of writing for science.

- Throughout the topic, use a range of vocabulary activities including matching terms and definitions, sentence writing, domino game with term and definition.
- Model writing in science by choosing two new vocabulary terms and writing a "cause and effect" statement using them.
- Use a mind map/graphic organiser to link new terms to the key concepts of the new learning.
- Talk through responses to questions using the new vocabulary, model and scaffold students to produce their own responses to questions.
- Use the making of flash cards as a tool to learn new terms, and remember to link new vocabulary to visual context and vice versa.

Teaching and learning for research

It is important to remember that any assessments we give students are designed to measure their learning. This means students need to be taught some scientific research skills before they are assessed.

Often this principle does not seem to apply to research assessments. Teachers may simply set the task, find some information sources and leave their students to it.

For students to research effectively they need to have mastered a number of skills:

- They need to be taught how to find and select relevant scientific information.
- They have to learn how to recognize key words and main ideas and then use these to summarise their findings into their own words.
- Information from different sources must be collated and integrated, again something students need to be shown how to do.
- Students need to learn how to structure and present their research appropriately.
- It is important that they understand the basics of referencing, beginning with at least a reference list at NCEA Level 1, and could include footnotes/endnotes at Level 3.

Students need to be taught these skills and given opportunities to practice them before they start their summative assessment.

A research standard may be worth 3 credits, representing 30 hours of teaching learning and assessment. Students may well be able to complete the research itself in 10 hours but the other 20 hours is for the teaching and learning. It is important to give students the opportunity to develop research skills before they are assessed.

Important links and resources for science teachers

NZASE - New Zealand Association of Science Educators

NZASE is the professional body representing all science educators.

NZASE has represented science teachers' interests in their involvement in:

- Developing guidelines on Animal Ethics for use in schools.
- Reviewing the Code of Practice approaches needed to address the revised legislation.

It is important for all schools to maintain their membership of NZASE in order to keep up with changes like these. Membership includes access to the NZ Science Teacher Journal as a paper copy. To register go to <http://nzase.org.nz/membership/>

Useful links and resources

Literacy and Numeracy page on NZQA site

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

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/>

Junior Science with a Nature of Science focus: Using a science capability lens of 'Interpreting Representations' to teach a medical science unit

In a Christchurch school the Year 10 Medical Science (Body Systems) unit this year has been taught through the science capabilities lens of Interpreting Representations.

First the students looked at different models of the heart to learn about the circulatory system. These included a large model that, when connected to power, showed the heart contracting and relaxing as well as blue and red colours and lights to represent the flow of oxygenated and deoxygenated blood. Other models were 2D diagrams from books and a sheep's heart which the students dissected.

The assessment, which included photographs of three different models of the heart, took the form of explaining what each model showed well and what it failed to show, followed by an explanation of which model the students found 'best'. The students were then asked to list all the things they had learnt during this unit of work. From these lists, student conversations, and the many interesting questions students asked, the teacher found that all her students had a far greater knowledge of the circulatory system than in previous years where she had taught from a knowledge content focus. As well, the students were much more engaged in the lessons.

A similar process was followed for studying the skeletal system. The teacher commented that because the students had already looked at models of the circulatory system, they grasped the models of the skeletal system very quickly. A full skeleton was present at the front of the laboratory throughout the unit. Questions asked of the students during a visit from the science facilitator confirmed what the teacher had related about student understanding of models and body systems. Students were applying their understanding in making their models of the skeletal system in this lesson.

School stories: Level 1 teaching and learning

- School 1 is planning to follow up the teaching and learning relating to metals with an assessment which will involve students actually making a metal box and a piece of jewellery. This sounds like a great context, as it will involve choosing metals for their physical and chemical properties, including a coloured glaze made from a metal compound.
- School 2 found the local issue of fracking a good socio-scientific issue to grapple with. It engaged the students and was a good vehicle for exploring chemistry and geology.
- School 3 had good success with a similar practical activity for the Level 1 heat internal standard. They provided students with cardboard boxes and some materials (carpet, acetate, polystyrene, foil) and got them to insulate their 'house'. They then measured the heat loss from a conical flask of heated water (hole for thermometer in the roof), compared it to a control and wrote it up, with photos. The students' engagement increased hugely; they enjoyed making their model houses and could see the practical application of their learning.

New science resources you can access online

- In response to a request, a google drive folder for senior chemistry resources has been set up by Team Solutions science facilitators. Several teachers have shared items which can be accessed from <https://drive.google.com/open?id=0B1eJy6TjOKRLfmlwMXNuY2lLdy1kWTMwRzA3WTFab1luamhBU3pHeEdYNDBYRONmNGZ4NW8>
For further information contact Ian McHale. (Email address on page 1.)
- Reciprocal teaching of reading is being promoted in several science departments. A video has been added to Mediasite outlining reciprocal teaching using a PowerPoint from Jenny Macdonald and Carina Britts. It can be viewed at <http://tinyurl.com/ReciprocalTeachingScience>
- To support the building of NoS understanding, an audit tool using the Level 4/5 achievement objectives has been made into a mediasite video discussing its use at <http://tinyurl.com/I-Love-Tui-songs>

Links and resources for science teachers

ANZCCART

The Australian and New Zealand Council for the Care of Animals in Research and Teaching Ltd (ANZCCART) was established in 1987 in response to particular concerns in both the wider and scientific communities about the use of animals in research and teaching.

Their main role is to provide leadership in developing community consensus on ethical, social and scientific issues relating to the use and wellbeing of animals in research and teaching.

ANZCCART has had assessment resources written and QAAM'd (a process where NZQA is paid to pre-moderate the assessment). There are assessment tasks for Biology 1.2, 2.2 (1 task each), 3.2 (2 tasks) due to be available by the end of week 8 in term 3.

Useful links and resources

COSMOS magazine

COSMOS magazine is providing lessons with an e-learning focus that could be a useful source of ideas and approaches for teaching effectively for those at BYOD schools.

The resources will need some amending but they provide a good starting point.

Find out more at

<https://cosmosmagazine.com/schools>

Subject specific alerts

All relevant documents for NCEA can now be accessed from the NZQA subject pages, accessed from <http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/subjects/>

A new process has been established for online links (URLs) to digital materials to be shared with NZQA for online moderation, in order to better meet the needs of assessors. More details can be found in [Assessment Matters circular A2015/002](#).

The version numbers of current NZQA approved assessment resources, but not the resources themselves, have been updated by the Ministry of Education.

- Level 1 TKI assessment resources are now version 3 in Biology, Chemistry, Science.
- Level 2 TKI assessment resources are now version 2 in Biology, Chemistry, Earth and Space Science.

Notification of all updates relevant to internally assessed standards can be received via NZQA's Facebook pages for each senior secondary school subject.

Links to these pages are on the NZQA subject pages (URL above) – just click 'Like' and alerts will appear in their Facebook News Feed when updates are posted.

Agricultural and Horticultural science

Clarifications for Level 2 standards have been updated.

Biology

Three new NZQA approved assessment resources in sports contexts are available on TKI:

- 90925 Exercise and breathing rate (Biology1_1C_feb15).
- 90926 Use of performance-enhancing drugs (Biology1_2C_feb15).
- 91154 Do sports drinks really work? (Biology2_2C_feb15).

Updated clarifications are in the process of being updated. Set up a 'Like' on NZQA Facebook page to receive notice of this.

Chemistry

Clarifications for Level 2 Chemistry standards were uploaded last term and some of these are significant.

Earth and Space Science

The NZQA Auckland Best Practice workshops scheduled for July have been postponed to November.

Level 2 and 3 exemplars and clarifications are being progressively updated throughout this year.

Physics

A Moderator newsletter will soon be uploaded. Physics teachers should take note of the comments applying to the research standards where many students are not using physics to explain their application. Investigations too have some issues – minimal calculations are dropping grades.

Clarifications for Level 2 standards have been updated.

Science

The Level 1 Science exemplars and clarifications on the NZQA Science Subject Resources pages are in the process of being updated. Set up an RSS feed on the alert page so you are made aware of them.



Science online

<http://scienceonline.tki.org.nz/New-resources-to-support-science-education>

Remember to explore the materials on the Science Capabilities and Use of Digital Learning Technologies in Science.



For a source of useful NZ scientific research material ready to use to stimulate student thinking relating to the Nature of Science and the Science Capabilities, go to: <http://www.allanwilsoncentre.ac.nz/massey/learning/departments/centre-s-research/allan-wilson-centre/our-research/resources/educational-resources.cfm>



For a source of resources on a wide range of contexts and science stories including teaching ideas, reading resources and NZ scientific research material ready to use to stimulate student thinking relating to the Nature of Science and the Science Capabilities, go to: <http://sciencelearn.org.nz/>
The Science Learning Hub also offers on line professional development opportunities.

Secondary Student Achievement professional development

This newsletter is developed by the Science National Co-ordinators of the Secondary Student Achievement professional learning and development. Secondary Student Achievement professional development is funded by the Ministry of Education and covers every learning area.