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National Newsletter: Science

Information and resources for middle leaders in secondary schools | Term 1 2013

Greetings from the secondary science team

Welcome to the first newsletter for 2013. Through this newsletter we provide a national overview of secondary science, share and discuss issues relevant to our community as they arise, and provide information and links to relevant materials and resources. In this issue we outline the UE literacy requirement, outline new workshops on offer for science leaders, HoDs and TiCs, provide some insight into using formative assessment in senior sciences, and take a closer look at issues with science textbooks. We look forward to ongoing contact with our science communities.

Kind regards
Mike and Kate

National workshop for sciences - addressing the needs of disengaged science learners

Many schools offer alternative Level 1 and 2 science programmes that incorporate few Achievement Standard assessment opportunities. These workshops will explore ways curriculum leaders can develop teaching and learning programmes that focus on building literacy and science capability that can enhance student achievement in Year 11 and 12. Included will be sessions on course design, and incorporating learning that provides assessment opportunities using Achievement Standards appropriate for priority learner groups of Maori, Pasifika and students with special learning needs. An additional consideration will be the planning of pathways in science for all learners.

These national workshops are intended for science middle leaders who have a role to play in developing and supporting science teaching and learning programmes, in order to raise student achievement. The workshops will be offered in these locations:

Location	Workshop Date
Northland	May 6 th
Auckland	March 19 th
Hamilton	June 14 th
Bay of Plenty	April 10 th
Gisborne	March 27 th
Napier	March 13 th
New Plymouth	March 21 st
Palmerston North	March 22 nd
Wellington	March 27 th
Christchurch	March 7 th
Dunedin	March 6 th

These workshops will be free of charge with light morning tea provided. Participants will need to provide their own lunch. More details soon but for initial inquiries please email:

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Specialist clusters for the sciences

Having problems with internals? Want to check on your moderation of student work? Get a cluster of 8-10 teachers from your science community together and we will help you.

The focus of a specialist science cluster is likely to be on Level 2 and 3 science subjects and moderation of internals. For example, it could be a group of chemistry or biology teachers who want tasks or grading of tasks checked. Facilitators can support the setting up of a cluster, and provide a session within the cluster meeting on topics such as 'Teaching approaches to improve student written responses' or 'Assessment strategies' or 'Writing your own assessment tasks'.

It is envisaged that these clusters will become self-managing during 2013 but some ongoing facilitator support may be possible. If you are interested in setting up a local cluster contact the Regional Facilitator for your region – in the list on page 1 of this newsletter.

Effective use of formative assessment

Pressures of meeting achievement targets set for science can lead to teachers adopting teaching practices that may only be effective for some learners. Placing emphasis on content coverage using traditional teaching often fails to engage learners in the learning process. Taking time to use a range of formative assessment approaches will enhance student achievement and support students to become lifelong learners.

Formative assessment involves a range of teaching strategies beginning with the way lessons are structured and managed. Learning outcomes are known and understood by all, and there is a classroom culture and approach to learning that values student involvement in the process through the use of quality questioning and feedback. All students will be included in setting targets for their learning based on their previous achievement that provide challenges for their learning. According to Black & Harrison, "You don't learn by taking in messages from people and just remembering them. You learn if you start from your existing understanding and then are changed and challenged, and in order to take that on, you've got to be involved. What that means in the classroom is that the teacher has to help the pupils to express themselves."

Using effective and appropriate questioning strategies can lead to huge shifts in engagement and involvement in the classroom. Some questions are better at providing assessment opportunities for teachers. Changing the way a question is phrased can make a significant difference to the thought processes pupils need to go through and the language demands made on pupils. Effective questions allow students to reveal their understanding, and fewer questions may be needed to assess their current understanding. For example, a teacher wanting to find out if students know the different types of energy asks, "What is the term used to describe elastic and chemical energy?" This leads to student responses of "I think it's energy" or "I don't know". The question has not allowed the teacher to effectively assess if the students know the energy types. Changing the question to, "Why is the word 'potential' used to describe energy types such as elastic and chemical energy?" does several things. First the vocabulary is provided, and then it requires students to clarify why the word is used and how it relates to the types of energy.

Reframing questions in this way can help both students and teachers, but will sit alongside classroom management practices of "no hands up" and "allowing 3 seconds wait time" and "talking partners" which place the expectation on all students to reflect on their understanding. This sits alongside a supportive learning environment culture where all students are learners and their contributions valued.

Read more on Questioning in Shirley Clarke's (2005) book *Formative Assessment in the Secondary Classroom*; Hodder Education.

Useful links and resources

Secondary Science Online

Access the Teaching and Learning Guide for Level 6 – 8 Sciences:

<http://seniorsecondary.tki.org.nz/science>

The guide provides useful information for teachers on ways to address the achievement objectives of New Zealand Curriculum, especially Nature of Science.

Secondary Middle Leaders

<http://nzcurriculum.tki.org.nz/Secondary-middle-leaders/Professional-learning-and-development>

This site provides a range of information, tools, and resources to support secondary middle leaders as they lead change in relation to *The New Zealand Curriculum* and [Ministry of Education priorities](#).

NCEA on TKI



<http://ncea.tki.org.nz/>

Resources to support internal and external assessment.

Improving outcomes for Māori students through partnerships

A resource that supports principals and other school leaders to improve outcomes for Māori students by working in educationally powerful partnership with whānau.

<http://partnerships.ruia.educationalleaders.govt.nz/>

The kaupapa of the website makes it essential that school leaders and whānau use it together in a collaborative process underpinned by the principle of ako – shared, reciprocal learning in which each person contributes as both teacher and learner.

This process will look different across schools.

Are science textbooks difficult to read?

Vocabulary knowledge and textbooks

Coxhead, Stevens & Tinkle (2010) conducted a study on the vocabulary in science textbooks (Pathways series) for year 9-12 students. They found students were challenged by the increasing complexity in reading from junior to senior. One of the reasons why the textbooks might be difficult to read they found is the quantity of unknown words. The gaps in vocabulary knowledge do increase as students progress through their high school years and it is acknowledged that the knowledge of words is not enough to ensure that they can read their textbooks better. Nation (2006) indicated that 8000 to 9000 words are needed in your vocabulary to read a novel, and even 7000 words for watching the movie *Shrek*. But how many are needed to read science textbooks? Coxhead et al. (2010) identified that Year 9 or 10 students needed 11,000 words and Year 11 students 15,000 words to cope with commonly used science texts.

The study referred to above builds on Nation's research into how much vocabulary is needed to read science textbooks. Words like: *electric, ray, temperature, solid, liquid, solve, false, reflect, angle* and *plate* occur frequently for students but can also be problematic if they do not consider what they mean in the science context.

Creating word lists that help identify the words that pose a challenge for students will assist, but students need practice in reading text with a focus on science vocabulary. They also need practice at –

- listening to the words spoken;
- knowing how to spell the word;
- learning then how to use it grammatically.

This approach will develop students' fluency in reading science text.

Literacyonline is one source of ideas for building vocabulary knowledge and also other websites such as the Digital Toolbox for vocabulary activities to help build students' strategies ('in the head') to enable them to work independently.

Reference

Coxhead, A., Stevens, L., & Tinkle, J. (2010): Why Might Secondary Science Textbooks Be Difficult to Read? Victoria University of Wellington, in *New Zealand Studies in Applied Linguistics*, 16 (2) 37-52.

(Thanks to Mal Thompson, National Literacy Coordinator, for this article.)

University Entrance literacy requirement

From 2014, new requirements apply for University Entrance. Students must meet a new literacy requirement to enter university-level programmes from 2015. (See SecQual 2012/026 for further details). Students must now achieve 10 credits in literacy instead of 8, and these credits can be gained through identified Achievement Standards from across the curriculum. The literacy requirement for the new University Entrance from 2014 is 10 credits at NCEA Level 2 or above, made up of 5 credits in reading and 5 credits in writing.

This link is to the identified standards lists of the NCEA Level 2 and 3 Achievement Standards that can contribute to the new University Entrance literacy requirements. Note that the change occurs from 2014. Students in Year 13 this year, or those intending to enter university in 2014, are not affected by the changes – they need to meet the current requirements. Universities will accept University Entrance once awarded, regardless of the year that students begin tertiary study. This applies to students who gain University Entrance in 2013 (meeting all requirements) and do not immediately proceed to tertiary study in 2014. Students who are in Year 12 this year (who intend to enter university in 2015) will work towards meeting the new requirement of 10 literacy credits.

Useful links and resources

Vocabulary Links

For resources related to vocabulary instruction:

<http://literacyonline.tki.org.nz/Literacy-Online/Teacher-needs/Reviewed-resources/Reading/Vocabulary>

<http://digitaltoolbox.wikispaces.com/Literacy+in+Science>

National newsletters

National newsletters such as this one are developed for every learning area by national co-ordinators from The University of Auckland and Te Tapuae o Rehua consortium (University of Canterbury, University of Otago and Te Rūnanga o Ngāi Tahu).

To download the latest newsletter, or for more information about Ministry-funded professional development for secondary middle leaders, visit this page on TKI:

<http://nzcurriculum.tki.org.nz/Secondary-middle-leaders/Professional-learning-and-development>

University Entrance Literacy Requirements

See details regarding changes: [SecQual 2012/026](#)

[List of standards](#) contributing towards UE Literacy requirements.