



## Mātauranga Māori and secondary science teaching: 2022

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### ABSTRACT

*This reflection piece is written for secondary science teachers in Aotearoa New Zealand who, for the first time, are being obliged to consider the inclusion of Māori words and concepts in the NCEA achievement standards they use to assess their students. My aim is to unpack the issues implicit in the current trends to incorporate Māori knowledge in the secondary science curriculum, in order to help science teachers see the new standards in a more balanced and optimistic way.*

**Keywords:** Māori medium, Māori science curriculum, Mātauranga Māori, NCEA, secondary science

### INTRODUCTION

I am interested in the current moves to bring Māori knowledge into the secondary science curriculum through NCEA assessment (Stewart & Tedoldi, 2021). The original matrix on which I commented in that 2021 paper has been updated and the Māori words have been removed from the titles, re-inserted as mandatory explanatory notes in each standard. To make a disclaimer, I have had no involvement in planning, writing or trialling any of the materials on which I will comment below. This paper is not suitable for beginner readers of Māori-Pākehā relationships, including at the levels of people, language, culture, education, knowledge and philosophy. The commentary assumes the reader has a grasp on the history of the Treaty of Waitangi (Consedine & Consedine, 2012; Orange, 1987), the theory and practice of culturally responsive teaching and the policies of *Ka Hikitia* and *Tātaiako*. My purpose is to help science teachers better understand the issues implicit in the current trends to incorporate Māori concepts, as these pertain to the science curriculum, and to encourage them to see the new proposals with optimism and hope.

I started teaching secondary science through the medium of te reo Māori in 1993, on my appointment as the inaugural teacher of Pūtaiao and Pāngarau at Te Wharekura o Hoani Waititi Marae, Oratia, Waitakere City. One of the first secondary Kura Kaupapa Māori, Hoani Waititi is the former school of many of

today's leading lights in the flourishing of Māori kaupapa across the arts, media, education, and research. I undertook doctoral studies of Māori science curriculum (Stewart, 2007), and have researched and written about these questions ever since (Stewart, 2017), as synthesised in my recent handbook chapter (Stewart, 2020).

The following five sections unpack the question of including Mātauranga Māori in NCEA Science achievement standards under these headings:

1. Education policy context and the 'mana ōrite' principle
2. A reductive binary: Asking "Is Mātauranga Māori a form of science, or not?"
3. Teacher responses
4. Content and context in NCEA achievement standards
5. The gift of difference: Knowledge systems and knowing more about science.

## **EDUCATION POLICY CONTEXT AND THE 'MANA ŌRITE' PRINCIPLE**

State education in Aotearoa New Zealand has followed an overall direction of 'bicultural education policy' for over 30 years, as part of a professed commitment to overcoming entrenched Māori inequity (Lourie, 2016). These policies have included expectations that teachers incorporate Māori language and knowledge in the classroom curriculum. Responses from teachers vary by level and subject, but the approaches fall into a few categories:

- Māori models: Māori art and artists in Art, Māori writers and literature in English, etc
- Māori perspectives and topics in subjects such as History and Social Studies
- Māori contexts for Mathematics word problems
- Māori language in all of the above and in classroom management.

Research led by Elizabeth McKinley in the mid-2000s showed that secondary science teachers believed in a 'culture blind' attitude, as expressed in remarks like "I treat all my students the same" and expressed disbelief at the idea that Māori knowledge has any place in the senior secondary science curriculum (McKinley, 2008; McKinley et al., 2004). A science department would typically have a file box containing worksheets and information for teaching a few 'Māori science' topics, which were accessed and used by all the teachers in their junior secondary classes. Interviews with teachers around the country showed that a few standard emblematic topics were being used: navigation by the stars as an introduction to astronomy, hangi stones as an introduction to heat, harakeke as an introduction to ecology, whakapapa as an introduction to genetics.

Subject Science has been largely immune from expectations in recent decades that secondary teachers should modify their classroom curriculum and pedagogy to include Māori in any more than the above tokenistic ways. The government's 2017-2018 national consultation on the future of education, namely the Education Conversation | Kōrero Mātauranga, led to a number of high-level

principles being adopted to inform the various reviews that followed, including the NCEA review. One of them is the ‘mana ōrite’ principle: that Māori as well as European forms of knowledge should be included in classrooms and centres. I read this principle as calling for an end to the unthinking dismissal of Māori knowledge that happens in all subjects, none more so than in Science. This makes more sense, as pursued below, than ideas of equal curriculum content or classroom time devoted to Māori knowledge. Such ideas are being aired, however, in the current state of confusion and concern that marks the development of the new NCEA Science qualifications.

### **A REDUCTIVE BINARY: ASKING “IS MĀTAURANGA MĀORI A FORM OF SCIENCE, OR NOT?”**

This question is problematic because it reduces the complex relationship between science and Māori knowledge to a binary, yes-no question that is unhelpful and simply adds to the confusion. The best answer to this reductive yes-no question is “it depends” on the definitions in use for both Mātauranga Māori and science. Neither of these knowledge terms admits of a simple, succinct, universally-agreed definition. Mātauranga Māori refers to every form of Māori knowledge covering all curriculum subjects. Māori knowledge is holistic, whereas science is highly codified, defining itself by its boundaries with other forms of knowledge including Indigenous Knowledge. The relationship between science and Mātauranga Māori is thus defined by the power and politics of knowledge. In previous work I have listed (equally persuasive) arguments for and against the proposition that Mātauranga Māori is a form of science (Stewart, 2019)

The use of the single word ‘science’ is misleading, concealing more than it reveals, given the vast terrain it covers, and the implicit assumptions that accompany its use as a subject name in the curriculum. Science in the world is a vast system of knowledge institutions and projects, the most materially powerful and destructive knowledge system of humanity. Science research powers the steady advance of this awesome machine, fed by university science education. A simple version of the university science curriculum is entrenched and internationalised in secondary schools, known as ‘school science’ and based on the three representative sciences, Biology, Chemistry and Physics (Aikenhead, 2000). School science is at the top of the school curriculum hierarchy, and a proxy for academic ability. Each of these levels benefits from the triumphalist ideology of science as a force for good (Falk, 2005). School science textbooks pay tribute to the successes of science but omit to mention its failures (Ninnes & Burnett, 2001). Science teachers rely on the ‘value-free’ myth of science to support their concerns about adulterating the science content with ‘religion’ or ‘myths and legends’—the main terms used by non-Māori for Māori knowledge.

### **TEACHER RESPONSES**

In the 2021 paper noted above, Angelo and I wrote about the responses of science teachers to the inclusion of one or two Māori words in the titles of the proposed CB L1 matrix. As we noted, secondary science teachers rely on the

scientific method to define science, but this is not as foolproof as the sector seems to believe. Contemporary philosophy of science recognises that the concept of 'a' scientific method, like many other former science concepts, must be resigned to the bin of history of science (Okasha, 2016) but this recognition does not appear to have penetrated the secondary science canon. In addition to the appeal to scientific method, three main concerns of science teachers were:

- Mātauranga Māori is not science
- We don't have time to teach it
- We don't know how to teach it.

I would respond to these concerns by agreeing that Mātauranga Māori is not science, and reassuring science teachers that they are not being obliged to be experts in Māori concepts. The two remaining sections below add more substance to these reassurances by drawing a distinction between content and context in the NCEA standards, and looking at the topic through a knowledge systems lens.

## **CONTENT AND CONTEXT IN NCEA ACHIEVEMENT STANDARDS**

One aim of the NCEA review was to counter the atomisation of knowledge that was inherent in the first generation of NCEA, designed 1999-2001 and implemented (systems built) 2002-2004. This aim is expressed in the principle of the review of having fewer, larger standards. Māori concepts are known for being holistic, so it seems reasonable to use relevant Māori concepts to help in the 'clumping' or counter-atomisation process, and such moves could be seen as an invitation rather than a threat. To combine chemistry and biology in the L1 CB matrix seems incongruous at first, but makes sense on reflection, as a radical but credible framework that facilitates a particular focus on biochemical aspects of ecology (Stewart & Tedoldi, 2021).

## **THE GIFT OF DIFFERENCE: KNOWLEDGE SYSTEMS AND LEARNING ABOUT THE KNOWLEDGE SYSTEM OF SCIENCE**

Māori knowledge is fundamentally different from science in its philosophy and fundamental concepts. Mātauranga Māori provokes science, and can act as a mirror for science to see itself more clearly, reflected in a philosophically different form of knowledge. The different strands of Māori science education are typically collapsed into one, but for adequate analysis must be kept distinct. When we think about Māori in science education, we may be thinking of Māori people, language, culture, or knowledge. Māori equity in science in terms of student outcomes seems to have been extended to knowledge in terms of the mana ōrite principle, but the differences as well as the overlaps between these issues must be respected.

Since 2006, Aotearoa New Zealand has had a national school curriculum comprising two parallel curriculum statements, one in English (NZC) and one in Māori (TMOA). Early attempts to put science education in Māori contexts gave

way to a translation approach that involved the creation of a pressure-cooked lexicon of science words in te reo, many coined and others adapted (Harlow, 2003; McKinley, 1996; Stewart, 2010). The outcomes of the translation approach have been modest, and arguably limited on principle (Stewart, 2011). The vast majority of Māori secondary students learning science are in English medium schools, and there is very little teaching using that lexicon as a classroom language in Māori medium schools.

Given that most Māori students attend mainstream secondary schools, and based on the principle that even very small changes in classroom curriculum can have large effects for Māori students, the approach being taken in the proposed CB matrix has far more potential to make a significant difference for Māori than the translation approach. To include carefully selected Māori concepts in the standards also invites science teachers to think through a 'knowledge systems' lens, and reflect on science as a knowledge system, with its share of successes and failures, according to its own criteria.

## CONCLUSION

School science teaching is a prime example of a real-world scenario in which the debate between science and Mātauranga Māori is of central importance. Subject Science is the worst-case scenario of Māori inequity in educational outcomes—a severe, entrenched disparity, sensitive to overall ethnic socioeconomic imbalance, which is skyrocketing as late capitalism delivers more and more of the public estate into the hands of private rich-listers, and continues to erode the number and conditions of available manual and low-skilled jobs.

The objection from scientists and science teachers that the introduction of Māori concepts into NCEA science is ideological can be answered by pointing out that *every* decision in education is ideological, including all aspects of how science is represented in school science curriculum. The single word 'science' is taken as a guarantee of 'facts' not 'values' and intellect, not emotion, but such binaries are easily revealed as full of holes and prejudice (Proctor, 1991; Putnam, 2004). The introduction of Māori concepts into NCEA Science is brave policy setting—holding great promise to those teachers who are looking for a way to embrace Māori knowledge, but also a measure of jeopardy in the form of possible anti-Māori backlash and desertion of NCEA Science. The ground is shifting quickly, hence the need to append the year to my title. A case of watch this space, if ever there was one.

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