

Indigenous knowledge in the Australian national curriculum for science

From conjecture to classroom practice

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Abstract

In most countries of the world, a culturally-specific (Western) form of science has masqueraded as universal, true and irrefutable. With the introduction of the first national Australian curriculum, Western science and its epistemological base have been challenged by formal expectations that Australian Aboriginal and Torres Strait Islander knowledges be included in formal school science programs. This paper draws upon two studies that have addressed the preparedness of the educational community to take up the challenges and opportunities this development offers. The first study drew on the reactions of heads of science departments in secondary schools and the second looked at ways in which a group of educators are working to meet the expectation.

Keywords: science, Australian National Curriculum, indigenous perspectives

Our context

The Australian National Curriculum

Recently, broad Australian community and government attitudes have coalesced in favor of a move to develop and mandate a national curriculum for schools. Increased mobility of the Australian population across State and Territory borders, perceived economic efficiencies, and a belief that centralization of curriculum will lead to greater nationwide accountability and achievement are all contributing reasons for the decision of Federal, State and Territory Ministers to agree to establish a national curriculum through the *Melbourne Declaration on Educational Goals for Young Australians* (December 5th, 2008).

The draft version of the Australian National Science Curriculum (Australian Curriculum Assessment and Reporting Authority (ACARA) March, 2010) was released for public comment and the mandated curriculum made available for implementation in schools in 2011. One feature of the national curriculum is the expectation that three cross-curricular perspectives will be “represented in learning areas in ways appropriate” (National Curriculum Board, 2009, p 12) to each content area. One of these is the *Aboriginal and Torres Strait Islander Histories and Cultures Priority* which aims to deepen students’ knowledge of Australia through engaging with Indigenous cultures (ACARA 2011).

Our concern

Jointly and individually, we have engaged in research and other activist work with an aim to advance the cause of practical reconciliation between Australian Aboriginal and Torres Strait Islander peoples and non-indigenous Australian populations. For this paper, we draw from two

of those projects - Renee's doctoral work (Baynes, in progress) and Jon's "Reactions" project (Austin & Hickey, 2011)— that appear to us to expose both the challenges confronting any genuine intent to bring Australian indigenous perspectives into the school science curriculum and the vigor with which committed teachers face those challenges. The "Reactions" project looked to capture the range of initial responses to the suggestion in the draft Australian Science curriculum that Aboriginal and Torres Strait Islander knowledges and perspectives be incorporated as content. Participant groups included university-based science teacher educators, heads of secondary school science departments, secondary specialist science teachers and general primary school classroom teachers. Renee's doctoral project charts the curriculum development processes and activities engaged in by a group of teachers as they work to bring the mandated Australian indigenous perspectives cross-curricular priority into their school and classroom science programs.

For the purposes of this paper, we have extracted from these two projects. Part One allows us to explore both the initial reactions from Heads of Science Departments (HODS) in secondary schools to the prospect of a mandated Australian indigenous component in the science curriculum. The second part presents the motivations and responses of the teachers in Renee's project to both the opportunities present and the challenges or obstacles placed before them by the HODS. This work draws on a small section of a larger more complex data set from the doctoral project.

Part 1: HOD reactions

In summary and in order of frequency and intensity of response in the Reactions project, the four most reported categories from HODS about the prospect of having to include Aboriginal and Torres Strait Islander knowledges and perspectives into the science programs they were responsible for were:

1. *Is this really science?* Four of the five HODs interviewed based their concerns about the possible incorporation of indigenous knowledge on their view of what constituted “science”. Views ranged from a grudging acknowledgement of similarities to “real” or “proper”(= Western) science, through a reformulation of what indigenous knowledge equates to (“*I may as well teach creation science*”) to derisory perspectives (“*look, this isn’t science, they are really just stories*”). The thrust of these concerns reinforced a discourse of primitivism and epistemological chauvinism (which in many ways, curiously, betrays the purported strength of positivist, “Kuhnian and Popperian science” as being always open to disruption, change, validation and the always tentative acceptance of new “truths”). Additionally, the professional socialization process has led most HODs to be prejudiced against anything other than “hard science”: “*Science teachers tend to be people who look at things very logically. There has to be a reason, it has to be quantitative...they don’t look at things which are not scientific literacies or scientific models of thinking*”. And, of course, this particular view of science is culturally transcendent: “*science is one of those languages which is universal. I suppose the way in which we operate is quite universal*”

2. *We don’t have the knowledge base or the professional development available to get it :* This was a common concern, and provided a range of justifications for a reluctance to commence curriculum development in this area. Some saw it as a failing that should and could be rectified: “*That doesn’t mean that I don’t believe that knowledge base is out there in their culture. It’s just*

that I don't know it" ; "I've come through an exclusively white Anglo-Saxon western world education". Others identified a more ingrained problem of the reliance of teachers generally – and non-science specialists teaching science in particular – on textbooks for content: "High schools quite often are still very much text book driven too... So people who are teaching in the middle phases or science are more reliant on a base resource" ; "You might be lucky, you might get a little bit on Aboriginal stuff in there. So there's very little in the text at the moment". One participant articulated what was possibly silently implicit in the concerns of a number of others: "In fact, where is there an embodiment of this knowledge? It is certainly not that I consider myself poorly read or anything like that, but it's not even in things such as The Australian Science Teachers Journal and so on. So how on earth do you actually get the information, if it's not in some of the biggest journals and so on available for Science teachers?"

There will be too much teacher apathy or outright resistance: That teachers would be unlikely to embrace the expectation of incorporating this new content was conceded by all participants ("people are going to say 'well I'm not teaching that' ") , and the underlying reasons for such resistance to curriculum change fell into two clear categories: one was that the imagined content would probably find better fit with other curriculum areas: "...might be better located in SOSE, Geography, art...in English that these are stories".

The second, and more frequently cited reason for teacher resistance, was the suspicion that in this instance, the curriculum was being used to effect base political purposes: *"I think aside from the actual direct relevance, there's probably a degree of scepticism as to why it's happening, not rather than thinking, oh jeez we really could look at what the contribution is there and just look at it objectively for what it is. I think that's probably the difficult parts to get past".* More directly:

“Is it a scientific aim, or is it a societal aim? The point there is, it seems to me as though again with Science, one it has been feminised, two it has been [dumbed] down by lacking the mathematical rigour and three now, if we are actually trying to involve ourselves in social Darwinism, then I think we're losing the whole purpose for us to exist, which is to evaluate issues on a scientific basis. Hence, I'm sorry but I look at that and I'm incredibly skeptical and cynical about it”

As a social aim, potentially very beneficial: Despite the seemingly insurmountable objections - the “yes, buts” - all but one of the participants conceded clear benefits were likely to accrue from the introduction of this content into the science curriculum: *“there is absolutely no doubt that Koori and Murri populations have absolutely fantastic observational skills built up over 50,000 years on this continent. So they know this continent far better than we westerners do”*; *“I think it would integrate society much better”*; *“I think it will be more unity between the Aboriginal tradition and us... we'll see the other side of the fence.”* and *“I'm sure they can teach us an awful lot”*.

Typically, such benefit was trowelled with a layer of paternalism: *“the idea that Aboriginal and Torres Strait Islander people operated very successfully and had very good practice and used a lot of scientific concepts, I think if you could get that understanding quite commonly known then I think maybe our ability to get those sorts of people employed and those types of people working with our broader groups on land care issues and farming practices, might be a little bit more seamless”*.

At times, the HODs saw such benefits flowing almost exclusively towards Aboriginal and Torres Strait Islander students: *“I think if Aboriginal kids can see that this is not totally*

removed from - well science isn't totally removed from their life and you're getting that unity and they're more able to take on some of the things they need to take from us”.-. That is, this initiative was seen as a way to draw otherwise reluctant learners into more positive engagements with “challenging” parts of the school curriculum.

Part 2: Teacher responses

If the “calls” or the “yes, buts” led to a pessimistic view of the likely success of this curriculum innovation, then the “responses” from teachers in this imagined conversation should proffer glimmers of hope. Teachers in the “Implementation” project worked individually in their classrooms and schools to make Indigenous knowledges and perspectives part of their teaching praxis. Their shared conversations about their individual work strengthened their resolve to continue in understanding the successes and impacts of their work. The data following is drawn mainly from two (of the eight) participants in the “Implementation” project who rose to the challenges outlined above and struggled against institutional pressures to hold firm to their beliefs that embracing indigenous perspectives offered students “*valuable, useful and worthwhile*” learning experiences.

Is this really science? In contrast to the HODs, the participants who implemented their ideas in the classroom did not see as much conflict or tension between western science and indigenous ways of knowing. They spoke of everybody owning knowledge about the world around them and suggested that “*it’s just a case of saying well, it’s all information, it’s all a way of understanding our environment, our lives and our existence here on this patch of dirt.*” Without an epistemological conflict around the nature of scientific and indigenous knowledge

these teachers were left wondering, “*I don’t understand why people just can’t add this in.*” Just adding indigenous knowledge in, however, did not equate to an ‘add-on’ approach. Teachers were also very conscious of avoiding being disrespectful to indigenous cultures and/or tokenistic in their presentation.

We don’t have the knowledge base or the professional development available to get it :

The topics of the units implemented were forces, classification and geology. Teachers quickly overcame their lack of knowledge through connecting with indigenous people available to them within their own school communities. Even in a school where there was a low indigenous enrolment, it was possible to draw in community involvement.

In considering indigenous classification, the teacher found it necessary to bring in a guest speaker who was able to guide students’ understandings of how Aboriginal people considered the world around them, challenging students to consider classification from such a base level as animate and inanimate. This was combined with student based internet research in the form of a project looking at indigenous and non-indigenous descriptions of the same animal.

Within the forces unit, the teacher found a willing participant in an Aboriginal student who happily and proudly brought in cultural artifacts, such as didgeridoos and digging sticks, and explained their use and significance. The teacher worked **with** this student and explained the forces at work so that the indigenous knowledge and scientific knowledge sat side by side. The student also visited another class where the teacher was not trained in science allowing the learning to be extended beyond one classroom only and freeing the teacher from having to rely on a textbook.

There will be too much teacher apathy or outright resistance: While the teachers involved in the “Implementation” project were conscientious supporters of indigenous knowledges in the science curriculum, they did encounter strong resistance from some of their colleagues. *“There were some barriers. For instance, I did all the planning. I gave it to all the year eight science teachers lesson by lesson. This is how you can do it. One of the science teachers just refused to teach it, even to the point where there were two questions in the exam and he just took them out of the exam. ‘It’s not in the textbook. I’m not addressing it.’”* This resistance had a deflating effect on the teacher, causing her to question the equity of education received between different classes within the same school, *“It’s not because I want power. It’s not because I want to be in the spotlight because I’ve written this. It’s because the other two classes that adhere to it just got so much productive learning out of it because the kids were relating to it.”*

As a social aim, potentially very beneficial: Participants in the “Implementation project” certainly recognized and witnessed the benefits of indigenous knowledges in science for Aboriginal students. Speaking of the student who assisted her in class, one teacher said *“For Terry himself, from that day, better interaction in class. He almost - I could see him physically sit a little bit taller, listen and be so much more interactive. For his exam on the topic he actually got a C+. He hasn’t got above a D for his exams all year. He’s not very good at exams. He did really, really well with this exam.”*

It was not however, only the impact on Aboriginal students that participants recognized. *“That was just so, so empowering for Terry but also for the other students as well because they were asking him questions. It was such an interactive lesson that - and the boys all responded so*

positively to it that I can't imagine why this whole concept is not a good idea." Aside from providing engaging learning experiences, teachers recognized the opportunity to have the different knowledge systems work together "*Aboriginal and indigenous knowledges and perspectives, that was the perfect way of promoting that this is science and that we can work together, irrespective of where we come from and what we bring to the table, to pass on knowledge and critical thinking.*" The experience of teaching indigenous knowledges and perspectives in science and the opportunity to reflect upon these experiences led participants to see the potential for promoting intercultural understanding between indigenous and non-indigenous students. "*It opens up and it makes people think, oh there's value in that and there's value in you.*"

Our conclusions and hopes

It would seem that the HODs responsible for the overall implementation of the indigenous knowledges in the science curriculum are more pessimistic and less likely to embrace change than motivated classroom teachers. Given the HODs reactions of "yes, but", innovation in the curriculum areas of indigenous perspectives will likely rest with culturally aware and epistemologically curious teachers. Where HODs are sympathetic and willing to allow teachers to explore the possibilities of indigenous perspectives in science, indigenous and non-indigenous students and teachers find the experience empowering.

In an era of high stakes testing and standardized curriculum, teachers need the agency to work in developing innovative curriculum. Current developments in schooling in Australia work

to reduce teacher curriculum innovation and control over what and how teaching takes place in their own classrooms. The mandate to include indigenous knowledges and perspectives through the national Australian Curriculum in itself, does not seem sufficient to overcome the perceived challenges seen by the HODs. Even where teachers have successfully implemented engaging, culturally aware lessons, there has been a level of resistance apparent.

Neither the “Reactions” nor the “Implementation” project engaged with Indigenous voices surrounding the appropriateness, availability and use of indigenous knowledges and perspectives. We recognize this silence, see the same gaps in the development of the Australian National Curriculum and suggest this is why data were not forthcoming through the projects on this issue. There seems to be a real danger of this mandated curriculum change becoming yet another neo-colonial project mining indigenous knowledges. Teachers in the implementation project have been left to find their own access to appropriate knowledge due to the gaps in the curriculum development process. This is a journey for White teachers that is fraught with nerves surrounding cultural sensitivities and tokenistic representations. It is a political-pedagogical challenge in the extreme.

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