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RESPONSE

## Maori and science education

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Not much goes by in education generally these days without an analysis being done on that which is being proposed and what it means for Maori students. The recent debate on constructivism in science education, involving Dr Michael Matthews, is no exception. The obligation for a Maori response emerges from Matthews' attempt to comment on Maori science education in his recent book *Challenging NZ Science Education* (1995). Smith has been lenient on Matthews in regard to some statements found in the book.

Matthews' theories and explanations dealing with cultural issues in science education are extraordinary. For example, hidden in the notes of Matthews' book (1995: 217), accompanying the section on Maori science education, is the following:

Why people feel driven to assert equality of achievement between cultures is itself interesting. It seems more sensible to say that some cultures do some things well and other cultures do other things well. European Jewry has had (but only since the mid 1800s) terrific success in fostering scientific talent, it clearly has had no success in fostering sporting talent. The Hmong people of South-East Asia have wonderful handicraft traditions but little achievement in technical areas. The medievals built gracious cathedrals, but did not master science. Some cultures have outstanding musical traditions, while other cultures barely rise above noise production.

This extraordinarily arrogant statement appears to be arguing for a cultural exclusion theory of education. Should teachers, say of music, in a multicultural classroom in Auckland, or elsewhere in New Zealand, pay no attention to some of their students because they belong to a particular cultural group? This line of argument, that we are born with deficiencies and capabilities which should affect the education we are given, has horrific implications for the education of Maori and other students. Statements, like the one quoted above, do need to be dealt with as they only serve to promulgate over-arching myths about various ethnic groups. This quote is one of the more blatant remarks regarding racial stereotyping that I have seen in print in New Zealand for many a year.

Smith, an educational sociologist and well known in Maori education circles, has put together an article that attempts to make a space for a Maori voice in this seemingly controversial debate. The act of having Maori issues legitimated in various disciplines often can be problematic for Maori, and this is especially true in science and associated areas. The exclusion of Maori concerns is often achieved by *insiders* defining their disciplines such as to locate themselves in the realm of the *universal* and, hence, do not recognise issues of any other nature. In his paper, Smith makes some constructive suggestions for the Maori crises in science education and, as a result, manages to achieve a refreshingly different perspective from the current debates.

The structure of Smith's paper is easy to follow. He first outlines what he has termed the constructivist debate. At the same time, he tries to situate aspects of Maori knowledge within the parameters of the outlined positions and then goes on to establish the Maori crises in science education, outlining the intervention strategies that have been used in the past. He then proposes ideas he argues need inclusion if Maori and science education are to move forward.

Smith's main contention in his article is that there are criticisms to be made of both constructivism and the liberal position proposed by Matthews because neither position takes account of the "structural impediments caused by wider societal forces" concerning issues of power, economics and ideology. This is not a new argument from Smith as he has written widely about structural inequality for Maori in education (Smith, 1990), as have many other Maori academics. His argument is not necessarily inconsistent with any of the positions advocated in the science education debate under discussion. His main objection is that the positions advocated on both sides of the debate do not go far enough. His concluding statements indicate that he is not against constructivism *per se*. In essence, he is arguing for a reconstructed version of constructivism in light of kaupapa Maori strategies. In other words, science education can *learn a lesson* from the successful kura kaupapa and kohanga reo interventions.

Smith's argument of pedagogies and learning theories not dealing with wider issues is one that is gathering support in other academic writings (Zevenbergen, 1994; Cobb, 1994; Klein, 1994; Delpit, 1988; Ogawa, 1995). The arguments are far from being uncontroversial. The lack of addressing issues of power, economics and ideology in educational interventions can be seen as a problem with science education research in the past and, to a large extent, still today. Research in science education has produced learning theories that are basically cognitive in construction and it has rarely looked beyond cognition, to a more holistic context, for answers. The conception of the problem is cognitive and, hence, the solutions have tended to be cognitive. Smith is arguing that until science education research extends itself beyond the cognitive, it will probably never make any substantial progress in solving issues concerning Maori students. Such a solution would require an entire re-orientation of how academia and research institutes approach their research. The success of kura kaupapa and kohanga reo initiatives do suggest there may be lessons to be learned from these.

Smith, in the course of his paper, explores the reforms and strategies that have been directed at Maori students in science education in the past - including taha Maori, bilingual and multicultural science - and advocates that they have been mostly cultural in form. What he means by this is that each attempt has never genuinely and meaningfully extended legitimacy and validity to Maori language, knowledge and culture to any extent. A quick look at these historical scenarios would suggest he has a point. The curriculum statement in Maori, *Te Tauaki Marautanga Putaiao : He Tauira* (Ministry of Education, 1994), in an attempt to give legitimacy and validity to Maori language, may shift this criticism to a new level. If we apply Smith's criteria to this document it could be argued that the new curriculum does not go far enough (McKinley, 1995).

It is difficult to argue against the main thesis of Smith's argument - the statistics of Maori involvement in science and science education, and the success of the kohanga reo and kura kaupapa movements speak for themselves. There are basic assumptions in his argument that are controversial. For example, to accept many aspects of Smith's argument one has to accept a basic premise - that all knowledge is constructed. Smith treats the notion of constructed knowledge as being unproblematic. To him knowledge construction has no boundaries, it is entirely historical and local. Many scientists and science educators find the notion of constructed knowledge extremely problematic.

The notion of constructed knowledge is not as contestable among sociologists as it is among scientists and science educators. The argument between these two positions basically reverts to a realist versus relativist argument, and various positions can be located in between. Some philosophers advocate that there is no ultimately reliable knowledge, while others argue against it. The point of this paper is to focus on the pedagogical implications of the constructivist debate for Maori students in science and not to engage deeply with epistemological or ontological issues of constructivism.

Having outlined Smith's argument, and basically agreeing with the main thrust, I want to move onto some other aspects of the paper which indicate points requiring further discussion. Although

Smith finds some aspects of constructivism that are very positive, in order to evaluate the effectiveness of it he poses the question "how do these strategies and reforms impact on Maori crises?". The question leads to a discussion whereby Smith merely scrapes the surface of science education policy and practices in New Zealand.

Many science educationalists would argue that the word constructivism is a learning theory that has implications for practice but does not prescribe it (or pedagogy). Two assumptions made are: first, that constructivism is present in (and indeed, shapes and forms) the recent curriculum document; secondly, that constructivist pedagogies are widespread and prevalent in our science education classrooms, and have been for some time. Smith seems to have accepted what Matthews has to say in his book on these two issues. Other writers have pointed out that both assumptions are highly contentious and lead on to further debates (Bell, 1995). Notions of constructivism have certainly underpinned science education research in this country for almost two decades, but Smith has little idea of its influence in practice at both the policy and classroom level.

Maori education is cross-disciplinary in that a number of issues relating to Maori and education are similar, if not exactly the same, across all disciplines. Smith's paper is a refreshingly new contribution to the debates in science education. This paper suggests very strongly that Smith (and maybe others like him) do have constructive comments to make to the science education community, and that the community should not exclude the points he has to make because he is not a scientist or science educator. Smith's points need to be picked up and debated, if only because science education (and science) has not yet been able to solve the Maori crises in it. To ignore his warnings would only estrange Maori issues further from science and science education than they are currently, and result in poorer understanding on all sides. Although much of what he has written here has been written before, what he does have to say does not remain any less critical today than when he first wrote about it- and that, to me, is the saddest thing about all this.

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