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The Ruamano Project: Raising Expectations, Realising Community Aspirations and Recognising Gifted Potential in Māori Boys

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When gifted Māori students feel they belong and find their realities reflected in the curriculum, conversations and interactions of schooling, they are more likely to engage in programmes of learning and experience greater school success. This article reports on a teacher-led project called the Ruamano Project, which investigated whether Maker and Zimmerman's (2008) Real Engagement in Active Problem Solving model (REAPS) could be adapted successfully to identify talents and benefit the student achievement and engagement of Māori boys in two rural Northland, New Zealand secondary school contexts. The project aimed to implement Treaty of Waitangi-responsive and place-based science practices by improving home–school–community relationships through the authentic engagement of whānau and iwi into the schools' planning, implementation and evaluation of a REAPS unit. As a result of this innovation, teachers' perceptions of Māori boys shifted, their teaching practices changed, more junior secondary Māori boys were identified as gifted by way of improved academic performance, and iwi and community members were engaged in co-designing the inquiry projects. Our research indicated that the local adaptation of the REAPS model was effective in engaging and promoting the success of gifted and talented Māori boys.

■ **Keywords:** Māori education, gifted boys, problem-solving, communty engagement

Māori are the Indigenous people of Aotearoa New Zealand; a people who retain a rich knowledge base and worldview that has endured for many centuries within te ao Māori (the Māori world) (Webber & Macfarlane, 2017). However, succeeding at school for many gifted Māori students, means having to suppress their own identities and act within a narrowly defined and institutionalised view of what it means to be 'gifted'. As such, for many young people going to school involves a particular and difficult type of identity work, including the complex negotiation of maintaining a positive sense of one's overarching self-perception as both 'gifted' and 'Māori'. For gifted Māori boys, this identity work can include struggling to sustain a working compromise between the meanings attributed to one's 'Māori' self, 'gendered' self and other social and institutional identities ascribed to them as 'gifted'. In this sense, many gifted Māori boys are juggling multiple identities, negotiating their school and out-of-school lives by consciously taking on different identities to match different contexts. In some school contexts, this choice is a necessary 'survival strategy ... not a lifestyle choice' (Smyth, Hattam, Cannon, Edwards, Wilson, & Wurst., 2004, p. 131).

Smyth et al. (2004) have argued at some length that school failure for many students is inextricably bound up with the process of students doing 'identity work'. Whether gifted Māori boys stay engaged at school or not depends in part on the sense they make of themselves, their community and their future, and in part on 'the adaptive strategies they use to accept, modify or resist the institutional identities made available to them' (Fraser, Davis, & Singh, 1997, p. 222). In reality, gifted Māori boys are unlikely to make the active choice to try to succeed in school if the school seems like a foreign country in which they are outsiders. This incongruity means that the choice to 'disengage' is

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easy if they are, as Smyth et al. (2004, p. 131) put it, 'living in one reality at home, in another reality with peers and then negotiating another reality at school'; academic demotivation, school dis-engagement and underachievement can be likely.

Māori Success and Performance in Educational Settings

New Zealand does not disaggregate its achievement results to report on the academic performance of gifted students. However, recent statistics demonstrate that despite improved overall academic results for Māori students, the achievement gap between Māori and non-Māori in English-medium education in New Zealand persists. In 2015, the total number of Māori students leaving secondary school with NCEA[1] level two or equivalent was 62.2%, while the top performing ethnic groups (Asian and European) had 90.6% and 83% respectively (Education Review Office, 2016). In addition, the Programme for International Student Assessment New Zealand Summary Report (May, Flockton, & Kirkham, 2015) has continued to highlight the fact that Māori students score below the average score for New Zealand, and the OECD, in all three subjects—literacy, numeracy and science[2]. Although New Zealand performs well overall on the PISA, the distribution of student performance in New Zealand shows that we have relatively low equality (equity) in learning outcomes and there is a wider gap between the top 10% and bottom 10% of our students than in most other OECD countries (Education Review Office, 2016). Furthermore, these statistics also identify Māori boys as being three times more likely to be suspended and excluded from school with 28% of Māori boys leaving school with no formal qualifications (Education Counts, 2015). It is evident that the New Zealand education system is failing many Māori students, and in particular, Māori boys. Consequently, Māori boys leave school with lower qualifications and a fewer life choices (Ministry of Education, 2007), which not only have implications for their own futures, but for the future well-being of our society as a whole.

Therefore, the success of Māori students at school is a matter of national interest and a number of recent initiatives have been implemented in New Zealand secondary schools to address the educational disparities between Māori and non-Māori. Many of these initiatives have been premised on an influential Māori education strategy called Ka Hikitia (Ministry of Education, 2009, 2013). The overall goal of the Ka Hikitia strategy is to enable Māori to enjoy and achieve educational success as Māori. The Ministry of Education (MOE) has described this as being when "Māori students have their identity, language and culture valued and included in teaching and learning in ways that support them to engage and achieve success" and when they "know their potential and feel supported to set goals and take action to enjoy success" (MOE, 2013, p. 13). The MOE further suggests that enabling Māori to succeed as Māori involves the following: (1) implementing teaching and learning approaches in schools that are engaging, effective and enjoyable for all Māori students; (2) having appropriately high expectations for all Māori students; (3) tracking and monitoring what works to support excellent Māori educational outcomes; (4) developing productive partnerships with whānau, iwi and community that are responsive and reciprocal—leading to collective action, outcomes and solutions (MOE, 2009, 2013). Yet, the Auditor General's report on Māori education (Controller and Auditor-General, 2016) stated that many schools still lack an understanding of what constitutes Māori success. This report recommended that the MOE work with schools to establish a framework for collecting cultural information (e.g., a Māori student's ties with their iwi) and other information (e.g., a Māori student's goals and aspirations) to better understand what Māori enjoying educational success as Māori means for their communities.

Additionally, Rata (2012) has reported that a school's cultural environment can enhance, or constrain, Māori identities, which in turn can increase, or decrease, psychological well-being and engagement in learning. In mainstream settings, some of school factors that influence Māori identities in either positive or negative ways are the teachers' expectations for Māori students, whether or not schools initiate Māori representation in decision-making, and whether there is a school-based marae or not (Rata, 2012). Rata's (2012) research implied that how well an institution understands and values te ao Māori (the world of Māori) is, perhaps, the most important factor determining whether Māori students will achieve success in the mainstream school setting or not. Similarly, Whitinui (2008) has long argued that kapa haka can provide a culturally responsive learning environment where students appear to participate, learn and achieve more consistently as Māori. In addition, in their report on schools' progress in promoting success for Māori students, the Education Review Office (ERO, 2010) observed that in the most effective schools:

> ... *parents and whānau were actively involved in the school and in students' learning. Whānau had a sense of connectedness and had a voice in determining the long-term direction of the school. The school ensured that ongoing opportunities for this partnership were encouraged, in order to find out and respond to the aspirations and expectations of parents and whānau* (p. 18).

Research and policy clearly indicate that schools need to be places where Māori students not only achieve academically, but where they are happy and comfortable to be themselves, where they can feel at home, valued and cherished, where they can realise their potential, where they can be supported in their learning by family and community and where they are able to be strong in their Māori identity (Averill et al., 2014). Schools which can promote

this positive cultural environment are more likely to create atmospheres where students are empowered by their experiences at school and 'develop the ability, confidence, and motivation to succeed academically' as Māori (Cummins, 1986, p. 23).

Treaty-Reponsive Practice and Place-Based Learning

In response to the arrival of European settlers to Aotearoa New Zealand, Māori signed a treaty with the British Crown (Treaty of Waitangi, 1840), based on the principles of partnership, protection and participation. There were two versions of the Treaty (both in the Māori language and English), but both promised to be the foundation for a bicultural nation. However, colonisation practices, such as illegal land acquisition and deliberate cultural oppression via state-mandated laws have created conflicts that have a continued impact on social determinants in Aotearoa New Zealand in contemporary times. The result has been 'the domination of Pākehā (European; non-Indigenous; new settlers) in political, social, and economic fields, the consequent marginalisation of the Māori people' (Bishop & Glynn, 1999, p. 50), perpetuating problems of inequity, particularly, in educational contexts. However, the NZ curriculum (2007) has stipulated that it 'acknowledges the principles of the Treaty of Waitangi, and the bicultural foundations of Aotearoa New Zealand. All students should have the opportunity to acquire knowledge of te reo Māori me ōna tikanga'. (Ministry of Education, 2007, p. 9). As such, three key principles of the treaty, partnership, participation and protection, have become critical components in regards to the development and implementation of policy and practice in New Zealand (Herbert, 2002).

The Treaty principle of *partnership* promulgates the importance of harnessing the knowledge and expertise of the diverse people who can contribute to students' learning, including families, whānau, iwi and other community members. Partnership is realised as schools collaborate with Māori and non-Māori to develop, implement and review policies, practices and procedures. By working collaboratively, schools are said to learn how to share power, control and decision-making while validating the unique position of Māori as tangata whenua (people of the land) and recognising the contribution Māori make to education.

Participation is about equality of opportunity and outcomes. The NZ curriculum argues that all students need to learn how to participate and contribute as active citizens through opportunities to explore and appreciate the rich and diverse cultures, languages and heritages that shape their identities as New Zealanders. Participation also emphasises positive Māori involvement at all levels of education.

The principle of *protection* is about actively protecting Māori knowledge, interests, values and other taonga (treasures—including language and culture). It is argued that identity, language and culture are important expressions of what it means to be a culturally located learner. A key educational policy called Ka Hikitia (Ministry of Education, 2007) emphasises that 'culture counts' and identifies that effective teachers must commit to 'knowing, respecting and valuing who students are, where they come from and building on what they bring with them' (p. 20). As part of their developing identities, the New Zealand curriculum (2007) has emphasised that all New Zealand students need to understand New Zealand's unique bicultural heritage. Consequently, all students need opportunities to learn te reo Māori and gain knowledge and experience of important Māori concepts and customs, considering them in relation to those of other cultures. Language and culture are intertwined, so this learning provides insights into te ao Māori and Māori world views. It can occur in many contexts and across the curriculum. Furthermore, all teachers are required to 'deliver a curriculum that recognises the significance of the Treaty of Waitangi while working towards increased participation and success by Māori consistent with the principles of the Treaty of Waitangi' and 'demonstrate their understanding of the implications of the Treaty of Waitangi' (Wilson, 2017, p. 29).

The Ruamano project necessarily placed the Treaty of Waitangi principles at the centre of its conceptualisation of culturally responsive practice (TRP). TRP puts students at the centre of teaching and learning, asserting that they should experience a curriculum that engages and challenges them, is forward-looking and inclusive and affirms New Zealand's unique identity. A 2011 Education Review Office (ERO) report stated that many school leaders and teachers find the Treaty of Waitangi principles challenging to implement. However, in schools where the principles of the treaty are evident:

- Māori language and culture are valued and promoted in school management and in teaching and learning.
- All students have the opportunity to learn Māori language and to understand and celebrate the place of Māori as the Indigenous people of Aotearoa New Zealand.
- There are established mutually beneficial relationships with students, parents, whānau, iwi and other community members to support Māori students' learning.

Therefore, a key component of the implementation of the REAPs model has been to consider to what extent TRP was evident in the interpretation and implementation of a place-based education (PBE) initiative like the Ruamano Project.

PBE offered an approach to teaching and learning that was relevant to the environmental, cultural and social issues associated with the two Northland, New Zealand secondary school contexts—both were in low-socioeconomic, high-Māori population towns. Smith

(2002) described how one aim of PBE is 'to ground learning in local phenomena and students' lived experience' (p. 585). Smith (2002) also stipulated that engaging students in the exploration of unique issues within their school and immediate community connects school learning with students' own lives, knowledge and experiences. As such, PBE aims to extend 'notions of pedagogy and accountability outward toward places so that pedagogy is more relevant to individuals' lives and what they consider important' (Gruenewald, 2003, p. 620). PBE engages students, teachers and schools more intimately with social, political and environmental issues associated with their local setting, which in turn encourages responsibility and accountability. In addition, Penetito (2009) has stated that at a practical level PBE sets out to answer to fundamental questions: 'What is this place?' and 'What is our relationship with it?' Penetito (2009) has further stipulated that there are four essential characteristics of PBE, as outlined in Table 1, and the overriding objective of PBE is to 'develop in learners a love of their environment, of the place where they are living, of its social history, of the biodiversity that exists there and of the way in which people have responded and continue to respond to the natural and social environments' (p. 16).

Barnhardt and Kawagley (2005) have also advocated the importance of Indigenous peoples' knowledge and perspectives of 'place' in education and environmental sustainability issues. Barnhardt and Kawagley stated that, 'the depth of Indigenous knowledge rooted in the long inhabitation of a particular place offers lessons to everyone, from educator to scientist' (p. 9). Many Indigenous peoples have maintained their commitment to sustaining their worldviews, knowledge systems, values, beliefs and practices, despite significant social and political disruptive circumstances. Similar to Gruenewald's (2003) ideas about invoking values of responsibility and accountability in PBE, Barnhardt and Kawagley (2005) advocated the importance of shared responsibility between Indigenous and non-Indigenous communities. Utilising aspects of TRP and PBE in the adaptation of REAPS for the Ruamano project presented a critical opportunity to engage meaningfully with Māori families, communities and iwi in a localised problem-solving endeavour of genuine relevance to everyone.

Real Engagement in Active Problem-Solving Model (REAPS)

The REAPS model, developed by Maker and Zimmerman (2008), is a transformative educational approach intended to meet the academic needs of gifted students. REAPS is a three-part model comprised of the following: (a) the Discovering Intellectual Strengths and Capabilities while Observing Varied Ethnic Responses (DISCOVER) model, (b) Thinking Actively in a Social Context (TASC), and (c) Problem-Based Learning (PBL). The three combined models contain pragmatic elements that complement each other, yet all models share a primary emphasis on the development of creative problem-solving ability. The main focus of the REAPS model has been to assist students in finding and solving the most complex real-world problems to create solutions that engage diverse students in meaningful learning (Maker & Zimmerman, 2008).

The REAPS model was selected for the Ruamano project because the research team believed its three-pronged approach would provide an appropriately broad and inclusive way to improve the engagement and success of gifted (and potentially gifted) Māori boys in learning. Utilising REAPS for the Ruamano project provided educators and students with ways to experience real life problem-solving in a manner that was meaningful and could be conducted in their immediate community environment.

Discovering Intellectual Strengths and Capabilities while Observing Varied Ethnic Responses (DISCOVER)

The DISCOVER model consists of two major components: (1) a problem continuum, and (2) a theoretical grounding in the prism of learning model. When using the DISCOVER model, the Northland teachers, (a) provided opportunities for students to develop their multiple abilities, (b) provided opportunities for students to solve a variety of problem types, (c) used active hands-on learning with the creative tools possessed within each of the multiple abilities, (d) integrated the culture of the students and the local community into the curriculum, and (e) planned curricula around the NZ curriculum requirements and abstract themes (Maker & Zimmerman, 2008).

Thinking Actively in a Social Context (TASC)

Using the TASC model for the development of thinking and problem-solving, students in the Ruamano project were led through a process of eight steps in which they (a) gathered and organised information about the problem––both what they already knew and what they wanted to find out, (b) clearly defined the problem they would solve, (c) generated as many ideas as possible for solving the problem, (d) evaluated the ideas and selected those that they considered the best by developing and applying clear criteria, (e) implemented their selected solution or plan (where possible), (f) evaluated the quality of this implementation, (g) communicated their solution to others, and (h) reflected on what they learned (Wallace, 2008; Wallace, Maker, Cave, & Chandler, 2004).

Problem-Based Learning (PBL)

PBL is a student-centred model in which students learn in small groups. Teachers act as facilitators, guiding students and encouraging their learning through the use of open-ended problems. Using PBL, teachers in the Ruamano project assisted their students in choosing

TABLE 1

Treaty-Responsive Practices in the Ruamano Project

The NZ curriculum (2007) envisions:	The Characteristics of placed-based learning (PBL) (Penetito, 2009, p. 7)	Treaty-responsive practice in the Ruamano Project
Partnership *'. . . young people who will work to create an Aotearoa New Zealand in which Māori and Pākehā recognise each other as full Treaty partners, and in which all cultures are valued for the contributions they bring' (p.8).* • whānau are involved in all decisions; they are consulted; they are partners • there is a balance of power: power is shared • appropriate ways of engaging and communicating with whānau are utilised	PBL connects place with self and community. Because of the lens through which placed-based curricula are viewed, these connections are pervasive. These curricula include multigenerational and multicultural dimensions as they integrate with community resources	Meetings were held with iwi prior to commencement of the REAPS training. Iwi played a key role in choosing the science focus. A powhiri (traditional welcome) was organised for the PD team and run by the community. Local iwi representatives attended the powhiri (Ngāti Whatua and Te Roroa). Māori koha (gifts of thanks) were prepared for the visiting Professors and PD team. An appropriate waiata was organised and learnt for the occasion. The whole school participated in the powhiri process. Other attendees included representatives from the schools; the Northland Regional Council, Te Ora Hou; the Department of Conservation; the Baptist, Methodist, Anglican and Lion of Judah Churches; the local Kindergarten and Kohanga Reo (Māori-medium preschool).
Participation *Increased participation and success by Māori through the advancement of Māori educational initiatives, including education in Te Reo Māori, consistent with the principles of the Treaty of Waitangi.* • whānau have access to appropriate services and support • participation is actively encouraged to enhance outcomes •cultural advice is accessed to enhance practice and facilitate outcomes	PBL is inherently experiential. In many programmes, this includes a participatory action or service learning component PBL is inherently multidiciplinary and often promotes teach teaching among educators and community resource people	Overwhelming community assistance with the local science trips with local people offering to act as drivers and to say karakia (prayers) at the testing site. The school was also offered the use of a local community hall. Community members voluntarily visited students and brought relevant artifacts to show them, including petrified wood and copies of local legends. Māori scientific perspective was included throughout the project. Northland Regional Council (NRC) and local iwi sent along representatives to do the testing with the students. The presentation was attended by local community members who marked the students' work and selected a winning presentation. Ngati Whatua was prioritised as a stakeholder group, acknowledging their importance as kaitiaki of one of the harbours. Representatives from Iwi including the Ngati Whatua Education liaison and and ex-Minstry of Primary Industries Fisheries manager were in attendance at the final presentations, as well as parents of students involved. Final materials and results were presented at the local field days and community surveys were collected from visitors from local community and parents.
Protection *Opportunities to learn te reo Māori and gain knowledge and experience of important Māori concepts and customs, considering them in relation to those of other cultures.* • the mana of the student and the whānau remains in tact • whānau preferences and practices are respected / valued • te reo Māori is valued and incorporated appropriately	PBL emerges from the particular attributes of a place. The content and precious knowledge is specific to the geography, ecology, sociology, politics and other dynamics of that place.	The unit has assisted students to engage with the local environment as kaitiaki (guardians). Acknowledgement and regeneration of traditional knowledge about Māori fishing practices. Emphasis was placed on Māori thought and traditional communication methods: waiata (songs), whakatauki (proverbs) and haka (chants). The project engaged the students in issues that were important in the local areas, introduced them to some of the people working to rectify the issues and taught them about the requirements for pursuing careers/professions related to the issue. Students were empowered in that they felt they could do something about an issue they were worried about. The Patuharakeke iwi representatives and NRC representatives were very impressed with the mature and sincere way that the students engaged in the learning and problem-solving process.

problems from their local contexts. The PBL model required using real rather than contrived problems which, because they are real, are complex and contain both multiple factors and multiple methods appropriate in searching for solutions. Using local stakeholder groups was an important component of the PBL model because the students were encouraged to consider the problem from multiple perspectives, developing realistic solutions and presenting these solutions to real audiences (Maker, Zimmerman, Gomez-Arizaga, Pease, & Burke, 2015).

The Ruamano Project

A Teacher Led Innovation Funds financed the Ruamano project and allowed the teachers in both Northland secondary schools to gain REAPS professional development and inquire into practices that addressed some of the needs of Māori boys who, fitting exactly with the Teacher Led Innovation Fund criteria, are considered a 'priority group' with particular educational needs (Ministry of Education, 2015). The inquiry project was titled 'The Ruamano Project' to acknowledge a local narrative about a taniwha (guardian, water spirit) who in the form of a mako (shark) guarded the local beaches and water ways of the mid-north area. This story was told to the teachers by an elder at the start of the project. Although this taniwha looked fierce, he was believed to have protected the local people. In New Zealand, many research reports would have us believe that Māori boys, like the shark, are problematic (Ministry of Education, 2007). However, the researchers in this study were clear that although Māori boys have long been misrepresented in educational research, we wanted to offer a different, hopeful and potential-focussed outlook. Consequently, this initiative aimed to encourage Māori boys' positive participation in science education and to draw on their inherent interests, strengths and gifted potential.

Traditional concepts and knowledge still shape the scientific thinking of most Māori today, and traditional values resonate strongly in contemporary Māori society, forming the basis for diverse Indigenous perspectives. The Māori world view has long acknowledged a natural order to the universe, a balance or equilibrium, and that when part of this system shifts, the entire system is put out of balance (Marsden, 1988). The diversity of life is embellished in this world view through the interrelationship of all living things as dependent on each other, and the Ruamano Project was designed to help gifted Māori students seek their role in maintaining a sense of natural order and responsibility to the natural world.

Methods

The Ruamano project involved the whole Year 9 group at one Northland secondary school and a group of 15 already identified gifted and talented Year 8 and 9 students from another Northland secondary school. Working alongside local iwi groups and regionally based scientific communities and organisations, the students learnt about and developed solutions to community-based problems with mentorship and support from key people within their cultural communities and then shared their work with the wider community. After consultation with the relevant communities, two topics for inquiry were chosen. Both topics of inquiry were co-designed by the school teachers and community members with gifted Māori boys in mind.

A review of the relevant research suggested that gifted Māori students must be encouraged to value their culture and see it as a meaningful and relevant part of their academic learning. Webber (2011) has argued that gifted Māori students require opportunities and encouragement to develop their talents in responsive family and school environments, which simultaneously nurture their cultural identities alongside their gifts and talents. Webber (2015) also postulated that when gifted Māori students are strong in their cultural identity and learn in contexts where their culture is valued, they are less likely to succumb to negative peer pressure and negative academic stereotypes, which undermine academic attainment and talent development. Bevan-Brown (2005) and Macfarlane and Moltzen (2005) also found that those children whose Māoritanga was utilised and developed, appeared to thrive in the educational context. The research suggests that culturally located learning activities increase self-esteem and confidence, resulting in gifted Māori students being more likely to develop their gifted potential. The overarching argument is that to engage gifted Māori learners, teaching and learning strategies need to be culturally appropriate, and the focus should be on a curriculum that is culturally meaningful and relevant.

Professional Development and Unit Development

At the end of 2015, Professors June Maker and Bob Zimmerman came to New Zealand, with experienced REAPS teacher Randy Pease, to facilitate three days of professional development workshops for 10 teachers from the two schools. They introduced teachers to the REAPS model and developed a localised REAPs unit for teachers to work through based on a topic recommended through community consultation. The teachers experienced REAPS as the students would, including taking a trip out to a local area for water testing. Following the professional development, the lead teachers developed units and associated Google sites for their school contexts. One school unit was designed with the four Year 9 mainstream science classes based around the issue of loss of seagrass in a local harbour and the effect on the Snapper populations. The second school unit was designed with a group of 20 Year 8 and 9 students who had already been identified as gifted and talented, using their school's criteria, and was based around the issue of the decrease in pipi population in another local harbour.

The project proposal included three teacher-developed inquiry questions, which were:

- How effective is REAPS in increasing engagement and achievement of Māori and Pasifika boys?
- How can gifted potential be identified in Māori and Pasifika boys engaged in PBL based through the REAPS model?
- How can evidence-based, international curriculum delivery models, like REAPS, be adapted and localised within New Zealand's cultural and educational context?

Both schools worked together, as part of their professional inquiry, in a three-step process:

1. Engaging in 5 days of professional learning and development on REAPS, delivered by Maker and her colleagues, Zimmerman and Pease, in New Zealand.
2. Planning, using the REAPS methodology, and adapting it to include the local context, community and iwi involvement, best practice policies from New Zealand, and cultural indicators of Māori giftedness and talent.
3. Implementing the REAPS unit, concluding with student presentations to the school, whānau and local community.

REAPS Project Implementation: School A

Teachers used the REAPS model to guide their Year 9 science classes through a project around the seagrass loss topic. The students were grouped randomly in groups of 3 or 4 within their class by the teachers. The students then used a Google site as well as teacher assistance to help guide them work collaboratively through the TASC process for three periods per week over one term (10 weeks). At the end of the process, each teacher picked three of the best solutions to be presented to members of the relevant stakeholder groups in a formal presentation.

REAPS Project Implementation: School B

Through community consultation, a REAPS unit was designed to examine a dramatic decline in the pipi population in the local harbour. This was an issue the local iwi (tribe) were genuinely concerned about. The iwi had secured funding to monitor and find a solution to the issue and consequently, the gifted students of School B were invited to work alongside the iwi to solve the problem. The lead teacher also set up a Google site to gather materials and help guide the students through the REAPS process. The teacher worked with the students for two periods (one hour long) each week on the project over a ten-week period. The students experienced a day out sampling pipi sizes and density in different points in the harbour with local experts. The students prepared a range of diverse solutions based on what they had learnt and shared these with members of stakeholder groups in a formal presentation setting.

Data Collection and Analysis

The Ruamano Project design was informed by culturally responsive methodology (Berryman, SooHoo, & Nevin, 2013), and consequently grounded in respectful, reciprocal relationships in which dialogue and co-construction take precedence, and socially responsible research outcomes are achieved that serve and empower otherwise underrepresented groups (Berryman et al., 2013). As such, range of data were collected to examine the effectiveness of the REAPS approach in terms of identifying and developing the engagement and achievement of potentially gifted Māori boys. The lead teachers were able to track the process of adapting and implementing REAPS in the New Zealand context while obtaining different perspectives about the implementation of REAPS. Qualitative data sets included: interviews with students, teachers, parents, whānau and community members involved in the project. Data analysis for this study focussed on one particular aspect of the Ruamano project: identifying which aspects of the planning and teaching process were treaty-responsive, place-based and effective for engaging gifted Māori boys, whānau, iwi and community.

Findings and Discussion

REAPS Potential as a Treaty-Reponsive and Place-Based Education Approach

PBE (Penetito, 2009) as a means of facilitating community-based science education programmes have resulted in improved academic results for Indigenous students where schools and teachers have worked alongside members of local Indigenous communities and other supporting community organisations (Aikenhead, 2001; Barnhardt & Kawagley, 2005; McRae, 2012). Other achievements for Indigenous students and their communities have also included improved student attendance, increased student interest in science and mathematics careers and increased Indigenous community involvement in science and mathematics education (Barnhardt, 2005). Table 1 details the range of TRPs evident in the planning, implementation and evaluation of the REAPS-informed Ruamano Project.

Teachers communicated an ethic of caring for students by creating a welcoming classroom environment and demonstrating sincere concern for their academic and social well-being. Results from the Ruamano project demonstrate that this ethic of care must be extended beyond the classroom walls—to students whānau, iwi and wider community groups. Though science teachers often feel constrained to 'cover' a wide variety of topics, it is just as important to cultivate caring relationships and practices of respect in science classrooms (Slaton & Barton, 2012). It is evident that teachers working to enact TRP nurture relationships of care and connectedness and value and legitimate multiple views of knowledge and ways of

knowing. They recognise the potential of everyone in the local community to contribute to identifying and extending what students already know, understand and can do. Treaty-responsive teachers engage the commnity in the planning and evaluation of student learning, and use a wide range of information/evidence to understand, monitor and evaluate the strengths and needs of the students. It is also evident that the teachers involved in the Ruamano project positioned themselves as learners alongside other learners and worked tirelessly to build connections between home, community and school in order to utilise a full spectrum of interactions and strategies appropriate for their students; consequently, empowering students to understand and actively work towards solving problems that have a direct impact on their lives.

REAPS Potential for Engaging Gifted Māori Boys in Scientific Inquiry

Enacting TRP in the process of implementing the REAPS model was critical to the Ruamano project's success. Central to this was the understanding that learning is not simply linked to relationships between people, but rather learning is deeply embedded in the types of relationships that exist between ourselves, our natural environment, our local communities, our learners and their whānau. The gifted Māori students expressed an appreciation of the localised nature of the projects. One of the students commented that the project was motivating because 'it's related to our community... I mean, that's our ocean'. A number of other students also articulated a deep sense of connectedness and belonging to the whakapapa (genealogy) of the local environment and working knowledge of the scientific changes the local environment has undergone.

> *We used to be able to swim and then accidentally like stand on a pipi but now when you're like swimming you can't stand on anything it's just like sand, empty shells, sand.*
>
> *There used to be quite a lot of pipis there and we used to like go and get a pipi but now less and less people are going like they haven't found like even a fish. You used to be able to get heaps of fish but now you don't get any.*
>
> *Yeah, you find more pipis when you like dive in like in Ruakaka beach down there. Yeah, because me and my papa (grandfather) were like trying to find some pipis for like lunch or something cos our cousins and stuff were coming over and then when we were diving with like snorkels and stuff and then we find like heaps.*

A treaty-responsive approach recognises that learning is not only a change inside an individual that prepares them to enter into new relationships, but rather learning is understood as the change in relationships with others that supports them to better come to understand their world and their place in it (Bruffee, 1988). Learning such as this better prepares students for their engagement with their community and other global communities. Paramount in this pedagogical approach is ensuring that students are not only learning and achieving for the future, but also that they are strong and secure in their cultural identity and deeply connected and committed to problem-solving the issues which impact their communities.

The notion of the land looking after the people and people looking after the land has long been posited as a core Māori value (McNeill, 2017; Waitangi Tribunal, 2008). The immutable and multifaceted nature of a concept called mana whenua (a reciprocal relationship between local people and the land/sea) is cast as central to constructs of Māori identity and cosmologies, as well as to the daily fabric of tikanga Māori (Māori custom law). The REAPS-informed design of the Ruamano project was effective because it penetrated the boundaries of the students' home and school lives. The students were able to bring a wealth of knowledge to the inquiry project that could be validated and incorporated into their learning. The students were able to bring their cultural and familial knowledge into the classroom and have it validated and incorporated into the programme. The student interview data suggests that their engagement increased, in part, because the learning was linked to the transmission of knowledge, culture and activities of direct importance to their lived lives.

Experiential or 'hands-on' learning was another important aspect of the programme for the students. The role of 'learning by doing' has become increasingly entwined with the idea of linking education with the goals of local communities. More recently, community-based approaches have dovetailed with biological and environmental science education to spawn a renewed interest in the power of experiential learning through local landscapes. Grunewald (2005, p. 255), for example, outlines a field of inquiry through which the 'social and ecological landscape should be studied through first-hand experience; it also must link such experience to the experience of others in other places and to the cultural, political, economic and ecological forces that connect people and places on a global scale'. Experiential learning was a critical motivating factor to the students enduring engagement in the project. For some of the students, the restricted amount of time they spent in the field (due to school timetabling constraints) was a source of frustration. One boy stated 'We went out and went pipi monitoring but like there's so much more we could've done with that information ... It would've been cool if we went out like a couple more times like we only went out once and like any scientific experiment, you've got to do it more than once'. They suggested a number of other related scientific experiments they would like to have done in order to triangulate their scientific data. Examples included:

> *we didn't do any investigation on the water quality at all or the plants like the mangroves or it could've been something to do*

with that and we may have come up with a conclusion about it.

I would've been really interested in something like the pH levels in the water and all the kind of chemicals from the refinery.

I wanted to know what types of minerals in the water keep these pipi alive and like what type of chemicals and stuff make them die and stuff? Yeah.

Tolbert (2015) has stated that communicating high expectations for science learning is a key aspect of developing strong caring relationships. What is clear from the student data is that the gifted Māori boys would have liked higher expectations of their academic potential, programme enrichment and increased scientific complexity. McKinley (2005) has long argued that New Zealand teachers must bring relevance, complexity and context to science education. Her research has illustrated that teachers must improve their own scientific techniques and use appropriate teaching strategies, include the excluded (Māori knowledge, Māori experts and Māori scientists), study the 'real stories', include Māori language in relevant contexts, and reinforce the value of Māori science and technologies. Similarly, Tolbert (2015) has argued that teachers must draw on meaningful and relevant contexts for science lessons and providing opportunities for Māori students to contribute their own ideas and share their own experiences from outside of school.

Conclusions and Implications

Teachers who are serious about accelerating the learning of gifted Māori boys must understand that the critical lever for positive change is authentic whānau–community–school partnerships. Such a partnership must actively provide a counter to negative societal stereotypes that posit Māori boys as uneducable, low achievers and academically disengaged. The Ruamano project has demonstrated that when schools and teachers hold high expectations for Māori whānau/iwi/ community involvement and actively invite their participation in decision-making, co-design and co-teaching activities related to their children's learning, the partnerships result in improved student engagement in science learning. The Ruamano Project's culturally responsive programme design created the optimal conditions for gifted Māori students to present their innate gifts and talents, in that the programme of learning drew on students': (1) sense of belonging, community and connection to the scientific context, (2) commitment to community care and reciprocity, and (3) sense that they could actively participate in science that mattered for them, their communities and tribal groups. As such, schools must work harder to cultivate a climate in which whānau, iwi and wider community organisations feel comfortable to initiate involvement in their children's education and should provide them with the appropriate opportunities to do so.

Research has shown that genuine whānau/iwi/ community involvement in schools is critical because 'students learn more and succeed at higher levels when home, school, and community work together to support students' learning and development' (Epstein & Sanders, 2006, p. 87). Webber (2012) has long argued that the educative process for Māori must include whānau participation in terms of designing culturally responsive curriculum material that simultaneously strengthens students' cultural connections, increases their cultural competence and connection to their communities of interest and improves their academic motivation to learn and succeed.

We know that students' identities are shaped by their lived experiences and social interactions at home, in school and in the wider world. At school, they belong to a number of different groups. What it means to be a 'Māori' male student and to have a 'gifted' identity will likely change from class to class and year to year. It is important that gifted Māori boys have access to science ideas that are local and relevant if they are to appreciate how science impacts on their lives and to begin to conceive what science research identities might be available to them in the future. Engaging gifted Māori boys in science and with a range of people who have an interest and expertise in science out of the classroom provides them with different access points for their own interest and illustrates some of the ways science is relevant to their lives and communities. As Brickhouse, Lowery and Schultz (2000) point out, 'to understand learning in science … we need to know how students are engaging in science and how that is related to who they think they are'. (p. 443)

The Ruamano project engaged gifted Māori boys in solving problems because they perceived the problems as real and relevant in their lives. Utilising a treaty-responsive and place-based approach was an effective way to nurture their giftedness and talent across all domains, providing a setting for developing their cultural and gifted strengths, interests and passions. Specifically, the findings of the Ruamano project has provided evidence that the engagement and identification of gifted Māori boys increases when we plan science units that highlight: the complexity and relevance of place-based science; community-responsive consultation processes; open-endedness; 'indigenous' and other community research perspectives; and the development solutions to real-world problems delivered to appropriate audiences. Bringing these together using the REAPS model has shown that collaboratively working to solve a real, local problem, identified by the community as relevant and meaningful, not only tapped new knowledge and skills, but also increased gifted Māori student engagement in learning, participating and contributing.

In conclusion, it is recommended that schools:

- Consult community and iwi over content at the course planning stage, rather than when the majority of your decision-making has been done.
- Build in time to collaboratively develop units as part of the PD.
- Localise topics and use stakeholder groups so that students have to look at issues from various perspectives.
- Plan units that encourage students to engage with real-life issues that may not have known solutions.
- Include field trips and hands on experiences, as all students interviewed found this more engaging than online, virtual or video experiences.
- Plan group work carefully to ensure that students can collaborate and feel they have their own role as well as being integral to the group.
- Ensure not all assessments are written (essay, topic test or written exam).
- Review your planning to ensure that there are opportunities for students to demonstrate a range of gifts and talents, including culturally specific gifts and talents.
- Examine teaching practices to ensure that there are a variety of teacher-led and student-led activities and a balance of individual and group work.

Notes

1 The National Certificate of Educational Achievement (NCEA) is New Zealand's national qualification for senior secondary school students.

2 The Programme for International Student Assessment (PISA) is an international study that assesses and compares how well countries are educationally preparing their 15-year-old students to meet real-life opportunities and challenges.

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