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# Exploring culturally sustaining practice for indigenous learners in initial teacher education in Aotearoa New Zealand

**Abstract:** Culturally sustaining practices are advocated for enhancing learning experiences of Indigenous learners. Developing the use of culturally sustaining practice is challenging, in part as many educators do not have Indigenous heritage and have not themselves experienced such teaching. Here we discuss an investigation into how we develop student teacher understanding of practice culturally sustaining for Indigenous Māori learners in our initial mathematics teacher education courses. We show how a four-dimension framework (accommodation, reformation, transformation, and representation) can expose strengths and opportunities for improvement in course content and approaches towards developing culturally sustaining practices. Factors considered include education policy, resources, course development and content. Affordances (e.g., ease of use) and challenges (e.g., contextal factors) of using the framework are discussed. We demonstrate that the framework can be a useful tool for teacher educators working to strengthen their focus on developing culturally sustaining teacher practice to enhance educational opportunities of Indigenous learners.

**Keywords:** Initial teacher education. Indigenous. Mathematics education. Culturally sustaining practice.

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# Explorando práticas culturalmente sustentáveis para alunos indígenas na formação inicial de professores em Aotearoa Nova Zelândia

**Resumo:** Práticas culturalmente sustentáveis são defendidas para melhorar as experiências de aprendizagem dos alunos indígenas. Desenvolver o uso de práticas culturalmente sustentáveis é desafiador, em parte, porque muitos educadores não têm herança indígena e eles próprios não experimentaram esse tipo de ensino. Aqui, discutimos uma investigação sobre como desenvolvemos a compreensão dos professores sobre práticas culturalmente sustentáveis para os alunos indígenas Maori nos nossos cursos iniciais de formação de professores de matemática. Mostramos como uma estrutura de quatro dimensões (acomodação,

reforma, transformação e representação) pode expor pontos fortes e oportunidades de melhoria no conteúdo do curso e abordagens para o desenvolvimento de práticas culturalmente sustentáveis. Os fatores considerados incluem política educacional, recursos, desenvolvimento e conteúdo do curso. São discutidas as possibilidades (por exemplo, facilidade de uso) e os desafios (por exemplo, fatores contextuais) do uso da estrutura. Demonstramos que a estrutura pode ser uma ferramenta útil para os educadores de professores que trabalham para fortalecer o seu foco no desenvolvimento de práticas culturalmente sustentáveis para melhorar as oportunidades educacionais dos alunos indígenas.

## Explorando prácticas culturalmente sostenibles para estudiantes indígenas en la formación inicial de docentes en Aotearoa Nueva Zelanda

**Resumen:** Se recomiendan prácticas culturalmente sostenibles para mejorar las experiencias de aprendizaje de los estudiantes indígenas. Desarrollar el uso de prácticas culturalmente sostenibles es un desafío, en parte, porque muchos educadores no tienen herencia indígena y no han experimentado este tipo de enseñanza ellos mismos. Aquí, discutimos la investigación sobre cómo desarrollamos la comprensión de los maestros de las prácticas culturalmente sostenibles para los estudiantes indígenas maoríes en nuestros cursos iniciales de capacitación de maestros de matemáticas. Mostramos cómo una estructura de cuatro dimensiones (acomodación, renovación, transformación y representación) puede exponer fortalezas y oportunidades para mejorar el contenido del curso y los enfoques para el desarrollo de prácticas culturalmente sostenibles. Los factores considerados incluyen política educativa, recursos, desarrollo y contenido del curso. Se discuten las posibilidades (por ejemplo, facilidad de uso) y los desafíos (por ejemplo, factores contextuales) de usar la estructura. Demostramos que la estructura puede ser una herramienta útil para los formadores de docentes que trabajan para fortalecer su enfoque en el desarrollo de prácticas culturalmente sostenibles para

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mejorar las oportunidades educativas para los estudiantes indígenas.

**Palabras clave:** Formación inicial del profesorado. Indígenas. Educación matemática. Práctica culturalmente sostenible.

## 1 Introduction

As in many countries with a colonial past, in Aotearoa New Zealand, formal education policy, curriculum, and teaching have developed in largely Eurocentric ways within a society that strongly reflects Eurocentric policies, institutions, and processes at the expense of Indigenous Māori. This situation is despite Aotearoa New Zealand being founded on a formal agreement between Māori and the British crown, Te Tiriti o Waitangi. The treaty principles (protection, participation, and partnership) were intended to safeguard treasures held dear by treaty partners. However, as in many contexts internationally, persistent disparities in acheivement generally, and in mathematics achievement in particular, exist between Aotearoa New Zealand's Indigenous and non Indigenous students (Klenowski, 2009; McCarty & Lee, 2014; Office of the Auditor General, 2012).

Culturally sustaining pedagogy emerged from concerns that 'culturally responsive' pedagogy did not go far enough to safeguard, nurture, and reflect learners' cultural practices and identities. Culturally responsive pedagogy is commonly understood to include ensuring the "cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students" enable learning (Gay, 2010, p. 31) and empower students "intellectually, socially, emotionally, and politically" (Ladson-Billings, 2009, p. 20). Culturally sustaining pedagogy (McCarty & Lee, 2014; Paris, 2012; Paris & Samy Alim, 2014) goes further to call for incorporation of "multilingualism and multiculturalism in practice and perspective" to "perpetuate and foster – to sustain – linguistic, literate, and cultural pluralism as part of the democratic project of schooling" (Paris, 2012, p. 95).

In Aotearoa New Zealand, deep understanding of and commitment to the implications of the treaty partnership, are expected in teachers' work with all students

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(Education Council, 2017). All teachers are expected to incorporate te reo Māori (Māori language) and reflect tikanga Māori (Māori custom) in teaching and learning. To foster academic progress alongside student wellbeing, teachers of Māori learners are expected to have and demonstrate cultural competencies in their teaching and in their interactions with learners and families (Ministry of Education, 2011).

Strong enactment of the cultural competencies requires strong knowledge of te ao Māori (the Māori world) and includes teachers interacting in caring and respectful ways with learners and whānau (family), engaging in dialogue about learning priorities, and being able to ground learning tasks within the experiences and knowledge of learners (Averill, Anderson, & Drake, 2015). Despite these policy expectations, many Māori learners in English-medium settings are not yet experiencing culturally responsive or sustaining teaching (Bishop & Berryman, 2006; Hynds, Averill, Hindle, & Meyer, 2017).

## 2 Initial teacher education

Many novice teachers (student teachers and early career teachers) have difficulty implementing equity-based learning strategies they meet in initial teacher education programmes (Ajayi, 2017). The extent to which teacher educator practice enables and encourages student teachers to adopt culturally sustaining pedagogy is affected by the beliefs and culturally-based knowledge of both groups, societal influences, and inconsistencies in discourse and practice across teacher educators and practica mentor teachers (Averill & McRae, 2019; Hall & Kidman, 2004; Han et al., 2014; Sleeter, 2001; 2012; Young, 2010).

To create teachers who "are socioculturally conscious" and "see themselves as responsible for and capable of bringing about change to make schools more equitable" (Lucas & Villegas, 2013, p. 20), initial teacher educators must be able to articulate and enact a suitable vision of teaching and learning. In relation to culturally sustaining practice, such visions may encompass a range of student-centred and culture-centric aspects, from ways of interacting suitably with students and families to embedding learning experiences in culturally-bound contexts (Averill et al., 2009). Teaching

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strategies that require relatively little culturally-based knowledge and understanding (e.g., fostering effective, caring, respectful teacher-student relationships) (Averill, 2012), are easier for many student teachers to demonstrate than strategies that reflect learners' cultural and linguistic heritage/s, especially when they do not share the learners' cultural background/s (Hernandez & Shroyer, 2017; Siwatu, 2011).

To draw learning experiences from culturally embedded contexts requires maintaining the integrity of both the cultural context being drawn from and the curriculum content (Trinick, Fairhall, & Meaney, 2016; Te Maro, 2018). Such teaching requires that the educator knows, understands, and can develop their learners' knowledge and understanding of both areas.

In Aotearoa New Zealand, teachers graduating from programmes focussed on preparation for English-medium settings often lack confidence in their ability to maximise the learning of Māori students and to work collaboratively with Māori whānau (Education Review Office, 2017). Hence, strong work on culturally sustaining practices in initial teacher education is essential for helping ensure graduate teachers are confident in their ability to teach in ways culturally sustaining for Māori. Our previous research has explored various models and frameworks for developing our own and our student teachers' mathematics teaching practices to be culturally sustaining for Māori learners (Averill, 2012; Averill et al., 2015; Averill, Anderson, Easton, Te Maro, Smith, & Hynds, 2009).

This article describes our most recent investigation, this time into aspects of our mathematics methods courses, in relation to culturally sustaining practice. We describe our use of a framework adapted from environmental sustainability education (Sterling, 2004) to evaluate and inform the development of course components in relation to culturally sustaining practice.

### 3 The framework

The framework used for our study was developed from a three-dimension framework used in environmental education to help compare the depth of knowledge, critical thinking, and commitment to change in responses to issues of environmental

sustainability (Renert, 2011; Sterling, 2004). We use the three dimensiondescriptors ('accommodation', 'reformation', and 'transformation') in relation to *culturally* sustaining practice, rather than environmental sustainability.

In this framework, actions described as 'accommodation' level responses, the lowest level response type, are actions that do not challenge basic values or the status quo. Accommodation level responses include relatively minor adaptations to usual practice, and usual structures and approaches are left in place. Accommodation level responses usually focus on content and knowledge and demonstrate some understanding about an issue – for our focus, about culturally sustaining practices. In our context, examples of accommodation level culturally sustaining teaching practice responses could include the teacher using greetings in the Māori language, basic counting in the Māori language, and displaying classroom posters that include Māori design.

Actions that differ from usual practice are described as either 'reformation' level or 'transformation' level responses, depending on the extent to which the actions challenge the status quo. Reformation type culturally sustaining practice responses are more substantial changes to usual practice than accommodation responses. Reformation responses are likely to foster culturally sustaining values and capabilities, learning for culturally responsive practice, by exposing learners to practice consistent with the focus culture, and through this exposure, engaging them in critical thinking about differing worldviews, beliefs, behaviours, and expectations.

Practice examples could include incorporating culturally-based protocols, basing learning activities within culturally-embedded contexts and sites, place-based education (Penetito, 2010), and using pedagogies historically favoured by the focus cultural group. A further example of a reformation type response includes instituting an entry requirement to initial teacher education programmes of every applicant introducing themself using the Māori language in a way fitting with Māori protocol.

Deeper again, the third level, 'transformation' type responses require paradigm shifts from usual practice. Transformation responses require substantial cultural understanding and capability, and strong commitment to change. Transformation

responses can be achieved through actions informed by critical thinking based on deep cultural knowledge, understanding, and awareness. They require strong belief in one's ability to effect change and the conviction to do so.

Transformation responses demonstrate practice as culturally sustaining teaching in that learners are involved in learning in ways totally compatible with and informed using aspects of the world of the focus culture. An example of a transformation type culturally responsive practice is initiating and managing suitable cultural protocols, such as for beginning and ending sessions, sharing of food, or formal powhiri (welcomes), within teaching contexts.

In developing the framework for the context of culturally sustaining practice from that of environmental education, a key consideration was that partnership between Māori and non-Māori is a pivotal principle of equity-based practice in Aotearoa New Zealand (Ritchie, Skerrett, & Rau, 2014). Therefore, to ensure consideration of this key aspect of partnership for developing and considering culturally sustaining practice, we have included a new dimension of 'representation' into the framework.

In Aotearoa New Zealand, representation describes prioritising Māori involvement at all stages to ensure suitable inclusion of Māori knowledge, expectations, and perspectives in all development. The representation descriptor enables reflection on the extent to which culturally sustaining practice initiatives have been developed in partnership with those of the focus cultural group. For example, initiatives being co-designed and co-implemented by Māori and non-Māori educators can demonstrate a strong representation response. In contrast, non-Māori educators working with no consultation with, or input from, Māori would constitute a low representation response.

## 4 Examining our practice

First, we describe examples of culturally sustaining practices used across our initial teacher education programmes that prepare teachers to teach in elementary and secondary English-medium schools, programmes within which our mathematics education courses sit. We then outline other contextual factors of the study, including

information about our mathematics education methods courses, our student cohort, and ourselves.

Representation is ensured at the programme level through our Māori Education Group of Advisors (MEGA), a group that provides advice and guidance in relation to programme wide design and implementation. MEGA's priorities include student teachers understanding Aotearoa New Zealand's colonial history and themselves as culturally-located people, demonstrating bilingual and bicultural dispositions, and being able to integrate Māori language, protocol, knowledge, history, and culture into their teaching. These priorities are consistent with enabling student teachers to design and implement culturally sustaining practices consistent with the reformation and transformation descriptors.

In keeping with Māori protocol, our programmes begin with a powhiri (formal welcome ceremony). Taught by experienced Māori teacher educators (representation), students can take two courses (one mandatory and one highly recommended) designed to foster student teacher understanding of te aō Māori (the Māori world), and to encourage and enable reformative and transformative culturally sustaining practices. Consistent with a kaupapa Māori approach (culturally appropriate Māori approach), all teacher educators are encouraged to take the optional course alongside student teachers. Accommodation, reformation, and transformation responses are present in student work in these two courses (Averill & McRae, 2019; McRae & Averill, 2019).

All initial teacher education courses are expected to incorporate te reo, tikanga, me te ao Māori, and teacher educators are expected to meet related professional standards, for example, by using te reo and tikanga Māori in their teaching (Education Council, 2017). However, the nature and extent of culturally sustaining practice varies across the initial teacher education teaching team and many of our courses, including the mathematics education courses that are the focus of this paper, do not have Māori academic representation.

Although our mathematics education courses have previously been taught and researched by teams comprising both Māori and non-Māori academics (e.g., Averill, et al., 2009), no Māori academics have taught in these courses over the past five years.

Typically, in their mathematics education methods courses student teachers take part in blended face-to-face and online learning. Face-to-face learning involves students in attending lectures (elementary initial teacher education only) and actively participating in workshop style sessions (elementary and secondary). Some student teachers complete almost all of their study online using a variety of resources and online interaction tools. All student teachers must take mathematics education courses across both semesters of their year-long programme. Both mathematics education lecturers are New Zealand European, with one (the first author) having completed a tertiary qualification in Māori language and custom.

Our second author, of Māori ethnicity and a fluent speaker of the Māori language, teaches the two courses on developing knowledge and understanding of Māori language and custom for teaching discussed above. Our student teacher cohorts typically comprise a majority of non Māori people, with the proportion of Māori to non-Māori much lower than that of the school population and of society more generally. Very few student teachers begin our programmes with strong knowledge of Māori language and custom.

To explore how the framework can help evaluate and inform the development of course components in relation to culturally sustaining practice, five key course foci of our mathematics education methods courses were collaboratively selected, discussed, and analysed in relation to the four framework response types. The focus areas were drawn from key aspects of policy, curriculum, and mathematics and culturally sustaining pedagogy literature nationally and internationally (e.g., Berryman, Lawrence, & Lamont, 2018; McCarty & Lee, 2014; Ministry of Education, 2011, 2017; Paris, 2012; Penetito, 2010).

The focus areas were selected as key aspects necessary for addressing the typical needs of our student teachers in relation to culturally sustaining mathematics teaching practice. The focus areas (relationality, diversity of approaches, critical thinking about equity, co-construction, and learners' foundational knowledge and experiences) (Tables 1 and 2) collectively illustrate a range of cultural competencies for teachers of Māori learners (Ministry of Education, 2011).

To determine which examples of practice would be used foranalysis, agreement was reached by course lecturers of existing course teaching approaches and content that were considered to be culturally sustaining practices. Analysis (categorisation by the framework dimensions) was carried out in an iterative process of categorisation, discussion, and refinement of categorisation. Once agreement had been reached regarding existing practice (Table 1), researchers used the five focus areas and four framework dimensions as prompts for identifying ways to enhance our culturally sustaining practice (see italics in Tables 1 and 2).

## 5 Analysing culturally sustaining practices using the framework: results

Many examples of accommodation and reformation response types were identified in relation to all of the five course focus areas (Table 1). However, the analysis showed us that apart from tools to stimulate critical thinking, our current courses include no examples consistent with the transformation descriptor (Table 2).Possible transformation type responses for each programme focus were identified (Table 2), which may provide starting points for decisions on course and teaching development.

Tabela 1 – Course Examples consistent with Accommodation and Reformation Responses to Culturally Sustaining Practice

| Course Focus | Accommodation Responses | Reformation Responses |
|---|---|---|
| Teaching mathematics is relational | Using student names, smiling, being welcoming, caring, accessible, listening.<br><br>Using greetings, teaching instructions, and mathematics words in te reo Māori.<br><br>Correct pronunciation of Māori names and words. | Being open with students about ourselves, inviting students to share about themselves(e.g., pepeha and mihi, cultural introductions).<br><br>Clear frequent curriculum-focussed communication between teachers and students (wānanga).<br><br>Using cultural protocols (e.g., karakia (prayer), providing kai (food)). |
| Teaching mathematics requires diverse pedagogical approaches | Including pedagogies important to Māori (e.g., singing, *waiata (Māori songs)*, *purākau (Māori writing)*, whakataukī, *pakiwaitara (Māori storytelling)*, storytelling. | Using and articulating Māori pedagogies in appropriate and authentic ways (e.g., Saunders, Averill, & McRae, 2018).<br><br>Promoting holistic responses to learning, increasing student |

| | | autonomy, enhancing student relationships with mathematics learning and wellbeing in relation to dimensions of the whare tapa wha (four sided house) (Averill, 2012; Durie, 1994). |
|---|---|---|
| Teaching mathematics requirescritical thinking about equity | Reflecting cultural competencies ('Tātaiako', Ministry of Education, 2011). | Consistently demonstrating and articulating cultural competencies ('Tātaiako', Ministry of Education, 2011) in ways that acknowledge and respond to the diversity of Māori learners and their communities. |
| Teaching mathematics requires co-construction | Using and articulating pedagogies that foster mathematical discussion.<br><br>*Likening pedagogy protocols to Māori protocols (e.g., for whaikorero, speech making, powhiri, welcome ceremony).* | Using and articulating pedagogies involving mathematical discussion through in-the-moment coaching, and linking this with cultural competencies (e.g., ako, wānanga (Averill et al., 2015; Ministry of Education, 2011)). |
| Teaching mathematics builds on learners' foundational experiences and knowledge | Drawing contexts of mathematics problems from students' prior experiences including from te ao Māori (e.g., probability problems related to powhiri, measurement problems related to marae, meeting places, and transformation and algebra using tukutuku panel and kowhaiwhai rafter patterns). | Using contexts of mathematics problems drawn from te ao Māori in culturally appropriate ways (e.g., measurement problems related to marae cooking and hangi (ground oven), transformations present in kapahaka (Māori group performance)). |

Source: Research data

Accommodation type responses included personable teacher-student teacher interactions, using some commonly used te reo Māori words and phrases, and learning experiences based within simple and Māori contextsfairly frequently used across New Zealand mathematics classrooms. Analysis enabled us to realise that while accommodation responses are relatively low level culturally sustaining practices, in that they do not differ significantly from many usual mathematics teaching practices in Aotearoa New Zealand, they are vitally important for establishing the relationships and learning environments necessary for employing higher level responses with comfort for and engagement.

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Examples of practice consistent with reformation response types included using culturally-based ways of introducing ourselves, articulating how we model use of cultural competencies, and using culturally-embedded mathematical techniques alongside curriculum-based techniques. We see reformation responses as essential for showing how cultural aspects can be woven into teaching in culturally sensitive ways. We see these as adapting usual pratice to encompass culturally-based mathematical ideas, behaviours, and considerations with integrity.

Potential transformation type responses were identified collaboratively, considering current practice (Table 1) and key ideas from research literature and policy (e.g., Berryman, et al., 2018; McCarty & Lee, 2014; Ministry of Education, 2011, 2017; Paris, 2012; Penetito, 2010).

Tabela 2 – Programme Foci and possible pathways towards Transformation Responses

| Course Focus | Transformation - Italics represent aspirations for practice |
|---|---|
| Teaching mathematics is relational | *Bilingual bicultural teaching with strong involvement of whānau, partnership schools, and community.* |
| | *Suitable physical context, location of learning, and nature and content of curriculum and curriculum delivery.* |
| Teaching mathematics requires diverse pedagogical approaches | *Non-Māori working alongside Māori mathematics education academics to review and develop suitable pedagogical approaches and strategies and understanding of how to suitably implement these.* |
| Teaching mathematics requirescritical thinking about equity | Using a range of tools for encouraging and supporting critical thinking about the content and nature of curriculum, assessment, and teaching in relation to te ao Māori. |
| | *Working alongside Māori education professional organisation groups to develop further strategies.* |
| Teaching mathematics requires co-construction | *Māori input into interpretation and use of co-construction.* |
| | *All aspects of teaching interactions reflecting MEGA priorities.* |
| Teaching mathematics builds on learners' foundational | *Practice embodies and builds on university-wide responsiveness to Māori (e.g., Victoria University of Wellington, n.d., 2014)* |
| | *Contexts of substantial and integrated mathematics learning experiences drawn from and relevant to te ao Māori considered and implemented in* |

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| experiences and knowledge | suitable ways (e.g., Meaney & Trinick, 2014). |

Particularly given the principles of protection, participation, and partnership of Te Tiriti o Waitangi, in our context, transformation response types, in particular, require strong representation of Māori for safe and appropriate implementation. Given that no Māori academics are currently teaching within the mathematics education courses, representation is currently limited to using readings and resources written about teaching Māori learners (e.g., Saunders, et al., 2018) and by Māori (e.g., Berryman, et al., 2018) and reflection of MEGA's priorities. Stronger representation can only be realised by having Māori teaching within our courses.

Our analysis provides specific examples of potential practice that help show how and why such representation is needed to achieve the aims of national policy and our teaching in relation to culturally sustaining pedagogy. For example, Māori academics are more likely than non-Māori to have suitable knowledge and access to appropriate personel and sites needed for transformative approaches.

Affordances of the framework for analysing our practice included the simplicity of the framework. With only four dimensions, for most practices agreement on categorisation was easily reached. Some examples of practice were more challenging to classify, particularly when deciding between reformation and transformation type responses.In part this was due to variation in the status quo. For example, for some mathematics learners, considering say, reflection, rotation, and translation, in relation to designs in a wharenui (traditional meeting house) is usual practice. For others, this would be a reformational or transformational culturally sustaining teaching response.

## 6 Discussion

As discussed over ten years ago (Averill et al., 2009), the work described here raises questions about the time needed within methods courses to develop student teachers' culturally specific knowledge and understanding and culturally sustaining pedagogical practices. Ideally, student teachers bring knowledge and understanding of

their responsibilities in relation to Te Tiriti o Waitangi to their methods courses, along with sensitivity to the nuances of working with and for Māori students' learning. However, although there has been some growth over time in student teachers' beliefs, attitudes, and culturally-specific knowledge, to date we are still needing to devote precious methods course time to building basic cultural knowledge and understandings. With constrained time in many initial teacher education programmes, the feasibility of enabling many strong and diverse transformative responses to culturally sustaining pedagogy within them is questionable.

Further questions are raised from this work. For example, research is needed into how student teachers can use the framework to evaluate, critique, and develop their own and one another's culturally sustaining practice. Given the very small numbers of Indigenous teachers, how can novice teachers ensure their work is informed by representation? Transformation responses represent paradigm shifts and thus take time,informed consideration, consultation, and collaboration to design, implement, monitor, and refine. How can novice teachers be encouraged and supported to continue developing their culturally sustaining practice?

## 7 Conclusions

Culturally sustaining practices are difficult for novice teachers to learn about and implement, particularly in relation to the languages and cultures of Indigenous people in colonised countries. Those working in initial teacher education are responsible for supporting such learning. Our programmes were designed in Eurocentric ways to meet Eurocentric internal and external criteria. We have demonstrated how Sterling's (2004) response types (accommodation, reformation, and transformation) can be used alongside representation as a valuable framework to describe, critically evaluate, and inform culturally sustaining practice.

Analysing key course components using the framwork was useful for enabling us to critique and consider how to develop our initial mathematics teacher educaiton practice. We found our practices were limited to accommodation and reformation type responses. The framework helped us to consider these and potentially deeper

responses, alongside the representation and partnership necessary to help us to implement such changes.

The analysis was also useful for helping us make our practice explicit to student teachers, so that they in turn can critically discuss culturally sustaining mathematics teaching practices and be deliberate about adopting such approaches in their own teaching. Knowing all course foci offer reformational and transformational opportunities for culturally sustaining practice provides us with confidence that we can articulate, demonstrate, and encourage a range of pedagogical shifts in traditional approaches to mathematics teaching toward improving learning experiences and achievement of Māori.Knowing all foci offer accommodation level responses enables us to expect student teachers who may lack confidence, competence, or the belief in the importance of working at a higher level to use at least accommodation level responses across foci, while continuing to work with them towards greater capability and intention.

This work adds to the conversation about culturally sustaining practice by demonstrating a new tool for examining and articulating culturally sustaining practice and showing the vital importance of including academics of the focus culture/s within methods teaching teams for suitable development. The framework helps highlight the need for representation that goes beyond non-Indigenous academics making decisions about culturally sustaining practice using only their own knowledge of Indigenous language/s, culture/s and practices, their interpretations of culturally-based advice, and literature and resources by and about Indigenous people/s.

Affordances to the culturally sustaining emphasis in our work and research include that Aotearoa Aotearoa New Zealand is founded on a treaty partnership and that Māori students constitute roughly 25% of the school-age population. While there are significant iwi-based language differences, te reo Māori has similarities across the country. Teacher responsibilities for all students, Māori and non-Māori, in relation to the treaty are mandated and supported and societal attitudes are increasingly positive about teaching including and reflecting te reo, tikanga, me te ao Māori.

In contexts with comparably undemanding legislation, fewer specific culturally-based requirements of and support for teachers, different languages across Indigenous

groups, and relatively low interest across society in ensuring culturally-related equity, change may be more difficult to advance. However, enabling exploration of the nature and depth of response, the framework provides a tool likely to be suitable across contexts for examining, articulating, and developing culturally sustaining practice.

Key learning from this investigation includes that partnership with Indigenous academics is essential for developing transformative practice appropriately. The framework also serves as a useful tool for articulating practice with initial teacher educators and with student teachers to help them recognise, understand, and critique culturally sustaining practice and to understand how to develop their own as informed, responsible education professionals.Further challenges to our student teachers' practice relate to their work during practica and following graduation.

Many schools have low proportions of Māori teachers. Non-Māori teacher mentors may be willing but may lack the time and resources that initial teacher educators possess, to develop their own understanding, knowledge, and practice of culturally sustaining pedagogy. Mixed messages regarding what is possible, expected, and effective in relation to teaching Māori and all students wellpose challenges for early career teachers. Research into the use of the framework in school settings could explore ways to bridge such gaps in knowledge and practice over time.

The descriptors accommodation, reformation, and transformation are all based on change to the status quo. As culturally sustaining changes become part of the status quo, new and deeper responses for each level are enabled and will be necessary to continue developing culturally sustaining practice. The long-standing problem of inequity in learners' mathematics learning opportunities is unjust, indefensible, and stubbornly challenging. For the work ahead we need many useful tools to critique and develop current teaching approaches. We have shown the potential of this framework for examining practice and developing thinking towards next steps. Kia tere! Kia tere! There is no time to be lost.

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