



Education Report: Developing Mathematics and Pāngarau Strategies

To:	Hon Jan Tinetti, Associate Minister of Education		
Cc:	Hon Chris Hipkins, Minister of Education, Hon Kelvin Davis, Associate Minister of Education		
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Purpose of Report

The purpose of this paper is for you to:

- **Agree** that the Ministry of Education will lead development of separate strategies for mathematics in English medium settings and pāngarau in Māori medium settings.
- **Agree** to the proposed process and timeline for the development of mathematics and pāngarau strategies to strengthen teaching and learning, and lift student achievement in these areas.
- **Agree** that this Education Report will not be proactively released at this time, and that its release be considered as part of communication on next steps in developing the strategies.

Summary

- 1 Persistent inequalities and a pattern of longer-term decline in student performance make clear that current approaches to teaching mathematics and pāngarau (including numeracy) are not working for all learners.
- 2 Following our agency meeting with you on Thursday 11 February, you asked for further advice on the process and timeline for developing strategies for mathematics and pāngarau. These strategies are part of a comprehensive work programme to strengthen the national curriculum, and how it is enacted in kura and schools.
- 3 We propose developing two strategies in parallel processes, for mathematics and pāngarau, that are aligned and will provide a comprehensive system response. The pāngarau strategy will be underpinned by fundamental principles founded in te ao Māori to achieve quality pāngarau outcomes across Māori medium pathways.

- 4 The mathematics and pāngarau strategies will draw on contemporary evidence about effective teaching and learning, from both research and practice. This will enable us to identify and plan for implementation of a range of actions to strengthen mathematics and pāngarau (including numeracy) teaching and learning that meets the unique needs of Māori and English medium education. The strategies will be developed with expert and sector input, as well as targeted consultation with industry, employers and tertiary providers, and will support and inform the broader STEM work programme.
- 5 The mathematics and pāngarau strategies will also be informed by the internal work we have done on shifting the dial on and literacy and te reo matatini [METIS 1245761 refers]. Although there will be differences in the specifics, at a high level the opportunities to improve system settings are similar. As we progress the mathematics and pāngarau strategies alongside the literacy and te reo matatini strategies, we will also work to ensure that there is alignment where needed to ensure there is a coherent approach to strengthening the national curriculum and its delivery.
- 6 9(2)(f)(iv)

Recommended Actions

The Ministry of Education recommends you:

- a. **Agree** that the Ministry of Education will lead development of separate strategies for mathematics in English Medium settings and pāngarau in Māori Medium Settings.

Agree / Disagree

- b. **Agree** to the proposed process and timeline for the development of mathematics and pāngarau strategies to strengthen teaching and learning, and lift student achievement in these areas.

Agree / Disagree

- c. **Agree** that this Education Report will not be proactively released at this time, and that its release be considered as part of communication on next steps in developing the strategies.

Agree / Disagree


 Ellen MacGregor-Reid
 Associate Deputy Secretary
 Early Learning and Student Achievement

18/02/2021


 Hon Jan Tinetti
 Associate Minister of Education

18/2/2021

Background

1. The Ministry of Education was commissioned by the Minister of Education in February 2020 to develop advice on how to strengthen the teaching and learning of literacy and te reo matatini, pāngarau and mathematics. This was driven by concerns about persistent inequities and a long-term decline in learners' and ākonga achievement (indicated by a range of national and international studies including the National Monitoring Study of Student Achievement and TIMMS), and the forthcoming introduction of new, more demanding literacy and numeracy co-requisites for learners and ākonga to achieve NCEA.
2. It is clear that current approaches to teaching mathematics and pāngarau (including numeracy) are not working for all learners. The forthcoming introduction of new, more demanding literacy and numeracy co-requisites for learners and ākonga to achieve NCEA mean that we need to address this as a priority.
3. International and national data¹ for English medium schools indicates that too many learners are not getting a full maths 'diet' that covers all the strands of those learning areas. It also indicates that teachers teach what they know and feel less prepared to teach some aspects of maths, although principals are positive about their school's provision for learning in mathematics, and about their teachers' capabilities.
4. We recognise the need for research and data to provide insights into teaching and learning of, and student achievement in, pāngarau in Māori medium settings. Current international and national sample-based studies do not provide this, nor are they appropriate for understanding progress through a te ao Māori lens. As part of working closely with pāngarau specialists to identify what pāngarau knowledge, skills and cultural perspectives are critical for all learners, the Ministry will also seek advice on how we will capture rich ākonga progress in pāngarau.
5. We have separately provided advice on the development of te reo matatini and literacy strategies [METIS 1249302 refers]. This briefing describes the approach we propose taking to develop pāngarau and mathematics strategies. These strategies are part of a comprehensive work programme to strengthen the national curriculum, and how it is enacted in kura and schools.
6. We propose developing two strategies in parallel processes, for mathematics and pāngarau, that are aligned and will provide a comprehensive system response. The pāngarau strategy will be underpinned by fundamental principles founded in te ao Māori to achieve quality pāngarau outcomes across Māori medium pathways. A timeline for developing the strategies is provided in Annex 1.
7. The process we undertake to develop the strategies will draw on contemporary evidence about effective teaching and learning, from both research and practice. It will ensure we capture both academic and practitioner expertise to identify and plan for implementation of a range of actions to strengthen mathematics and pāngarau (including numeracy) teaching and learning that meet the unique needs of Māori and English medium education.
8. The mathematics and pāngarau strategies will also be informed by the internal work we have done on shifting the dial on and literacy and te reo matatini [METIS 1245761 refers], as part of the wider CPA work programme. Although there will be differences in the specifics, at a high level the opportunities to improve system settings are similar. As we progress the mathematics and pāngarau strategies alongside the literacy and te reo matatini strategies,

¹ National Monitoring Study of Student Achievement (NMSSA) 2018, Programme for International Student Assessment (PISA) 2012, and Trends in Mathematics and Science Study (TIMSS) 2019. Research available for English medium schools only.

we will also work to ensure that there is alignment where needed to ensure there is a coherent approach to strengthening the national curriculum and its delivery.

Developing a mathematics strategy – *The New Zealand Curriculum*

Evidence gathering

9. We have begun by developing the evidence base for change. To do this, we are gaining independent advice (through a Royal Society Te Apārangi convened independent paper) on the mathematics knowledge and skills learners need to know, and when. This will enable better understanding of why many learners are experiencing gaps in their maths curriculum learning, and the shifts that are required.
10. The evidence gathering process will:
 - a. synthesise the existing research and data, for example, NMSSA, ERO and TIMSS reports
 - b. identify possible implementation challenges and ways to mitigate them
 - c. include early learning through to year 13 and will identify the learning young people need pre-school entry, to support their ongoing learning in mathematics.
11. This work is under way will be carried out until April 2021.

Synthesising and recommending

12. The Ministry will then work with practitioner working groups to develop advice on what should be included in the draft strategy. At this early stage, it is anticipated that there will be four working groups covering these key areas for action:
 - a. Ensuring universal mathematics teaching in schools and early learning services is evidence-based and meets the needs of diverse learners, including refreshing *The New Zealand Curriculum* to be more explicit about the mathematics demands across the curriculum
 - b. Ensuring a shared understanding of progress and progressions and the tools need to support this so that early learning services, schools and whānau can ensure learners are on track and support them to remain so
 - c. Increasing the mathematics capabilities, including cultural capability for equity in the early learning and schooling education workforce
 - d. Reviewing and re-designing the system functions in the curriculum that impact mathematics learning, and in particular, accelerative interventions.
13. These action areas are unpacked further in Annex 3.
14. The Ministry is already identifying potential practitioners in early learning and schools for the working groups, so that they can be convened prior to the completion of the evidence gathering phase. The working groups will meet between May and July 2021, and this phase will also include targeted consultation with industry, employers and tertiary providers. Findings from this phase will be synthesised to develop recommendations and will also support and inform the broader STEM work programme.

Development of a mathematics strategy

15. ~~9(2)(f)(iv)~~

Developing a pāngarau strategy – *Te Marautanga o Aotearoa*

16. We know that ākongā who engage in the Māori medium education pathway are well positioned to achieve success and positive wellbeing outcomes. These positive outcomes provide the opportunity for intergenerational growth where whānau, hapū, iwi and Māori communities can achieve their aspirations.
17. The establishment of the Ohu Matua who are overseeing the refresh of *Te Marautanga o Aotearoa* will also provide advice regarding the development and design of the pāngarau strategy. The Ohu Matua will ensure, within the refresh of *Te Marautanga o Aotearoa*, that the core components of He Tamaiti Hei Raukura will guide and support the design of the pāngarau strategy.
18. The Ministry will work closely with pāngarau specialists to identify what pāngarau knowledge, skills and cultural perspectives are critical for all learners, and what cannot be left to chance. We will also work with them to undertake an environmental scan of pāngarau capability across the Māori medium sector to identify where we need to strengthen this.
19. Through 2021, the Ministry will action the following:
 - a. An investigation into the current state of pāngarau will commence in 2021 and be completed by the end of 2021.
 - b. A sector and whānau engagement plan will be developed in conjunction with updating *Te Marautanga o Aotearoa*;
 - c. Research and development that will help inform a pāngarau work programme will be undertaken in a way that is meaningful and relevant within the Māori medium sector
 - d. The Ministry will continue to work with the Māori medium sector, ākongā, whānau, hapū, and iwi to develop and/or repurpose resources;
 - e. The Ministry will develop a Pāngarau strategy that supports the sharing of resources and information throughout the Māori medium education sector; and
 - f. The Ministry will develop programmes that enhance kaiako practice in Māori medium settings to improve pāngarau ākongā progress and achievement.
20. These actions are described further in Annex 2.

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Proactive Release

22. We recommend that this Briefing is not released at this time. Its release will be considered as part of communication on next steps in developing the strategies, which are yet to be decided.

Annexes

- Annex 1: Timeline for developing mathematics and pāngarau strategies
- Annex 2: Actions to develop a pāngarau strategy – *Te Marautanga o Aotearoa*
- Annex 3: Actions to develop a mathematics strategy – *The New Zealand Curriculum*

Proactively Released

9(2)(f)(iv)

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Pāngarau Actions

Shifts	Actions	Outputs
<p>Identify the fundamental changes required to support teaching and learning of pāngarau, based on te ao Māori universal principles.</p> <p>Ensure that the education system has a shared understanding of pāngarau.</p>	<p>Review of pāngarau research, data, resources and roles in the system</p> <p>Identify systematic changes that need to be addressed.</p> <p>Identify the scope of the work required including PLD providers and RTMs.</p> <p>Investigate the current state of pāngarau.</p> <p>Organise Ohu Matua hui (CPA) working group.</p> <p>Develop sector and whānau engagement plan in conjunction with updating Te Marautanga o Aotearoa (TMOA), He Tīrewa Ako & Te Tīrewa Mātai</p> <p>Develop a draft strategy based upon research, Ohu Matua and sector feedback.</p>	<p>Advice from a range of audiences to develop a draft pāngarau strategy that identifies:</p> <ul style="list-style-type: none"> • Systematic changes that need to be addressed • The scope of the work and resourcing required
<p>Invest in research priorities to inform the design and implementation of the strategy that uses kaupapa Māori approaches, ensures pāngarau learning and teaching is evidence-based and founded on te ao Māori worldviews.</p>	<p>Identify research gaps.</p> <p>Set research priorities specifically for pāngarau.</p> <p>Analyse research conducted from advice provided from Ohu Matua, pāngarau experts.</p>	<p>Undertake an analysis of research that supports pāngarau</p> <p>Undertake research and development plan to research capability and capacity in a way that is meaningful and relevant within a Māori medium setting</p>
<p>Develop an action plan for both kura Māori and Māori medium settings, including the resourcing and capability of the education workforce that promotes the revitalisation, maintenance and sustainability of te reo Māori.</p>	<p>Undertake an analysis of current pāngarau resources.</p> <p>Identify current and fit for purpose pāngarau specialists.</p> <p>Identify gaps where more resourcing is required.</p> <p>Identify what teaching and learning materials are available.</p> <p>Work with the sector and resource developers to develop and/or repurpose resources that reflect a te ao Māori perspective.</p> <p>Update pāngarau resources to support learning investment in other whenu.</p> <p>Develop a strategy that supports the sharing of resources and information throughout the Māori medium education sector.</p>	<p>Evidence informed resources will be identified and developed to support pāngarau.</p> <p>Provide the sector with a stocktake of available resources.</p> <p>Have a strong network of pāngarau practitioners connected through Kahu Pūtoi</p>
<p>Review and strengthen the capability and capacity of our workforce to provide quality educational services.</p> <p>Develop the strategic focus areas and actions collaboratively with ākonga, whānau, hapū, iwi, and peak Māori bodies.</p>	<p>Identify professional development needs and set priorities that will enable a focused approach to professional development across the sector.</p> <p>Build the capacity of the pāngarau specialists within the workforce to develop systems and leadership qualities to lead learning in pāngarau.</p> <p>Build stronger relationships with ITE institutions to ensure teaching and learning tools as well as resources are introduced to kaiako in training.</p> <p>Identify and/or develop programmes that enhance kaiako practice in Māori medium settings to improve ākonga progress and achievement in pāngarau.</p>	<p>Develop a focussed professional development (PLD) approach to support pāngarau</p> <p>Develop a monitoring system that provides the Ministry with current information about where Pāngarau specialists are located across the system</p>
<p>Fundamental to the development of the Pāngarau strategy: The Refresh of Te Marautanga o Aotearoa: Trust, Coherence and Equity, Te Tamaiti Hei Raukura, Māori Data Sovereignty Must align with: Record of learning, He Tīrewa Ako & He Tīrewa Mātai</p>		

Mathematics Actions

Shift	Actions	Outputs
Ensuring universal mathematics teaching in schools and early learning services is evidence-based and meets the needs of diverse learners, including refreshing The New Zealand Curriculum to be more explicit about the mathematics demands across the curriculum	<p>Work underway commissioning a Royal Society Te Apārangi paper to establish what mathematics needs to be learned and when to inform and changes in the curriculum refresh.</p> <p>Establish writing group for NZC refresh Mathematics and Statistics learning area and numeracy approach – this group will also develop curriculum progress outcomes in the NZC.</p>	<p>A refreshed NZC including a revitalised Mathematics and Statistics learning area.</p> <p>Curriculum progress outcomes clear in the refreshed NZC.</p> <p>Royal Society Te Apārangi knowledge paper.</p> <p>Guidance statements on best evidence teacher practice in maths and links to supporting resources that encourage best practice.</p>
Ensuring a shared understanding of progress and progressions and the tools need to support this so that early learning services, schools and whānau can ensure learners are on track and support them to remain so	<p>Work underway commissioning a Royal Society Te Apārangi knowledge paper to establish what mathematics needs to be learned and when and recommend appropriate checkpoints.</p>	<p>Royal Society Te Apārangi knowledge paper published and feeding into the maths strategy.</p> <p>Evidence informed resources that can be used by teachers to help address gaps. Includes:</p> <ul style="list-style-type: none"> • Teacher professional learning modules • Classroom tasks • Activities for learners <p>Recommendations on the system structure shifts required, including systematic checks to ensure learning needs are identified and addressed.</p>
Increase the mathematics capabilities, including cultural capability for equity, in the education workforce	<p>Work underway to convene an Evidence Challenge Hui with sector representatives to determine root causes of issues and develop next steps to lift learner achievement.</p> <p>Use co-requisite pilot evaluation on teacher capability and school readiness.</p> <p>Preparatory work with nzmaths underway to ensure effective and coherent curriculum resources</p> <p>The evidence challenge hui findings will feed into curriculum resource development and effective implementation strategies.</p>	<p>Advice from sector experts on steps to ensure effective implementation of the maths strategy initiatives.</p> <p>Advice on teacher capability and school readiness to feed into the maths strategy.</p> <p>Teaching and learning guides to support schools to implement the numeracy co-requisite (Years 9-10 developed with Secondary Tertiary).</p>
Review and re-design the system functions that impact mathematics learning, particularly accelerative interventions.	<p>Establish a working group to develop advice on how to build maths expertise in the system. This would include consideration of specialist roles and their functions required to implement a three Tier Response to Intervention (RTI) model.</p> <p>Establish a working group to consider the impact of accelerative Tier 2 interventions with an initial focus on Programmes for Students (PFS).</p>	<p>Recommendations on the system shifts required to improve learner achievement in maths to feed into the maths strategy.</p> <p>Recommendations on Tier 2 approaches to inform accelerative programme for students</p>