

Numbers Talk – Words Count: Language policy and adult numeracy education in Wales and New Zealand

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Abstract

In this paper we review and compare language policy in relation to adult numeracy education in Wales and New Zealand with respect to the Māori and Welsh languages in the latest stage of our international comparative study of adult numeracy education. While much has been written about the relationship between language and literacy, the relationship between language and numeracy - especially adult numeracy - has been less explored, especially from a policy perspective, despite evidence of the importance of language for learning. We seek to shed light on the policy context in which adult numeracy education is set in Wales and New Zealand with respect to these languages, viewed from a critical linguistic human rights perspective.

Key words: numbers, language policies, ethnomathematics

Introduction

In both Wales and New Zealand policies are in place to raise levels of adult numeracy. Both countries have also developed measures to revitalise the Welsh (Cymraeg or y Gymraeg) and Māori (Te Reo Māori) languages²⁷ respectively and afford them some protection from the language spoken by the majority of the population: English; sizeable numbers of people in both countries speak other languages.

In this paper we seek to shed light on the policy context in which adult numeracy education is set in Wales and New Zealand with respect to these languages. We begin by setting out our argument, from a critical linguistic human rights perspective, on why language matters – or should matter - to adult numeracy educators. We then give a brief review of research on language in relation to mathematics education, and ethnomathematics before setting the scene with a brief language-focused description of the current legal contexts, demographics, principal policy drivers, strategies and policies on language, education and adult numeracy in Wales and New Zealand. Finally, we compare current policies and strategies with respect to language and adult numeracy education.

²⁷ In this paper we use ‘Te Reo Māori’ or ‘Te Reo’ (literally: ‘the Māori language’ or ‘the language’) and ‘Welsh’, respectively, to refer to these languages.

Why should language matter to adult numeracy educators?

Language is important in relation to adult numeracy education because, in a world where, as Barwell, Barton and Setati (2007, p. 113) point out, “Multilingualism is no longer an extraordinary case”, the language in which mathematics (or numeracy) is learned and practised has a bearing on learning. They identify “three good reasons for focusing on multilingual issues in mathematics education” which we summarise as follows:

1. Increasing movement of populations across international borders.
2. Widespread demand for access to English internationally, whether or not this is desirable or promoted.
3. The rise of minority and indigenous peoples’ movements, usually incorporating a strong educational focus with immersion and bilingual settings on the agenda, as the means to political and economic emancipation and cultural renaissance. (Richard Barwell et al., 2007, p. 114)

We concur; Barwell, Barton and Setati’s third reason is particularly pertinent to this paper since Welsh and Te Reo Māori, the indigenous languages of Wales and New Zealand respectively, are the focus of this paper.

We start from the position that language rights are human rights. As François Grin states:

being a native Welsh speaker in Cardiff or a Māori speaker in Auckland (instead of a native speaker of English) cannot, in a liberal society, be construed as a failing for which one should have to atone through a lifetime of denial of one’s identity, culture and language. (Grin, 2005, p. 455)

Accordingly, we approach our exploration of language policy and adult numeracy education in Wales and New Zealand from a critical linguistic human rights perspective, echoing Stephen May’s argument for a more nuanced sociolinguistic and wider socio-political approach to the issues of language, inequality and social justice with which minority language rights are centrally concerned (May, 2005, p. 339). While a full exposition of our perspective is outside the scope of this paper, we are broadly aligned with May’s and Grin’s positions in their works cited here and mindful of the United Nations’ Declaration on the Rights of Indigenous Peoples (United Nations, 2007) to which both the United Kingdom and New Zealand are committed. We characterise our perspective as ‘critical linguistic human rights’ because a linguistic human rights approach per se “is a necessary but far from sufficient argument for advocating the protection and promotion of minority languages and/or of linguistic diversity” (Grin, 2005, p. 458). Ultimately we are interested in the practical and pedagogical implications of language policy for adult numeracy teaching and learning in situations of linguistic diversity and a critical approach allows us to consider these.

By ‘language policy’ we mean:

a systematic, rational, theory-based effort at the societal level to modify the linguistic environment with a view to increasing aggregate welfare. It is typically conducted by official bodies or their surrogates and aimed at part or all of the population living under their jurisdiction. (Grin, 1996, p. 31)

We turn next to look at research on language in relation to mathematics education, including work to explicate the ‘mathematics register’ (Meaney, 2006), and ethnomathematics, in order to outline the ‘state of play’ in these fields as this may be relevant to our study.

Research on language and ethnomathematics in relation to mathematics education

The role of language in mathematics learning

There is growing recognition from around the world that language (and bilingualism/multilingualism) plays a key role in mathematics teaching and learning (R. Barwell, 2003).

Research on Gaeilgeoirí learners (students who learn through the medium of Irish) in transition from learning mathematics through Gaeilge (Irish) to learning it through English at the third level “highlights that mathematical understanding is influenced by language and [...] the students’ cultural background and experiences” (Ní Ríordáin & O'Donoghue, 2008, p. 248).

Findings from a larger study of the Irish context by Ní Ríordáin & O'Donoghue are consistent with those found in bilingual contexts in other countries:

Studies in these contexts [also] found that students learning through the medium of English (their second language of learning) experienced problems with syntax, semantics, and mathematics vocabulary in the English mathematics register, with language playing a key role in their mathematical performance. (Ní Ríordáin & O'Donoghue, 2011, p. 62)

A study of EAL students studying mathematics in English-medium classes at secondary school and university in New Zealand found that:

EAL students suffer a disadvantage in mathematics learning due to language difficulties. [...] Prepositions and word order were key features causing problems at all levels. So also were logical structures such as implication, conditionals, and negation, both at senior secondary and third year university levels. (Neville-Barton & Barton, 2005, pp. 13-14)

Similarly, a study of English-Chinese language differences by Galligan (2001, p. 112) found “large differences in orthography, syntax/semantics, and phonetics” which “may have consequences in the processing of mathematical text”. Ní Ríordáin (2013, p. 6) has also examined the differences between the Irish and English languages and points out the difficulties of how to interpret “whether differences between the languages have a differential impact on cognitive processing”.

The mathematics register

Yore, Pimm and Tuan (2007, p. 599) discuss the “importance of general cognitive and metacognitive abilities [...] and discipline-specific language” for both scientific literacy and mathematical literacy. They emphasize the importance of “not overlook[ing] or underemphasiz[ing] the fundamental literacy component of mathematical and scientific literacy for all students”. This ‘fundamental literacy component’ for mathematics, the ‘mathematics register’ of a language, “includes both the terminology and grammatical constructions which occur repeatedly when discussing mathematics” (Meaney, 2006, p. 39). Yore, Pimm and Tuan (2007, pp. 565-566) stress that “natural language is only a starting point toward acquiring the disciplinary discourses or languages of mathematics and science”, that it is essential to engage with the “three-language problems of moving from home language to school language and onto scientific and mathematical language” to become “mathematical and scientific literate”. For English as an additional language (EAL) students there is the complication of a further language.

In New Zealand, the development of a Māori mathematics register (Tikanga reo tātai) has been described by Barton, Fairhall and Trinick (1997, p. 3). They describe a “self-conscious process of mathematics discourse production [...] highlight[ing] both the complexity and the multiple directions of language evolution” (Barton et al., 1997, p. 8).

Ethnomathematics

The ‘father of ethnomathematics’, Ubiratan D’Ambrosio, has defined ethnomathematics as “the maths practised among cultural groups such as national-tribal societies, labour groups, children of a certain age bracket, professional classes and so on” (Ubiratan D’Ambrosio, 1985, p. 45) and later as “the arts or techniques developed by different cultures to explain, to understand, to cope with their environment” (Ubiratan D’Ambrosio, 1992, p. 1184).

The inclusion of ethnomathematical perspectives into the mathematics education of indigenous students is often described as being politically essential and culturally, linguistically and pedagogically beneficial (see, for example, Powell & Frankenstein, 1997). A New Zealand study is pertinent here: Colleen McMurchy-Pilkington explored Māori women’s mathematical thinking in marae²⁸ kitchens. She explored the “complex mathematical thinking and reasoning skills” that Māori women have constructed outside of school and “embedded in their everyday cultural practices” (McMurchy-Pilkington, 1995, p. 21). She argued that despite policies that have contrived to alienate Māori girls from mathematics over 150 years, Māori women have been a driving force behind Māori educational initiatives (McMurchy-Pilkington, 1995, p. 7).

More recently, the Māori Adult Learners (Te Pakeke Hei Ākonga²⁹) project aimed to capture the perspectives of learners, tutors and providers on how language, literacy and numeracy in foundation learning programmes can be optimised for adult Māori learners. It was found that the “PTEs³⁰ and iwi³¹ providers expect to deliver more than literacy and numeracy skills; they aim to celebrate the Māori identity of their learners and usually teach Māori tikanga³² and sometimes Māori language as well” (McMurchy-Pilkington, 2009 p.1).

The findings with regard to adult numeracy education and Te Reo Māori are encouraging:

The Māori learners felt their tutors were teaching them and their needs rather than a set curriculum. This was in contrast to their school days. They acknowledged that they were learning more than numeracy and literacy. They were learning social skills (how to get along with other people), survival skills, how to study more effectively, cultural skills and knowledge [...], work employment skills, self-confidence, te reo Māori (in some instances), self-respect and respect for others. Their learning was more interactive, it related to everyday life, and in maths it was more hands-on. Their tutors explained and clarified things and made learning fun. (McMurchy-Pilkington 2009, p.2)

However, ethnomathematical approaches alone may not be enough. As Meaney, Fairhall and Trinick (2008) found, cultural practices, including ethnomathematical ones, cannot be separated from the language in which they were developed. Hence, changing the language or the linguistic register in which practices are discussed will have an impact on how the practices are perceived by students and could result in a loss in the fundamental values that would normally accompany the practices. They conclude that without proper consideration of this issue many of the benefits associated with using ethnomathematical approaches may be nullified.

We turn now to consider the demographic and policy contexts in Wales and New Zealand in order to situate our discussion of language policy in these countries in relation to adult numeracy education.

²⁸ Marae: an area of land where the Wharenu (meeting house) sits – the community focal point.

²⁹ <https://akoatearoa.ac.nz/community/recommended-resources-ako-aotearoa/resources/pages/te-pakeke-hei-%C4%81konga-m%C4%81ori-adult-learner>

³⁰ PTEs are Private Training Establishments.

³¹ Iwi: the largest everyday social units in Māori society, analogous to that of tribe or clan. Māori who know their iwi connections typically value them highly and take pride in knowing their genealogy.

³² Tikanga Māori refers to general behaviour guidelines for daily life and interaction in Māori culture <http://www.korero.maori.nz/forlearners/protocols>

Wales

Status of the Welsh language in Wales

Welsh is the oldest language in Britain, dating back possibly 4000 years. Early in the ninth century, when Wales enjoyed a cultural and political autonomy that lasted until the Norman invasions in 1066, the Latin alphabet was adapted for writing Welsh and Welsh literature emerged³³. In more recent centuries there has been a long history of the suppression of the Welsh language in Wales in favour of English. Following the Laws in Wales Acts of 1535 to 1542, Wales was treated as part of England; English was the only language of the courts and all use of Welsh was banned from public office.

Literacy began to spread throughout Wales in the 18th century, greatly aided by the circulating schools established by the preacher Griffith Jones. He devised an efficient three-month system to teach children and adults to read in their mother tongue using religious texts. The language taught was usually Welsh, although English was used in areas with an English-speaking majority. Almost half the population had attended these schools by the time Jones died in 1771 and Wales became one of the few European countries to have a literate majority³⁴.

While there were very few Welsh national institutions in 1850, in 1896 the Central Welsh Board was established to inspect grammar schools and a separate Welsh Department of the Board of Education was established in 1907. Although speaking Welsh in schools was not illegal, it had no government support and was actively discouraged; the medium of instruction was English and pupils could be punished for speaking Welsh until as late as the 1930s. Nevertheless, the BBC's Welsh service began introducing some Welsh-language radio programming in 1937; Welsh was allowed in the courts from 1942; and Welsh-medium education was authorised in 1944. The Welsh Language Act 1967 legitimised the use of Welsh in the courts and in 1988 the Welsh Language Board was established to advise the British Secretary of State for Wales on language issues. From the 1990s, legislation required equal treatment of the Welsh and English languages in Wales: *The Welsh Language Act 1993*; *The Government of Wales Act 1998*; *The Welsh Language Measure 2011*; and *The National Assembly for Wales (Official Languages) Act 2012*. Under this legislation: public bodies prepare and implement a Welsh Language Scheme; local councils and the Welsh Government use Welsh as an official language, with official literature in Welsh and English; and the Welsh language is visible in public. Welsh language media are important instruments of language revitalization; these comprise: a Welsh language TV station (S4C) and a radio station: BBC Radio Cymru; a weekly national paper, magazines and regional monthly papers. This is important because the availability of broadcast media, especially television, in the minority language strengthens other language revitalisation measures, as Grin and Vaillancourt (1998, p. 114) point out.

Through a process of devolution within the UK, the Government of Wales Act 1998 created the National Assembly for Wales which determined how the UK government's budget for Wales is spent and administered. Education is a devolved power under this legislation. More recently, the Government of Wales Act 2006 created the Welsh Assembly Government (the executive), separate from the National Assembly for Wales (the legislature).

Welsh language speakers

Wales has a diverse population with 78 languages spoken in 2006³⁵. In 2011, 19 percent of usual residents aged 3 or more could speak Welsh, a reduction from 21 percent in 2001, despite an increase in the total population (3.06 million in 2011). The population with no Welsh language skills increased

³³ <http://www.bbc.co.uk/wales/history/sites/themes/language.shtml>

³⁴ http://www.bbc.co.uk/wales/history/sites/themes/society/language_literacy.shtml

³⁵ <http://www.museumwales.ac.uk/en/2680/>.

between 2001 and 2011. Welsh is now a minority language in the Welsh-language heartlands of Carmarthenshire and Ceredigion and the proportion of Welsh speakers has also dropped in Gwynedd and Anglesey, mainly due to inward-migration by non-Welsh speakers (in 2011 26 percent of the population was born outside Wales). However, there are more Welsh speakers aged 3 to 14 and 20 to 44 years but fewer in other age groups³⁶ (ONS, 2013).

The Welsh language in schools

The Welsh Assembly's strategy, *The Learning Country*, set out a ten-year vision and associated actions to transform education and lifelong learning in post-devolution Wales (Welsh Assembly, 2001). Welsh-medium schools were included in the strategy and the government's Welsh-Medium Education Strategy was published in 2010 with a vision to have an education and training system that responds in a planned way to the growing demand for Welsh-medium education (Welsh Assembly Government, 2010, p. 4). In English-medium schools Welsh is taught as a second or additional language, compulsory to age 16 in alignment with the Welsh Second Language Action Plan (Welsh Government, 2012).

The Welsh Assembly Government's literacy and numeracy strategy: *Words Talk – Numbers Count*

Post-devolution, the Welsh Government's commitment to raising standards in literacy and numeracy has been expressed in a series of reports with an emphasis on basic skills in work. These include Skills that Work for Wales (Welsh Assembly Government, 2008), the first annual report of the Wales Employment and Skills Board (2009) and the Employer Pledge³⁷, awarded to employers who support staff with essential skills needs. The government's second Basic Skills Strategy, *Words Talk – Numbers Count* (National Assembly for Wales, 2005), covers 2005 to 2010 and takes forward the agenda of *The Learning Country* (Welsh Assembly, 2001). *Words Talk – Numbers Count* covers all ages, and includes the aim that "the number of adults with poor basic skills should be diminished significantly" (National Assembly for Wales, 2005, p. 6). From 2007 the National Assembly for Wales (since 2011, the Welsh Government) has promoted Wales as a "bilingual and multicultural nation" but "there has been less of a strategic emphasis on the development of basic skills in the medium of Welsh" (Miller & Lewis, 2011, p. 6).

Adult numeracy in Wales

Adult numeracy in Wales has been measured in a series of national and international surveys in recent years. All four countries of the UK took part in the second round of the International Adult Literacy Survey (IALS) in 1996; England, Scotland and Wales took part as one jurisdiction (Carey, Low, & Hansbro, 1997) and Northern Ireland was assessed separately (Sweeney, Morgan, & Donnelly, 1998)³⁸. The UK did not take part in the successor to IALS, the Adult Literacy and Lifeskills (ALL) survey. Instead, the National Survey of Adult Skills in Wales 2010 (Miller & Lewis, 2011) assessed literacy and numeracy skills of adults aged 16 to 65³⁹ through the medium of English and the literacy

³⁶ <http://www.ons.gov.uk/ons/rel/census/2011-census-analysis/language-in-england-and-wales-2011/index.html>.

³⁷ <http://wales.gov.uk/topics/educationandskills/skillstrainingandemployment/employerpledgeaward/?lang=en>

³⁸ IALS surveyed 'quantitative literacy' rather than 'numeracy'.

³⁹ The survey used the latest available mid-year population estimate from the Office for National Statistics at the point the survey was carried out in 2009 and was 1,927,000 (Llywodraeth Cymru/Welsh Government, personal communication, 7 February, 2014).

(but not numeracy) skills of Welsh-speaking adults through the medium of Welsh. The 2010 Survey replicated similar surveys undertaken in 2004 (BMRB, 2004; BSA, 2004).

The 2010 survey found that progress on numeracy was slower than literacy, with 50 percent of respondents assessed at Level 1 or above, three percentage points higher than in 2004 but five percentage points below the Strategy target of at least 55 percent to achieve at least Level 1 numeracy by 2010. Assessment results for Welsh literacy declined between 2004 and 2010, from 67 to 63 percent at Level 1. The report notes that “The gap between literacy and numeracy assessment levels also widened, so that four times as many people were classified at Entry Level for numeracy than for literacy in 2010 and some 918,000 working age adults across Wales were estimated to have numeracy skills below Level 1” (Miller & Lewis, 2011, p. 9). Numeracy levels were higher amongst the employed and those with greater household income, higher qualifications and amongst the older age groups. The survey also revealed a substantial gender gap in numeracy: 60 percent of women and 41 percent of men were assessed at Entry level; and 29 percent of men were assessed at Level 2 or above, as compared to 13 percent of women (Miller & Lewis, 2011, p. 10).

England and Northern Ireland (but not Wales or Scotland) have taken part in the successor to the ALL survey, the Programme for the International Assessment of Adult Competencies (PIAAC) (OECD, 2013).

Aotearoa⁴⁰ New Zealand

The precise date of the first human settlement in New Zealand is debated, but current understanding is that Māori arrived in the 13th century. From 1642, when Abel Tasman named the country New Zealand, Māori had increasing contact with European and other seafarers and then with settlers, the latter mainly from the British Isles. The Treaty of Waitangi⁴¹ (1840) is the nation’s founding document, setting out the terms of a political compact between Māori and the British Crown. Following the Treaty, from 1841 to 1907 New Zealand was termed a British colony, then, from 1907, a Dominion of the British Empire and in 1931 became a founder-member of the British Commonwealth⁴². In 1986 residual British legislative powers ended and New Zealand became formally (rather than just de facto) self-governing. Until the ‘Māori Renaissance’ of the 1980s, New Zealand government policies favoured the Pākehā⁴³ majority. Since then biculturalism has been emphasised, based, since 1992, on Treaty of Waitangi claims and settlements.

Languages spoken in New Zealand

New Zealand has three official languages: English; Te Reo Māori; and New Zealand Sign Language. New Zealand is one of the world’s most super-diverse societies, with 160 languages spoken (Spoonley & Bedford, 2012). Despite its linguistic diversity, 76.6 percent of New Zealanders continue to be monolingual in English (NZHRC, 2008).

A proposed national languages policy for New Zealand

2013 marked the 21st anniversary of the publication of the Ministry of Education report Aotearoa: Speaking for ourselves (Waite, 1992), widely understood to be a precursor to a national languages policy (East, Shackleford, & Spence, 2007; Holmes, 1997; Spence, 2004). However, while various

⁴⁰ Aotearoa is the Māori name for New Zealand; in this paper we use the country’s official name: New Zealand.

⁴¹ <http://www.nzhistory.net.nz/politics/treaty-of-waitangi>

⁴² In 1949 the British Commonwealth was re-named the Commonwealth of Nations.

⁴³ Pākehā refers to non-Māori New Zealanders, primarily those of European descent.

language initiatives (outlined below) have emerged, so far there is no such policy. Meanwhile, independently of government, the New Zealand Human Rights Commission (NZHRC, 2010) has proposed a national languages policy, recently summarised in priorities for action (quoted in RSNZ, 2013, p.3).

Te Reo Māori in New Zealand

Use of Te Reo Māori in New Zealand was actively suppressed and discouraged in favour of English until the later half of the 20th century (NZHRC, 2012, p. 3). The Māori Language Act 1987 brought Te Reo Māori into the public policy domain in New Zealand and established the Māori Language Commission to promote and support the growth of the Māori language. A 1991 Amendment to the Act expanded the range of legal settings in which Te Reo could be used. As in Wales, the broadcast media are important instruments of language revitalization. There are two TV channels (Māori Television and Te Reo) and there are Māori language programmes on mainstream TV and Māori radio stations. The promotion of Te Reo has resulted in the public acceptance of the use of some Māori language and protocol as a part of New Zealand culture. For example, by 2011 most government agencies had Māori and English names and traditional Māori welcome and farewell ceremonies are often performed at official functions.

Numbers of Te Reo Māori speakers in New Zealand

The most recent New Zealand Census for which figures are available (2006) showed a total population of 4,027,947, with Māori at 15.4 percent. Māori were counted in two ways: by ‘ethnicity’ (i.e., cultural affiliation: 15 percent) and ‘descent’ (i.e., ancestry: 18 percent)⁴⁴. The figures for those of Māori descent are rising: in 2006 they were up 26 percent from 1991. The Māori population has a predominantly young demographic profile: in 2006, 35 percent of people of Māori descent were under 15 years old, while only 4 percent were 65 or over (Statistics New Zealand, 2007b). The Census shows that Te Reo is spoken by 4 percent of the New Zealand population and English is spoken by 96 percent; all adult Māori speakers can also speak English. Amongst the Māori population, 25 percent of those aged 15 to 64 and 49 percent of those aged 65 or over could hold a conversation in Te Reo Māori. However, there is a decline in the use of the language by those aged under 15: of these, 17 percent could hold a conversation in Te Reo Māori in 2006, compared with 20 percent in 2001 (Statistics New Zealand, 2007a).

However, the *Survey on the Health of the Māori Language* in 2006 (Research New Zealand, 2007) shows significant increases in Māori adults’ proficiency in Te Reo. Speakers of the language are up 8 percent, readers of it up 10 percent, writers up 11 percent and the numbers of those who can listen with understanding are up 9 percent, compared with the 2001 survey (Statistics New Zealand, 2002). This increase comes alongside progress in re-establishing intergenerational language transmission, with more Māori adults speaking Te Reo Māori to children in their homes and in community domains. The greatest increases have been recorded in the higher proficiency levels, which have more than doubled in the 15-24 and 25-34 year age groups. More young people now have some degree of speaking proficiency, with increases of 13 percent, 16 percent and 10 percent across the 15-24, 25-34 and 35-44 year age groups respectively (Research New Zealand, 2007).

⁴⁴ Intermarriage between Māori and non-Māori in New Zealand has been commonplace since early colonial times.

Te Reo Māori in schools

By the 1830s Māori were attending mission schools in large numbers and becoming literate in English and Māori⁴⁵. By the early 1860s Pākehā were in the majority and English became the dominant language. Te Reo became confined to Māori communities and was suppressed in schools (including government-funded Native Schools), either formally or informally, in the name of assimilation with the wider community.

Since the mid-1980s the Māori Renaissance has led to the emergence of different levels of Māori language and cultural immersion in education: ‘Māori-medium’ schools; ‘Māori language in English medium’ schools; and ‘no Māori language in education’. ‘Māori-medium’ schooling comprises kōhanga reo (pre-school); kura kaupapa Māori (primary school); and wharekura (secondary school) wherein students are taught the curriculum in the Māori language for at least 51 percent of the time. In ‘Māori language in English-medium’ schools students learn Māori as an additional language, or are taught the curriculum in the Māori language for up to 50 percent of the time. Thirdly, ‘no Māori language in education’ ranges from an introduction to the Māori language via Taha Māori⁴⁶ to no involvement in Māori language education at any level. In addition, whare wānanga⁴⁷ provide Māori Tertiary options and most of the major universities and technical institutes teach Te Reo Māori as a language subject⁴⁸. In principle, parents can send their children either to an English-medium school or to a Māori bilingual or immersion school but in practice many parents have no local access to Māori-medium programmes.

Māori students' outcomes of schooling in Mathematics

The New Zealand Ministry of Education’s Best Evidence Synthesis (BES) for mathematics, *Effective Pedagogy in Pāngarau/Mathematics*, paints a disturbing picture of low achievement in mathematics by Māori students, with one in three leaving school without any formal qualifications: “the harsh reality is that average achievement, as shown in PISA and other mathematics assessments (e.g., the National Education Monitoring Project), is lower for Māori and Pasifika⁴⁹” (Anthony & Walshaw, 2007, p. 9).

Recent efforts to improve this situation with respect to Māori include Te Poutama Tau project (Trinick & Keegan, 2007) which aimed: to develop the discipline to support Māori-medium mathematics; to raise Māori student achievement in mathematics by improving the professional capability of teachers; and to continue the revitalisation of Te Reo Māori. The authors found that 11 year-old pupils performed significantly above the national norms for Māori-medium schools (Trinick & Keegan, 2007, p. 20).

Adult numeracy, literacy and language in New Zealand

In the ALL survey New Zealand adults consistently scored average on all four scales⁵⁰ of the survey. The main variation in the literacy and numeracy skills of 25 to 65 year olds was due to three key factors: completed education; language background; and computer use. People whose first language was English had a considerable advantage, especially in English literacy, but also in numeracy tested

⁴⁵ Missionaries first transcribed the Māori language in 1814 and the written language was systematised by 1820.

⁴⁶ Taha Māori means ‘the Māori perspective’, in this context, this entails the use in teaching of simple Māori words, greetings or songs.

⁴⁷ Whare wānanga: ‘house of learning’ or ‘house of teaching’ (referring to higher learning or teaching).

⁴⁸ http://www.maorilanguage.info/mao_lang_faq.html.

⁴⁹ Pasifika refers to people of Pacific Nations heritage.

⁵⁰ The ALL survey measured prose literacy, document literacy, numeracy and problem solving.

in English. Non-first language speakers of English were less disadvantaged if their main home language was English (Lane, 2010, p. 1). Interestingly, when ethnic identification was examined as a secondary factor for English first-language speakers, “an advantage for Europeans and a disadvantage for Māori and Pasifika, especially in numeracy, [was found] within this language subgroup” (Lane, 2010, p. 4). New Zealand is taking part in the second round of PIAAC, the successor survey to ALL, with results due in 2016.

New Zealand's strategies, policies and goals with regard to Te Reo Māori and Māori students

New Zealand has instituted various strategies, policies and goals with regard to Māori students and Te Reo Māori; these are outlined below.

The Māori Language Strategy 2003

The Māori Language Strategy 2003 set out five goals to be achieved by 2028: the majority of Māori will be able to speak Māori to some extent and proficiency levels in speaking, listening to, reading and writing Māori will increase; Māori language use will be increased at marae, within Māori households and other targeted domains; all Māori and other New Zealanders will have enhanced access to high-quality Māori language education; iwi, hapū⁵¹ and local communities will be the leading parties in ensuring local-level language revitalisation; iwi dialects of the Māori language will be supported; the Māori language will be valued by all New Zealanders and there will be a common awareness of the need to protect the language (Ministry of Māori Development, 2003). In 2011 Te Pūni Kōkiri, the successor to the Ministry of Māori Development, published a Review of the Māori Language Sector and the Māori Language Strategy (Te Pūni Kōkiri, 2011). A proposed national Māori Language Strategy (Te Puni Kōkiri, 2013) was released in December 2013 with public consultation in February 2014. The Strategy proposes strengthening the focus on whānau⁵², hapū and iwi and consolidating Māori leadership.

Ka Hikitia

Ka Hikitia is the New Zealand Ministry of Education’s (2008, 2013) strategy for Māori achieving educational success as Māori, currently being refreshed for the period to 2017. In the first stage of the Ka Hikitia strategy, from 2008 to 2012, Māori language in education was identified as one of four areas in which coordinated activity would have most impact (Ministry of Education, 2008, p. 24).

Adult literacy, language, and numeracy education policy in New Zealand

There has been a strong development of adult literacy, language, and numeracy education policy in ‘foundation learning’ in New Zealand, consistently in literacy, although numeracy and language appear and disappear in official policy documents. For example, More Than Words, the policy document that launched the New Zealand Adult Literacy Strategy in 2001, is silent on numeracy but does include “the opportunity to achieve literacy in English and Te Reo Māori” (Walker et al., 2001, p. 3).

⁵¹ Hapū: A named division of a Māori iwi (tribe) consisting of a number of whānau (extended families); membership is determined by genealogical descent.

⁵² Whānau: extended family.

The subsequent *Literacy, Language and Numeracy Action Plan 2008–2012* (TEC, 2008) includes both language and numeracy, as the title suggests. However, Te Reo Māori is not mentioned and language is subsumed within literacy (TEC, 2008, p. 7).

Two years later, *Getting Results in Literacy and Numeracy* (TEC, 2010) provided an update on what had been achieved since the Action Plan and outlined the next steps for the tertiary education sector. The main focus is on literacy and numeracy, not language.

The title of the most recent document associated with New Zealand's adult literacy and numeracy policy, the *Adult Literacy and Numeracy Implementation Strategy* (TEC, 2012), reflects the focus on literacy and numeracy but once more language is not included. Te Reo Māori is mentioned, but only weakly, in the New Zealand adult Learning Progressions in listening, speaking, reading and writing in New Zealand English (introduced in 2005 and a key element in the New Zealand adult literacy and numeracy infrastructure)⁵³.

The current Tertiary *Education Strategy 2010–2015* (TES) specifically includes Te Reo Māori: “tertiary education plays a major part in promoting the revitalisation of te reo Māori” (New Zealand Office of the Minister for Tertiary Education, 2010, p. 7). At the same time, TES Priority 4 is “improving the literacy, language and numeracy and skills outcomes from levels one to three study” (New Zealand Office of the Minister for Tertiary Education, 2010, p. 10) and the Tertiary Education Commission’s (TEC’s) priority groups are Māori, Pasifika and Youth learners.

The TEC’s operational approach and implementation of the government’s Draft Framework for Māori Learners, *Tū Māia e te Ākonga* 2013–2016, is informed by the Tū Māia Working Group⁵⁴. This Group advises the TEC and shares best practice in the tertiary sector to ensure that Māori enjoy success as Māori in tertiary education, particularly at higher levels.

Te Reo Māori in adult numeracy education practice and provision in New Zealand

Foundation programmes in tertiary education are provided by universities, polytechnics, whare wānanga, private training establishments (PTEs) and iwi providers. There is targeted government funding for ‘embedded’ (i.e., integrated) literacy and numeracy provision at Levels 1 to 3 of the National Qualifications Framework but, as noted above, Te Reo Māori barely features.

Against this background, the Māori Adult Learners (Te Pakeke Hei Ākonga) project aimed to capture the perspectives of learners, tutors and providers on how language, literacy and numeracy in foundation learning programmes can be optimised for adult Māori learners (McMurphy-Pilkington, 2009). Findings from this project are discussed earlier in this paper in the Ethnomathematics section.

Comparing New Zealand and Wales

As we have seen, New Zealand and Wales have similar-sized populations in which the majority of people speak English, a minority speak Te Reo Māori or Welsh (albeit a larger minority in Wales than in New Zealand) and adult members of these linguistic minorities generally also speak English. Both countries have a history of the suppression of their native languages by successive British governments, followed by relatively recent attempts at language revitalisation, including through education, with varying but limited success to date.

In both countries the native language is a powerful symbol of a resurgent national, cultural and/or ethnic identity. The main policy driver in this respect in Wales is devolution, with the Welsh language

⁵³ <http://www.literacyandnumeracyforadults.com/resources/354991>

⁵⁴ <http://www.tec.govt.nz/Tertiary-Sector/Reviews-and-consultation/T-Mia-Working-Group/>

an important outward and visible sign of increased independence within the UK. In New Zealand, the main policy driver is biculturalism (Māori and Pākehā), with the revitalisation of Te Reo Māori strongly bound up with issues of ethnicity and culture, played out against the backdrop of post-colonial redress for Māori through Treaty of Waitangi settlements. This is happening at the same time as New Zealand is becoming increasingly linguistically (and ethnically and culturally) diverse.

Both countries are liberal democracies, currently governed by coalitions of political parties. Rata (2011) warns that institutionalising ethnicity in New Zealand is leading to the re-racialisation of society, thereby subverting the claim to universalism upon which liberal democracies are based. It is notable that debates around language and culture in Wales have largely abjured issues of ethnicity (although perhaps language is a proxy for ethnicity for some) and there is no equivalent in Wales to the emphasis in New Zealand on Māori kaupapa and tikanga (Māori world view and protocols).

At the level of policy, Wales' language policy is enshrined in law, while New Zealand has no formal language policy. Nonetheless, the revitalisation of the minority language is a live issue in both countries. In both countries, also, education in the native language is available as an additional language and (though to varying extents) Welsh-medium and Māori-medium education are available in compulsory schooling.

From the late twentieth century there is also evidence of similar levels of numeracy amongst adults of working age, similar concern by both governments to raise levels of numeracy and literacy for economic and social reasons and similar government responses in terms of the creation of an infrastructure to support adult literacy and numeracy learning and achievement, together with associated research and professional development. As a result, adult numeracy education in both New Zealand and Wales is widely available. However, in both countries it appears to be conducted almost exclusively through the medium of English. This requires some explanation, given the efforts to revitalise Welsh and Te Reo Māori outlined above and the "growing recognition that language (and bilingualism/multilingualism) plays a key role in mathematics teaching and learning" noted by Ní Riordáin and O'Donoghue (2011, p. 45). It may simply be that adult numeracy tutors are thin on the ground in both countries, with Welsh-speaking or Māori-speaking bilingual tutors especially rare. If so, this bespeaks the need for tutor training and professional development – in language and adult numeracy pedagogy - to fill the gap. However, that is unlikely to happen without a clear policy direction.

The absence of a robust link between language policy and adult numeracy education indicates the need for further policy development, alongside research and development focusing on language issues in relation to both existing adult numeracy learners and those outside provision; for some in either camp the language of instruction may be a barrier rather than a tool for learning.

A way forward? Policy evaluation from a critical linguistic human rights perspective

Since the adoption of the United Nations' (1992) *Declaration on the Rights of Persons Belonging to National or Ethnic, Religious and Linguistic Minorities*, states must positively engage in the protection of minorities rather than just refrain from discrimination. Grin (2004) points out the need for fairness and presents a framework for evaluating the monetary and non-monetary costs and benefits of minority language policy, including important social non-monetary effects, from a critical linguistic human rights perspective. Beneficial social non-monetary effects include "harmonious community relations or the positive value placed on diversity in its own right" and "long term benefits such as building capability, competitiveness and reducing costs", while social non-monetary costs include the unused skills of speakers of non-majority languages (Royal Society of New Zealand, 2013, pp. 3-4, citing Grin, 2004). While a full policy analysis along Grin's lines is beyond the scope

of this paper, the findings of the Māori Adult Learners project, outlined above, indicate beneficial social non-monetary effects of adult literacy and numeracy education, with some inclusion of Te Reo, tikanga and kaupapa Māori and a whānau atmosphere, all of which were valued by Māori learners. It behoves us as educators not to squander the unused and undeveloped numeracy skills, knowledge and understanding of speakers of non-majority languages.

Finally, Stephen May (2005, 2011) looks forward to ways in which minority languages may be reconstituted as instrumentally useful, rather than simply as ‘carriers’ of identity. He hopes that minority language rights will continue to develop a more nuanced sociolinguistic and wider socio-political approach to the issues of language, inequality and social justice with which it is centrally concerned.

We echo May’s hope and share his and Grin’s critical linguistic human rights perspective. We believe May is right to emphasise the practical advantages of implementing minority language rights within nation-states (May, 2005, p. 327). In further work we plan to explore what these advantages (and any disadvantages) may be (and for whom) with respect to adult numeracy education and how these rights might be articulated within relevant policy frameworks in linguistically diverse societies. We see minority languages as something to celebrate rather than just accommodate in adult numeracy education. Language is too important for the language dimensions of adult numeracy learning to be ignored in policy, teaching and the organisation of provision. Numbers and words are both important in adult numeracy teaching and learning. To invert the title of the adult literacy and numeracy strategy in Wales: numbers talk and words count.

Acknowledgements

We acknowledge the support of our institutions in writing this paper but wish to make clear that the ideas contained herein are our own and do not represent the policy of either of our institutions.

We wish to thank the following people who discussed aspects of this paper with us, all of whom did so in a personal capacity, rather than as representatives of their institutions:

- Theresa Aucamp, Te Wānanga o Aotearoa, New Zealand
- Conny Huaki, Te Wānanga o Aotearoa, New Zealand
- Niki McCartney, National Centre of Literacy and Numeracy for Adults, University of Waikato, New Zealand
- Tamsin Meaney, Malmö University, Sweden
- Pania Te Maro, National Centre of Literacy and Numeracy for Adults and Te Whare Wānanga o Awanuiārangi, New Zealand
- Jenny Young-Loveridge, Faculty of Education, University of Waikato, New Zealand

We also extend our thanks to those who attended our presentation at the ALM20 conference for their insightful comments.

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