

ALIGNING MEASURES OF ADULT LITERACY AND NUMERACY

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A minimum level of competency in literacy and numeracy is essential for people to participate fully in the 21st century and without these competencies adults face limitations in their work, community and home lives. Raising the literacy and numeracy skills of New Zealanders not only improves the prospects of individuals but also leads to a more productive workforce. As workplaces become more dynamic and increasingly technology-based, individuals need to have stronger basic skills, especially in literacy and numeracy, to maintain sustainable careers (Ministry of Education, 2014a).

Education plays an important role in providing young people with the key skills and competencies they need for further learning or to enter the workforce. This is one of the reasons why the Government introduced the Better Public Services (BPS) target of 85% of 18 year olds achieving the National Certificate in Educational Achievement (NCEA) Level 2 or equivalent qualifications. Embedded within NCEA qualifications is a requirement to obtain a minimum number of literacy and numeracy credits.

This short paper presents the key findings from a research report¹ commissioned by the Tertiary Education Commission to investigate the relationship between three measures of literacy and numeracy in widespread use in the New Zealand Education system. The first of these, the Literacy and Numeracy for Adults Assessment Tool (Assessment Tool), is primarily used in the tertiary sector. The Assessment Tool was developed to identify what individuals may need to learn in order to strengthen their literacy and numeracy competencies and is based on the Learning Progressions for Adult Literacy and Numeracy (learning progressions; Tertiary Education Commission, 2008). The Assessment Tool is underpinned by a measurement scale and served as a lynchpin for aligning two other measures: the literacy and numeracy requirements for NCEA and the levels of the Adult Literacy and Life (ALL) survey. Assessment Tool results were also used to investigate the distributions of reading and numeracy skills for students in school and tertiary samples.

The school sample included approximately 1,000 students at each of years 8, 11 and 12. The tertiary sample included approximately 36,000 students aged 16-20 years who were studying at Levels 1-3 of the New Zealand Qualifications Framework (NZQF) and were assessed on the Assessment Tool in 2012.

Key finding #1. Aligning the learning progressions to ALL levels

The alignment between the six steps on each of the reading and numeracy learning progressions, and Level 3 of ALL was explored through a critical analysis of previous empirical work

¹ The full report is available on the TEC website.

undertaken by Darr (2010) and Earle (2014). This was undertaken because ALL Level 3 is established as a benchmark for a minimum level of adult literacy and numeracy.

Darr (2010) used a psychometric approach in which ALL items were included in test trials for the Assessment Tool and concluded that ALL Levels 3 and 4 approximately correspond to steps 3-5 of the reading learning progressions, and that the bottom range of ALL Level 3 approximately aligns with the bottom range of step 5 on the numeracy learning progressions.

Earle (2014) used a statistical approach to map between the two scales. Earle's results positioned the bottom of ALL Level 3 close to the top of step 4 of the reading learning progressions and ALL Level 3 close to the bottom of step 6 (the highest step) of the numeracy learning progressions.

For the purposes of this research we used the most conservative alignments so that our analyses would provide a best-case scenario in terms of the proportions of students achieving the various credentials of interest. Consequently we aligned step 5 on the numeracy scale and step 4 on the reading scale to ALL Level 3. These alignments are also consistent with the NCEA literacy and numeracy requirements outlined by the New Zealand Qualifications Authority (NZQA) for the unit standard pathway. The left-hand side of Figures 1 and 2 show these alignments.

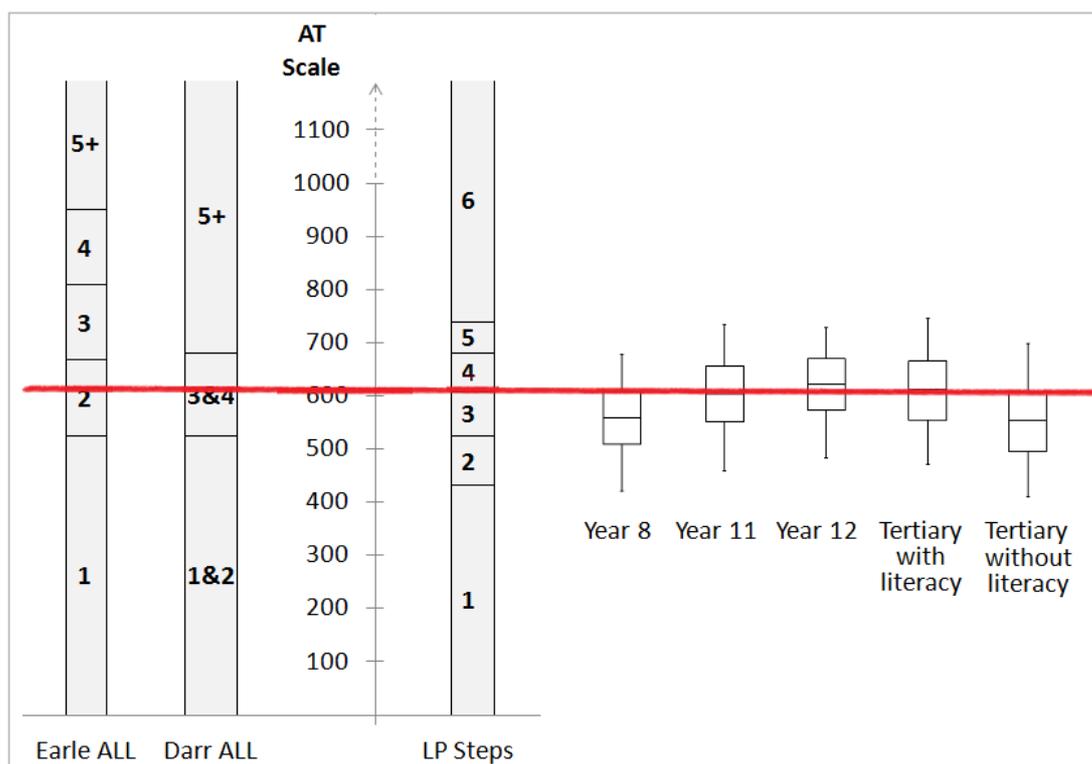


Figure 1. Literacy measures and the competencies of school and tertiary samples

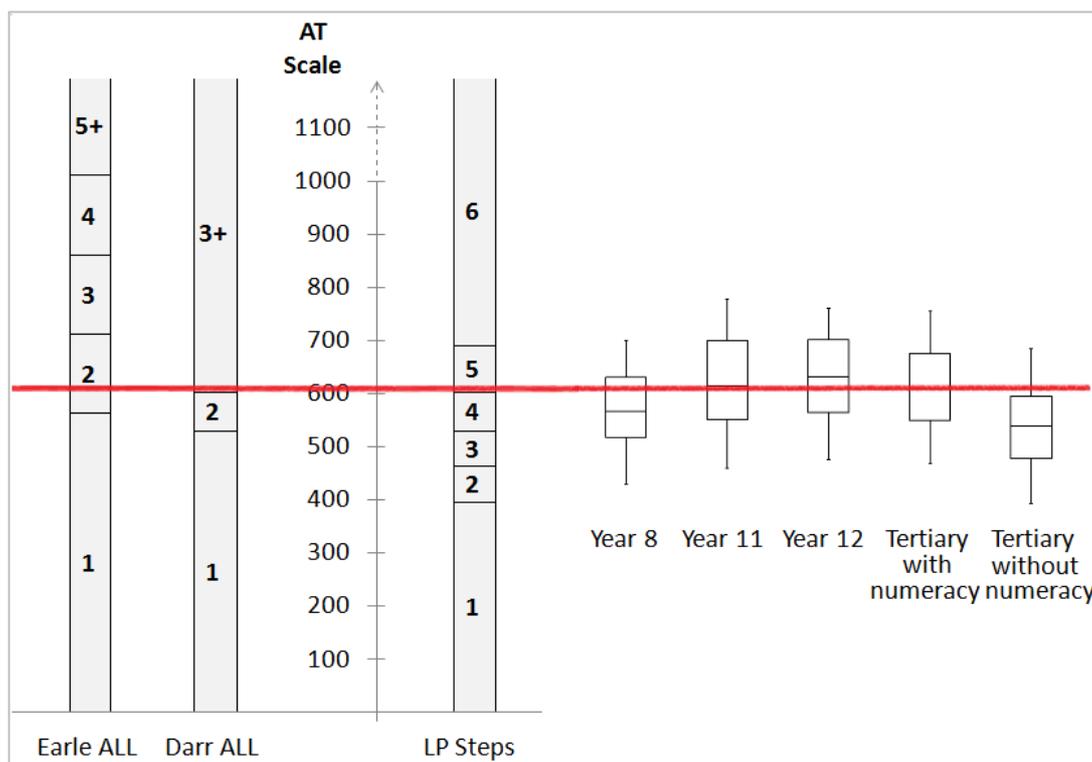


Figure 2. Numeracy measures and the competencies of school and tertiary samples

Key finding #2. The reading and numeracy competencies of students who have met the literacy and numeracy requirements for NCEA

The middle three box-and-whisker plots in Figures 1 and 2 show the Assessment Tool distributions of students who have met the literacy and numeracy requirement for NCEA. If the students possessed the competencies described in these requirements the distributions for the three plots should be above the red lines. As illustrated in the figures reasonably large proportions of students are below these lines. Approximately 50% of the year 11 students with NCEA Level 1 and 40% of year 12 students with NCEA Level 2 are under the literacy requirement defined in this research (step 4 on the reading scale). Just under 50% of the tertiary sample that have met the literacy requirements are below step 4.

The picture for numeracy is similar to that for literacy with just under 50% of the year 11 students with NCEA Level 1 and approximately 40% of the year 12 students with NCEA Level 2 assessed as below the numeracy requirements defined in this research (step 5 on the numeracy scale). Approximately 50% of the tertiary sample that have met the numeracy requirements are below step 5.

Key finding #3. Growth in the reading and numeracy competencies of students

The first three box-plots in Figures 1 and 2 illustrate the growth in the reading and numeracy competencies of students from the end-of-year 8 to the end-of-year 12.

One quarter of the year 8 sample is above ALL Level 3 for reading under the criterion defined for this research (step 4 on the reading scale). For year 11 students with NCEA Level 1, this increased to one half, with a small further increase for year 12 students with NCEA Level 2. Similar comments apply to the numeracy scale except that the proportion of the year 8 sample

above the minimum desired level (step 5 on the numeracy scale) was slightly more than one quarter. It is worth noting that the reading profile of the year 12 students who have attained NCEA Level 2 is very similar to the literacy profile of the adult population of New Zealand, as measured by the ALL survey in 2006. The numeracy profiles of both the year 11 students that have attained NCEA Level 1 and the students in the tertiary sample that have met the NCEA numeracy requirements also reflect these adult levels. The figures show that, while reading and numeracy do improve as students move from the end of the National Standards system to the level of formal qualifications, they do not improve at a sufficient rate to ensure that a clear majority of students will leave school with functionally adult levels of these skills.

Key finding #4. The literacy and numeracy competencies at the 15th percentile

A current BPS target for the New Zealand education system is to have 85% of young people achieve a qualification at Level 2 of the NZQF or above in 2017. The school sample was used to estimate the level at or above which 85% of all year 11 and 12 students are functioning. Table 1 shows the 15th percentile scale scores and the associated steps for year 11 and 12 on each of the reading and numeracy scales.

Table 1. Scale locations and steps on the reading and numeracy learning progressions associated with performance at the 15th percentile for Year 11 and Year 12 students in the school sample.

	Year 11		Year 12	
	Scale location	Step	Scale location	Step
Reading	492	2	531	3
Numeracy	471	3	506	3

Two features of these data are striking. Firstly, locations for both Year 11 and Year 12 students on both scales are well below the points associated with the NCEA requirements and ALL Level 3. Secondly, there is relatively little difference between the 15th percentile locations for Years 11 and 12. For numeracy, the location is well within step 3 for both year levels. Step 3 is associated with the following competencies: solving simple one-step addition and subtraction problems (eg 52-7), knowing basic multiplication facts, understanding numbers to 1000 and comparing simple fractions. For reading, although the 15th percentile location for Year 12 students is at step 3, rather than step 2 as it is for Year 11 students, it is at the very bottom of step 3. Step 2 for reading is associated with being able to read and understand a large number of everyday words, in short texts with simple sentences.

Key finding #5. Using the Assessment Tool as an integrating mechanism

The Assessment Tool might be suitable to provide an integrated mechanism for identifying individuals below the desired minimum levels of reading and numeracy, defined to be ALL level 3.

The Assessment Tool has two very attractive features as a lynchpin or integrating mechanism; it is calibrated to a measurement scale, and its online platform and adaptive algorithm and item bank make it accessible and efficient. However, before it can be adopted as an integrating mechanism, some further work should be undertaken and some caveats apply. Given the equivocal nature of the alignment work already undertaken, further work should be undertaken to confirm the steps on the reading and numeracy scales that best represent the minimum competencies required by New Zealand adults to participate fully in the 21st century, currently defined as ALL Level 3. Because the ALL survey has been superseded by the Programme for the International Assessment of Adult Competencies (PIAAC) which will first be conducted in New Zealand in 2014 (Ministry of Education, 2014b) it would be most appropriate to align these minimum competencies with the PIAAC scale.

It needs to be remembered that this project has not included measures of writing, listening, or speaking which are all important aspects of literacy. While the Assessment Tool does include an adaptive writing assessment it may be worth considering extending the scope of the tool to include these elements if it were to be used for the purpose of identifying whether individuals had met the agreed minimum competencies. Similarly, elements of geometry and statistics are not included in the Assessment Tool measure of numeracy.

Suggestions for the way forward

Suggestion 1: Confirm the minimum levels of literacy and numeracy New Zealand adults require to be functionally literate and numerate.

Suggestion 2: Ensure any requirement is properly and rigorously assessed.

Suggestion 3: Credential literacy and numeracy independently from qualifications.

Suggestion 4: Introduce formal requirements for literacy and numeracy to be met by the end of year 10.

References

Darr, C. (2010). Inside the Assessment Tool: Part 2. In *Assessing Adult Learning: literacy and numeracy competencies* (pp. 41–52). Wellington: NZCER Press.

Earle, D. (February, 2014). *Measures of Adult Literacy and Numeracy, Comparing the Adult Literacy and Life Skills Survey and Literacy and Numeracy for Adults Assessment Tool*. Wellington: Ministry of Education.

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