

## Analytical Note: Initial Results of Estimating the effect of Te Kotahitanga's model of pedagogy

James Ladwig, The University of Newcastle, March 2012.

### Background points

**The pedagogy scale:** The pedagogy used here scale is based on modelling reported in Bishop, Ladwig, Berryman (2012), and is a composite score that includes estimates of 'Relationship', 'Cognitive Level', 'Discursive Practices,' and 'Engagement' (see attached for this as yet, unpublished paper).

**The gain score:** For each student, a gain score was calculated based on asTTle results for each student for whom more than two gains scores were available. The maximum time interval for each gain score was 1 year, but for approximately a third of the sample (of 1318 students) the time interval was less (for schools who had pre-test data collected in the same year as the post-test). Thus the gains reported here are likely to be lower end estimates than would be the case if all student gains could have been based on a full year interval. These gain scores were used for the initial analyses simply to investigate the utility of further investment in further research using these data. The current analysis was conducted using Mathematics results for students who were in Year 10 in 2009. Future analyses will extend into literacy, and explore further the variable available gain scores.

**Process for matching pedagogy scores to students:** Pedagogy scores were first calculated per observation and aggregated by teacher. Student – teacher matches were then conducted based on form class lists provided by schools. Thus, for each student, an overall score of the pedagogy experienced by student (inclusive of all observed lessons) was developed. For each student in this analysis, the number of lessons observed ranged from 6 to 32. The mean number of observation per student = 9.22. This process requires relatively strong reliability of the pedagogy score within teacher (between classes). Within teacher repeated measure reliability have been previously estimated in evaluations of Te Kotahitanga, and are considered sufficiently strong for the current analysis. Further investigations of this reliability and other ways to match student outcomes to pedagogy data are underway.

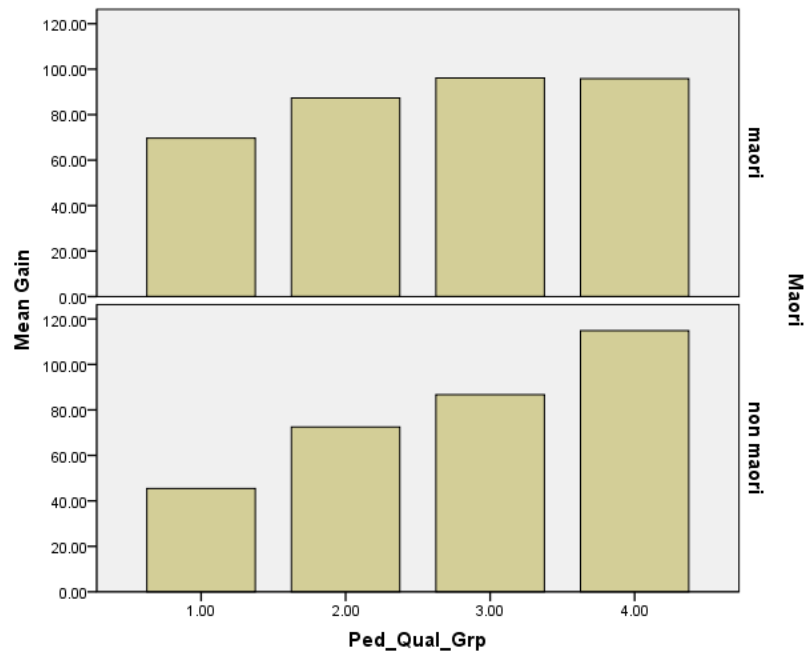
## Results

Using the above procedure, gains scores were calculated for each student and analysed relative to the pedagogy experienced by that student. The pedagogy score was further used to establish four groups of students: those whose scores for experienced pedagogy were 2 or more standard deviations above the mean, up to 1 standard deviation above the mean, down to 1 standard deviation below the mean, and 2 or more standard deviations below the mean pedagogy score. Using these four pedagogy groups it was then possible to estimate gain scores per group – thus examining the relative impact of increases in the quality of pedagogy as measured by Te Kotahitanga.

A further comparison in the results was done, splitting the population of students into Maori and non-Maori grouping. This allows some indication of whether or not improvements in pedagogy are beneficial to these different groups of students (a key rationale for Te Kotahitanga). The initial, descriptive, results of these analyses are presented below. First, Table 1 presented the basic mean gain scores and within group standard deviations numerically. Figure 1 presents the same data in graphic form, to allow quick comparison.

*Table 1: mean gain scores for Maori and Non-Maori students by pedagogical quality grouping*

Maori	Pedagogy by 1SD group	Mean	Std. Deviation	N
Maori	1.00 (2 SD below mean)	69.69	94.88	80
	2.00 (1 SD below mean)	87.31	89.58	191
	3.00 (1 SD above mean)	96.09	98.24	220
	4.00 (2 SD above mean)	95.81	129.93	47
	Total	89.02	98.11	538
Non Maori	1.00	45.44	84.11	75
	2.00	72.47	97.78	209
	3.00	86.70	95.35	398
	4.00	114.87	103.25	98
	Total	82.46	97.39	780
Total	1.00	57.95	90.36	155
	2.00	79.56	94.13	400
	3.00	90.04	96.41	618
	4.00	108.69	112.49	145
	Total	85.14	97.70	1318



*Figure 1: Bar graph of Gain score results reported above*

## Effect Size Estimates

From the results above, it is important to note that the smallest gain score found are in fact above the national average reported by the NZ ministry ('How much difference does it make Report,'). Rough effect sizes for the gain scores achieved by Te Kotahitanga schools (2009 mathematics) can be reported relative to those provide to schools for this purpose. For this we used the 2009 report available from:

<http://www.educationcounts.govt.nz/publications/schooling/36097/9> (see especially Table 3 of that report, pp 19-20).

Relative Effect sizes for each of the mean gain scores above are listed below in Table 2

**Table 2: Effect sizes for each of the mean gain scores**

Maori	Pedagogy by 1SD group	Mean	Effect Size
Maori	1.00 (2 SD below mean)	69.69	.35
	2.00 (1 SD below mean)	87.31	.55
	3.00 (1 SD above mean)	96.09	.63
	4.00 (2 SD above mean)	95.81	.63
	Total	89.02	.57
Non Maori	1.00	45.44	.11
	2.00	72.47	.39
	3.00	86.70	.53
	4.00	114.87	.82
	Total	82.46	.49
Total	1.00	57.95	.25
	2.00	79.56	.47
	3.00	90.04	.57
	4.00	108.69	.77
	Total	85.14	.53

Thus two things are evident in this analysis: 1) the gains achieved by students in Te Kotahitanga schools in 2009 mathematics are substantially higher than the national averages, with moderate to strong effects for the majority of students, and 2) the positive effects associated with higher quality pedagogy increase as the quality of pedagogy increases – consistent with the rationale and purpose of Te Kotahitanga.