School Name

PAT Growth Analysis

2010 - 2011

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ATSI: Aboriginal and Torres Strait Islander

Bands:

Band	Percentile Rank
P10	10th percentile and below
P25	11-25th percentile
P50	26 – 50th percentile
P75	51 -75th percentile
P90	76 – 90th percentile
P100	above 90th percentile

Boxplot: Boxplots are graphical representations of data, and are used here to describe the variation or spread of scale scores. The length of the box represents the difference between the 25th and 75th percentiles: the middle 50% of scores are within this box. The length of the box indicates the spread, so a larger box suggests that the middle 50% covers a wider range of scores. The line within the box is the median (or middle score, if all the scores were ranked), and spread is further suggested by whether this line is towards the top or bottom of the box: a median in the top half of a box suggests that, of the middle 50% of scores between the 25th and 75th percentiles, more scores were towards the 75th percentile than the 25th percentile. The point to which the line extends below the box indicates the 5th percentile, and the point to which the line extends above the box indicates the 95th percentile. These lines further indicate the spread of scores, as longer lines suggest more extreme scores in that direction.

Cohort: A group of students.

Cut score: Selected points on the score scale of a test. In this report, the cut off score for a percentile rank.

Gain or change: Gain or change of cohort performance is measured by the difference in average scale scores obtained by the matched cohort. A key assumption in measuring gain or change is that test scores have been placed on a common scale, and test scores can be directly and meaningfully compared across Year levels.

Matched Cohort: A group of students who have taken the same scaled test in previous years.

Matched Cohort: A group of students who have completed consecutive ACER TEST scores in previous years.

Mean: The average or central tendency of a distribution.

Median: The middle value of a data set when it has been arranged in ascending order.

p-value: The probability obtained by performing the statistical significance test, i.e. t-test (see page 7).

Percentile: A percentile is the value of the scale score below which a certain percent of students fall. For example, the 10th percentile is the score below which 10 percent of the students may be found.

Scale score: Scale score points are different from the "raw score" results that you would get by adding up the number of score points for correct answers on each part of the assessment. It is then possible to make meaningful comparisons of results between different years, and between different Year levels, even though the tests that are administered are not the same.

Standard Deviation (SD): A way to measure the spread of a distribution.

Standard Error of Mean (SE): The standard deviation of the sample mean estimate of a population mean. It is a measurement of sampling error.

Stanine: A stanine is a score from 1 to 9 with a stanine of 9 indicating a very high level of general ability relative to the whole norm reference group, and a stanine of 1 indicating a very low relative achievement. Stanines group together percentile ranks as shown in the table below:

Description	Stanine	Corresponding Percentile Ranks
Very High	9	96 and above
Above Average	8	90 - 95
	7	77 - 89
Average	6	60 - 76
	5	40 - 59
	4	23 - 39
Below Average	3	11 - 22
	2	4 - 10
Very Low	1	3 and below

t-test: The t-test assesses whether the means of two groups are statistically different from each other. The t-test is based on the observation that, when looking at the differences between scores for two groups, the difference is better captured by the difference between group means relative to the spread or variability of their scores.

t-value: The score obtained by performing a t-test.

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School (x) has a total of 222 students sitting PAT tests in two consecutive sittings (February 2010 and February 2011). Due to relatively small sample size for matched cohort, data from year level 2, 3 and 8 are not used in this analysis. In this report, statistics are only reported for cohorts with a minimum sample size of 20.

Table 1 shows the number of students in the School (x) cohort in 2011, the matched cohort who sat two consecutive years and percentages of matched cohorts for each year level in 2011.

Table 1 School (x) cohort

Year Level in 2011	PAT Cohort in 2011			Students who did 2 or more consecutive tests			Percentage of matched cohort		
	Total	Female	Male	Total	Female	Male	Total	Female	Male
5	48	19	29	47	19	28	97.9	100.0	96.6
6	52	23	29	52	23	29	100.0	100.0	100.0
7	52	25	27	51	24	27	98.1	96.0	100.0
8	76	35	41	72	34	38	94.7	97.1	92.7
Total	228	102	126	222	100	122	97.4	98.0	96.8

Table 2 shows means and standard deviations of School (x) cohort in 2011 and PAT norming sample. The t-test statistics show that the mean scores of School (x) cohorts are higher than mean scores of PAT norming sample.

Table 2 Comparison of School (x) cohort to PAT Norming sample

Year Level	Test Used	2011				PAT Norming sample				Difference		
		Mean	SD[1]	SE[2]	N[3]	Mean	SD	SE	N	Mean	t-value[4]	p-value[5]
5	4	58.5	13.6	2	47	49.6	20.9	3.3	39	8.9	2.3	0.02
6	5	59.1	9.9	1.4	52	54.9	20.5	3.2	40	4.3	1.2	0.23
7	6	63.6	7.8	1.1	52	60.2	20.7	3.2	41	3.4	1	0.33
8	7	63.6	9.5	1.1	73	65.2	20.8	3.2	42	-1.6	-0.5	0.64

1. SD: Standard Deviation; 2. SE: Standard Error of Mean; 3. N: Number of Students; 4: t-value: the score obtained by performing a T-test; 5. p-value: the probability obtained by performing the statistical significance test, i.e. T-Test.

Figure 1 shows the score distributions of School (x) cohort in boxplots. Box plots are graphical representations of data, and are used here to describe the variation or spread of scale scores. The length of the box represents the difference between the 25th and 75th percentiles: the middle 50% of scores are within this box. From the length of the box you can determine the spread, so a larger box suggests a cohort had a larger number of different scores.

The line within the box is the median (or 50th percentile), and spread is further suggested by whether this line is towards the top or bottom of the box: a median in the top half of a box suggests that of the middle 50% of scores between the 25th and 75th percentiles, more scores were towards the 75th percentile, than the 25th percentile.

The point to which the line extends below the box indicates the 10th percentile, and the point to which the line extends above the box indicates the 90th percentile. These lines further indicate the spread of scores, as longer lines suggest more extreme scores in that direction.

The dotted lines represent PAT norming percentiles, from top and downwards, 90th, 75th, 50th, 25th, and 10th percentiles.

This chart clearly shows that School (x) cohort had higher scores on the 10th, 25th and 50th percentiles than PAT norming sample for all year levels. The School (x) cohort had lower scores on the 75th and 90th percentiles than PAT norming sample for all year levels.
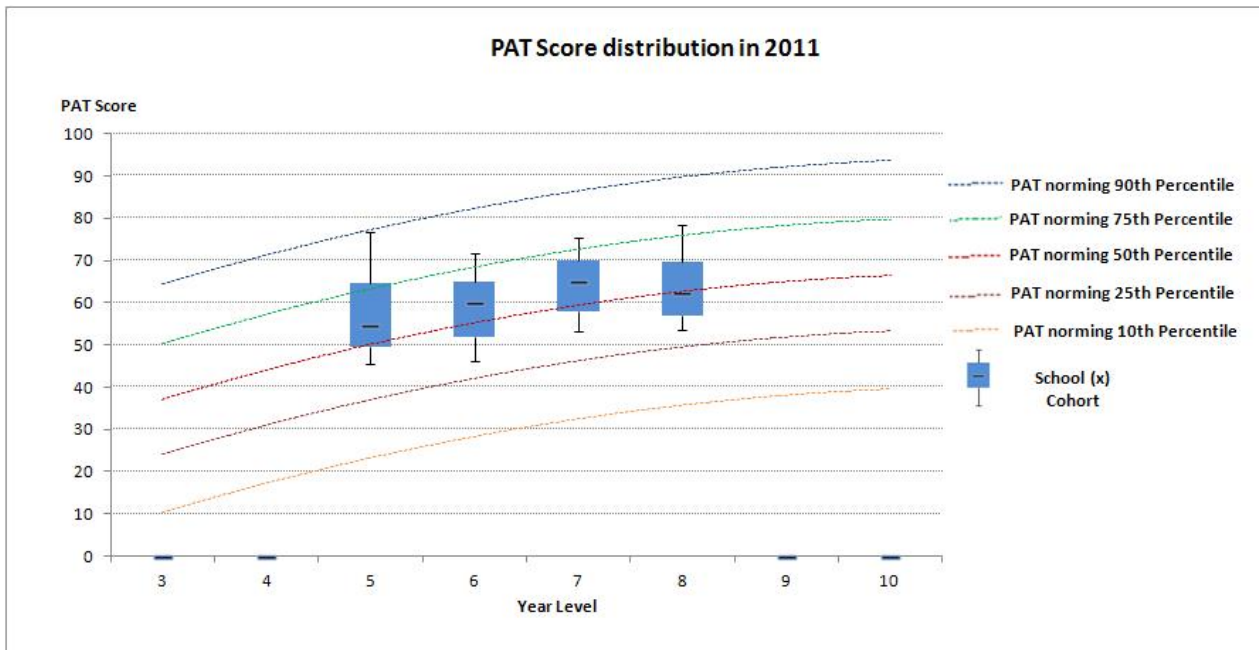
Figure 1 PAT score distribution in 2011

This section analyses the matched cohort data (i.e. for PAT for two consecutive years).

Table 3 and Figure 2 show the change in mean PAT scores for matched cohort from 2010 to 2011. The changes for Years 5, 6, 7 and 8 are in the range of 1.9 to 7.5 PAT score points. The cohort with the largest change is Year 5 with a change of 7.5. All changes are statistically significant with 95% confidence.

Table 3 School (x) matched cohort statistics from 2010 to 2011

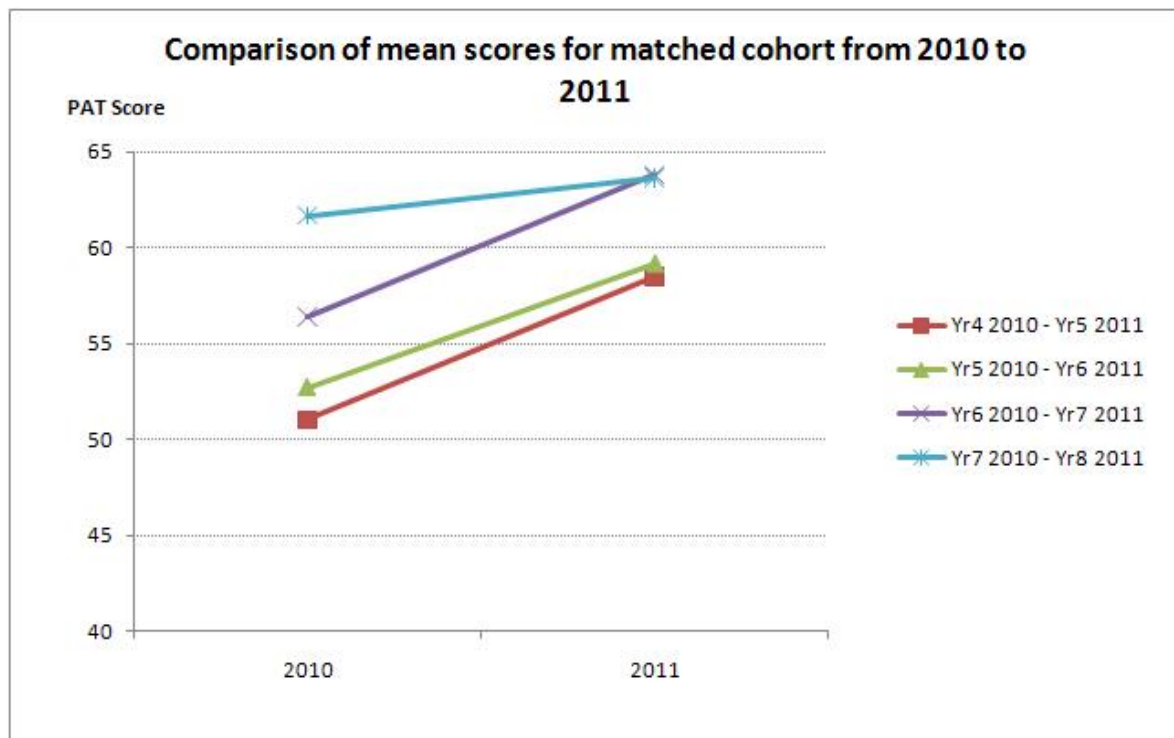| Year Level in 2011	N	2010			2011			Change
		Mean	SD	SE	Mean	SD	SE	
5	47	51.0	11.5	1.7	58.5	13.6	2.0	7.5
6	52	52.7	11.4	1.6	59.1	9.9	1.4	6.4
7	51	56.4	8.0	1.1	63.8	7.7	1.1	7.4
8	72	61.7	8.3	1.0	63.6	9.6	1.1	1.9

Figure 2 Comparison of mean scores for School (x) matched cohort from 2010 to 2011

Table 4 shows the percentile scores[1] (from P10[2] to P100) for matched cohort. (Please refer to Glossary for more information about percentiles). In Table 4 for example, the row for Year 5 (when the group is in Year 4, 2010) indicates that the 10th percentile score was 18.2. In 2011 (when they are in Year 5), the 10th percentile score is 27.3.

Table 4 Percentile scores for School (x) cohort from 2010 to 2011

Year Level in 2011	2010						2011					
	P10[1]	P25	P50	P75	P90	P100	P10	P25	P50	P75	P90	P100
5	18.2	29.5	36.6	42.4	48.7	49.1	27.3	35.1	42.4	48.3	53.3	54.2
6	27.1	36.4	42.9	49.7	53.9	54.2	34.0	41.2	46.8	52.8	56.7	57.8
7	30.6	38.8	47.2	52.8	59.1	60.3	37.2	44.7	50.6	55.8	61.0	62.0
8	39.8	47.6	55.0	62.0	63.9	65.1	43.9	54.3	63.4	70.8	76.5	77.8

Figure 3 shows that the score for 10th percentile, 25th percentile, 50th percentile, 75th percentile and 90th percentile is higher in 2011 than in 2010.
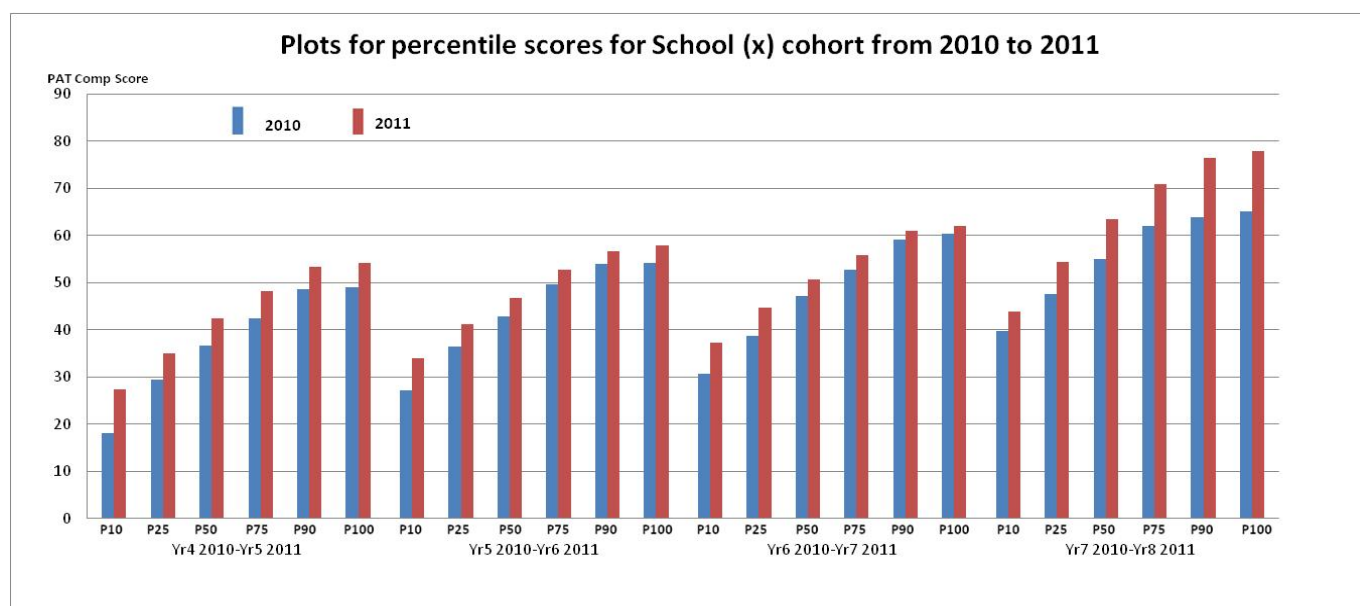

Figure 3 Plots of percentile scores for School (x) matched cohort in 2010 and 2011

Figure 4 shows the percentile changes in paired boxplots. Box plots are graphical representations of data, and are used here to describe the variation or spread of scale scores. The length of the box represents the difference between the 25th and 75th percentiles: the middle 50% of scores are within this box. From the length of the box you can determine the spread, so a larger box suggests a cohort had a larger number of different scores.

The line within the box is the median (or 50th percentile), and spread is further suggested by whether this line is towards the top or bottom of the box: a median in the top half of a box suggests that of the middle 50% of scores between the 25th and 75th percentiles, more scores were towards the 75th percentile, than the 25th percentile.

The point to which the line extends below the box indicates the 10th percentile, and the point to which the line extends above the box indicates the 90th percentile. These lines further indicate the spread of scores, as longer lines suggest more extreme scores in that direction.

A paired boxplots show the change from 2010 to 2011 with medians connected by a line. The boxplot on the left is for 2010, and the boxplot on the right is the 2011.

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[1] Please refer to Glossary for more information regarding Percentiles

[2] Please refer to Glossary for more information regarding Bands.

The chart clearly indicates positive change in each of percentiles from 2010 to 2011 for year levels 5, 6 ,7 and 9. The cohort with the largest change in median is the cohort of Year 8 with a change of 8.4 score point.
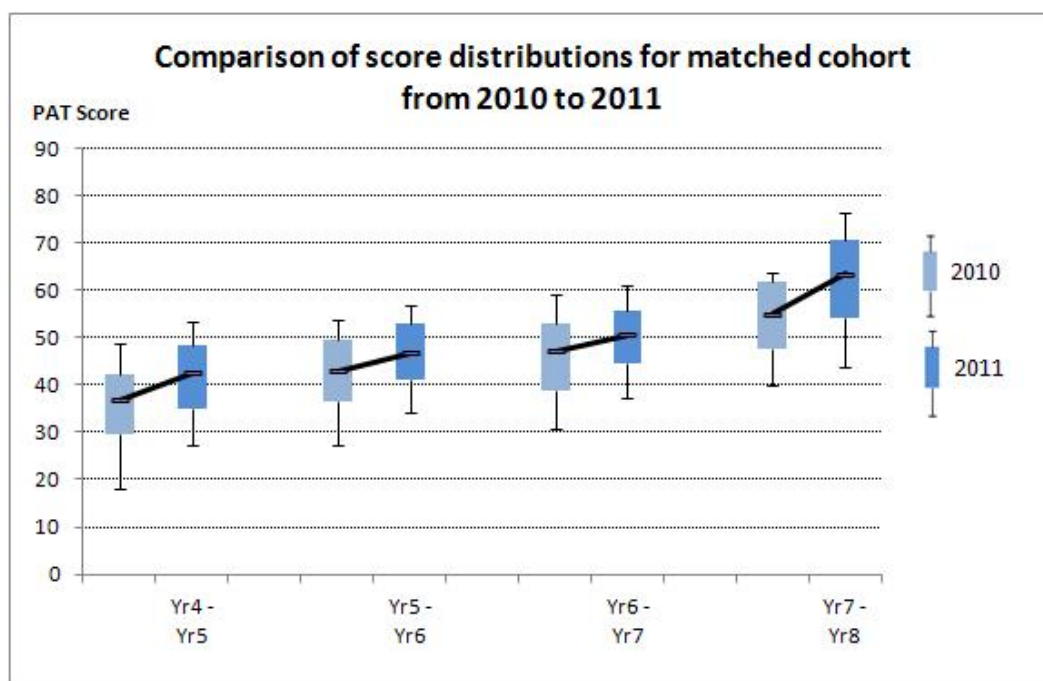

Figure 4 Comparison of score distributions for School (x) matched cohort from 2010 to 2011

Before comparing change between School (x) cohort and PAT Norming sample, School (x) cohort is compared to PAT Norming sample to get an idea of relative performance between these two samples. Table 5 shows that School (x) matched cohort in 2011 had relatively higher performance in PAT score than PAT Norming sample in mean differences except for Year 8 in 2011.

Table 5 Comparison between School (x) matched 2011 students and PAT Norming sample

Year Level in 2011	Test Used	School (x)				PAT Norming Sample				Difference		
		Mean	SD	SE	N	Mean	SD	SE	N	Mean	t-value	p-value
5	4	58.5	13.6	2.0	47	49.6	20.9	3.3	39	8.9	2.3	0.02
6	5	59.1	9.9	1.4	52	54.9	20.5	3.2	40	4.3	1.2	0.23
7	6	63.8	7.7	1.1	51	60.2	20.7	3.2	41	3.6	1.0	0.30
8	7	63.6	9.6	1.1	72	65.2	20.8	3.2	42	-1.5	-0.5	0.65

Figure 5 shows the one-year gain comparison between School (x) cohort and PAT Norming sample by mean scores. Note that PAT Norming sample are not matched cohort, and therefore the changes between year levels (e.g. from year 3 in 2009 to year 4 in 2010) were based on different students. The chart indicates that School (x) cohort had a relatively higher performance than PAT Norming sample in Year 6 and Year 7 in 2011.
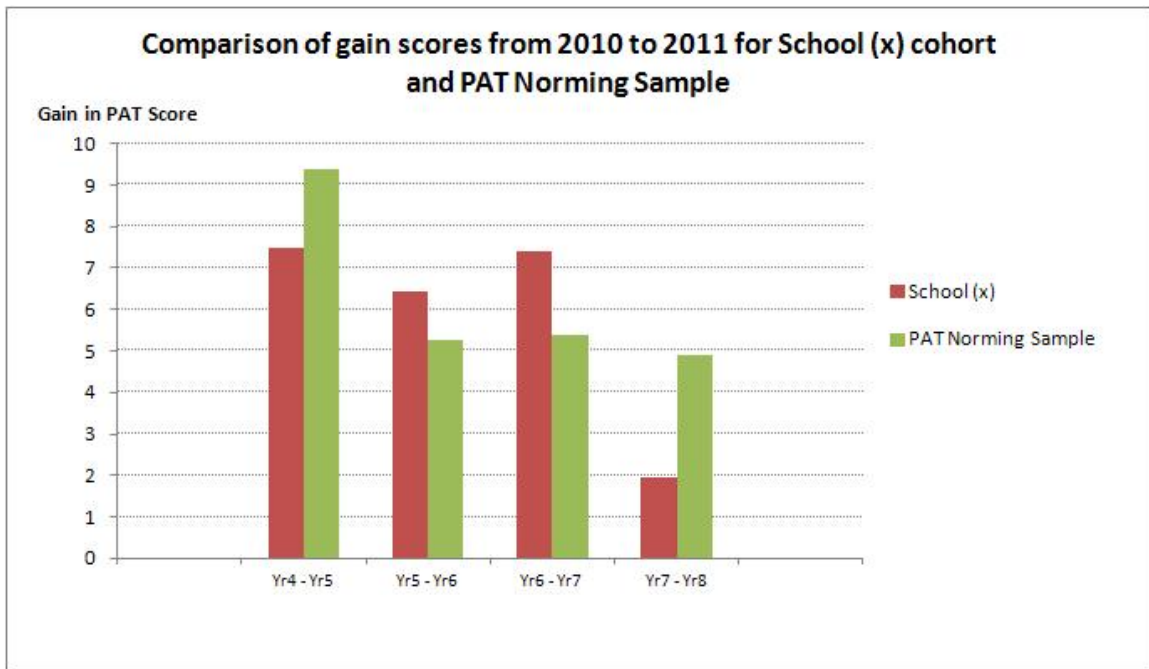
Figure 5 Comparison of gain scores from 2010 to 2011 for School (x) cohort and PAT Norming Sample

Table 6 and Figure 6 presents the percentile scores for the matched cohort and PAT Norming sample. Figure 6 plots the percentile scores for the school matched cohort and PAT Norming sample.

Table 6 Percentile scores for School (x) matched cohort (2010-2011) and PAT Norming Sample

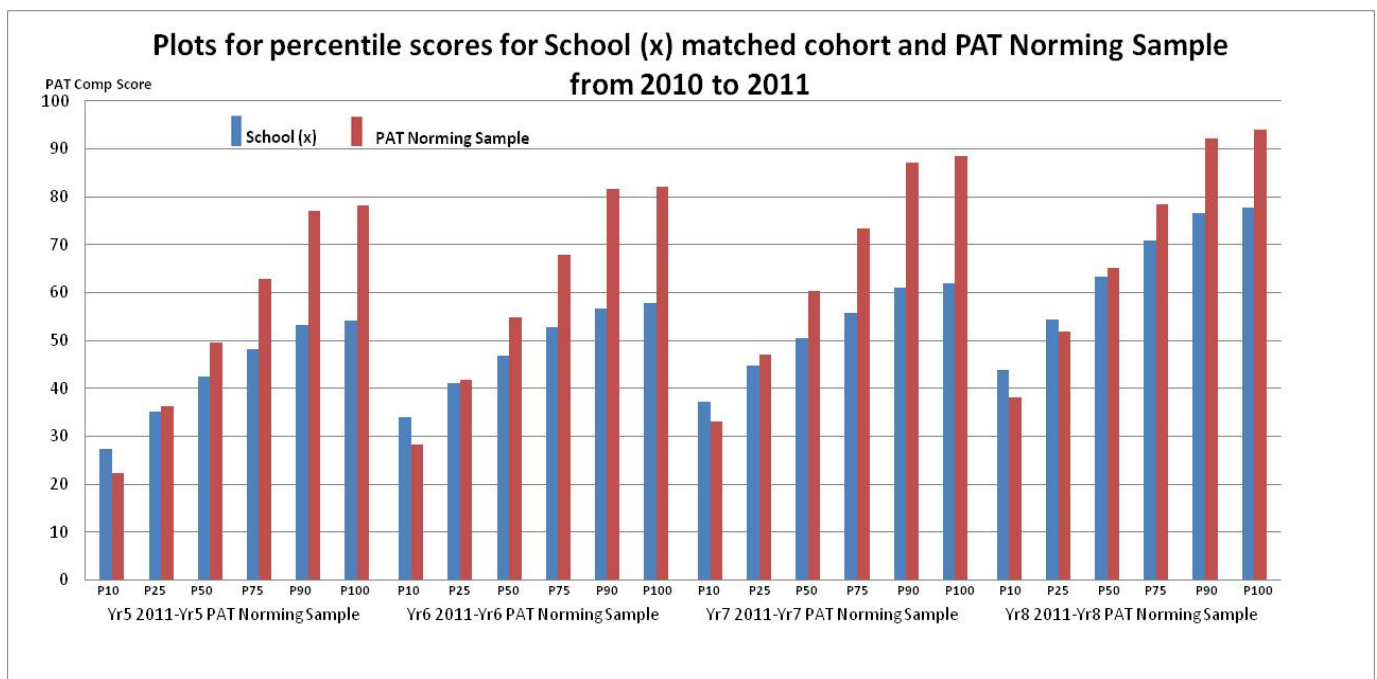| Year Level in 2011	Test Used	School (x)						PAT Norming Sample					
		P10	P25	P50	P75	P90	P100	P10	P25	P50	P75	P90	P100
5	4	27.3	35.1	42.4	48.3	53.3	54.2	22.4	36.2	49.5	62.9	77.0	78.1
6	5	34	41.2	46.8	52.8	56.7	57.8	28.2	41.9	54.8	67.8	81.7	82.0
7	6	37.2	44.7	50.6	55.8	61	62.0	33.2	47.1	60.3	73.5	87.1	88.5
8	7	43.9	54.3	63.4	70.8	76.5	77.8	38.2	51.9	65.1	78.4	92.3	94.1

Figure 6 Plots of percentile scores for School (x) matched cohort and PAT Norming Sample (2010-2011)

Figures 7 is stanine distribution charts (please refer to glossary for more information on stanines), for two consecutive years, starting from 2010 Year 7 to 2011 Year 8. For comparison purpose, the PAT Norming stanine distributions are included in the charts. In the paired stanine distribution, the left distribution refers to the matched cohort and the right is for the PAT Norming sample.
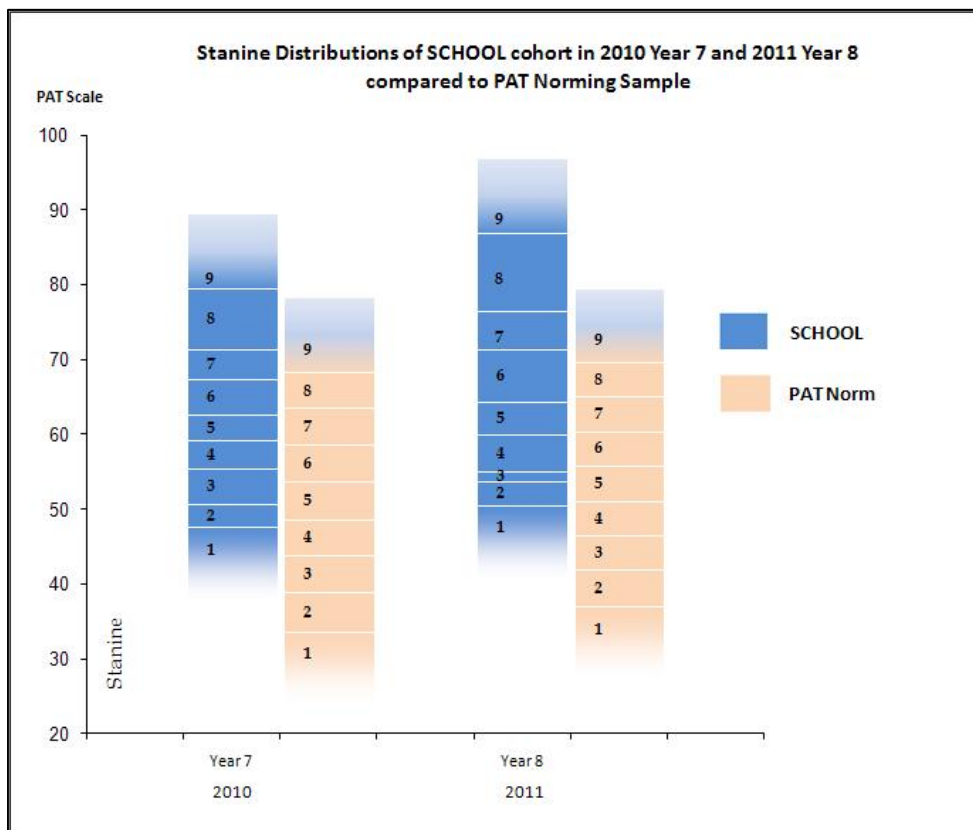

Figure 7 Stanine distributions of School (x) cohort from 2010 Year 7 and 2011 Year 8 compared to PAT Norming Sample

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Table 7 and Table 8 show one- year change of matched male and female cohorts respectively in PAT scores from 2010 to 2011. The changes for male cohorts in year 5, 6, 7 and 8 are in the range of 0.2 to 9.2 score points, compared to changes found in female year levels (a range of 4.0 to 9.2). All changes are statistically significant with 95% confidence. The remaining section will discuss the analysis results for year level 5, 6, 7 and 8 to compare male cohort with female cohort.

Table 7 Male cohort statistics from 2010 to 2011

Year Level in 2011	N	2010			2011			Change
		Mean	SD	SE	Mean	SD	SE	
5	29	51.3	10.9	2.0	60.5	13.9	2.6	9.2
6	29	54.1	13.4	2.5	58.3	8.2	1.5	4.2
7	27	57.5	8.1	1.6	65.0	7.6	1.5	7.5
8	40	63.1	8.4	1.3	63.3	10.1	1.6	0.2

Table 8 Female cohort statistics from 2010 to 2011

Year Level in 2011	N	2010			2011			Change
		Mean	SD	SE	Mean	SD	SE	
5	19	50.8	12.3	2.8	55.6	12.9	3.0	4.8
6	23	51.0	8.1	1.7	60.2	11.8	2.5	9.2
7	24	55.1	8.0	1.6	62.1	7.8	1.6	7.0
8	35	59.8	8.1	1.4	63.9	8.9	1.5	4.0

Figure 8 shows the change of male and female cohorts from 2010 to 2011, in terms of changes in mean PAT scores. The figure shows that although female cohort had relatively lower performance in all comparisons except Year 6 2010 to Year 7 2011, male cohorts appear to achieve similar gains, as female cohorts in year level 5, 6, 7 and 8. In other words, the rates of change for male cohorts appear to be same as those of female cohorts.
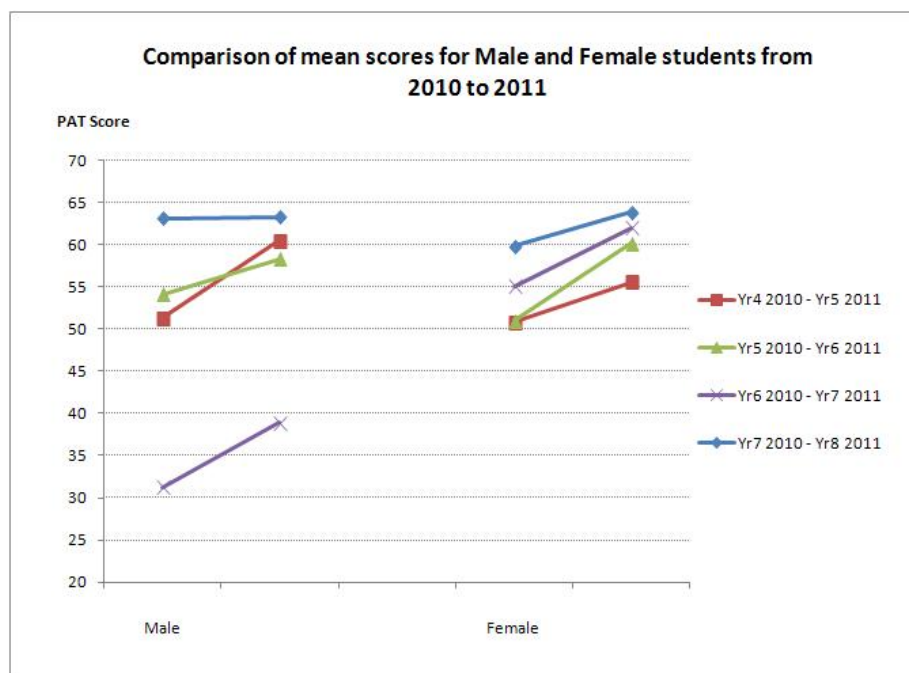

Figure 8 Comparison of mean scores for Male and Female students from 2010 to 2011

Figure 9a compares male against female cohorts in percentiles from 2010 to 2011 for Year 6 to Year 7. The lines connect the medians from 2010 to 2011 for male and female cohorts. The slope of the line indicates the rate of change in medians. The figure clearly shows that male cohorts had marginally higher growth rates in medians, than female cohorts in year level.
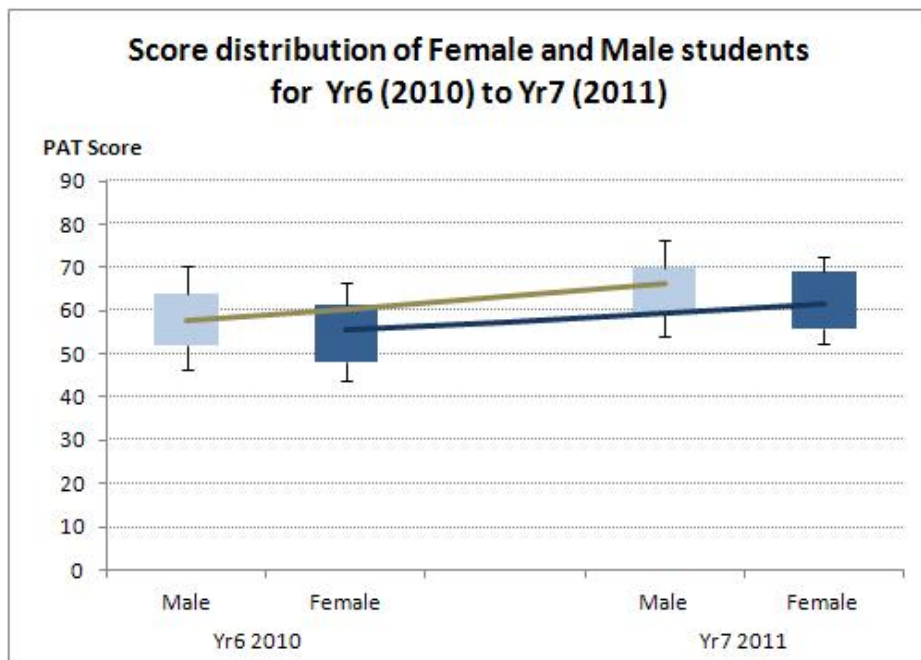
(a) Year 6 in 2010 to Year 7 in 2011

Figure 9 Score distribution of Male and Female students from 2010 to 2011

Figure 10 shows the comparison of gain scores among the School (x) male cohort, female cohort, and PAT Norming sample. The chart indicates that female cohort had relatively greater gains than both male cohort and PAT Norming sample in Year 6, and male cohort had relatively greater gains than both female cohort and PAT Norming sample in Year 7. Male cohort had relatively greater gains than female cohort but less than PAT norming sample in Year 5, whereas Female cohort had relatively greater gains than male cohort but less than PAT norming sample in Year 8.
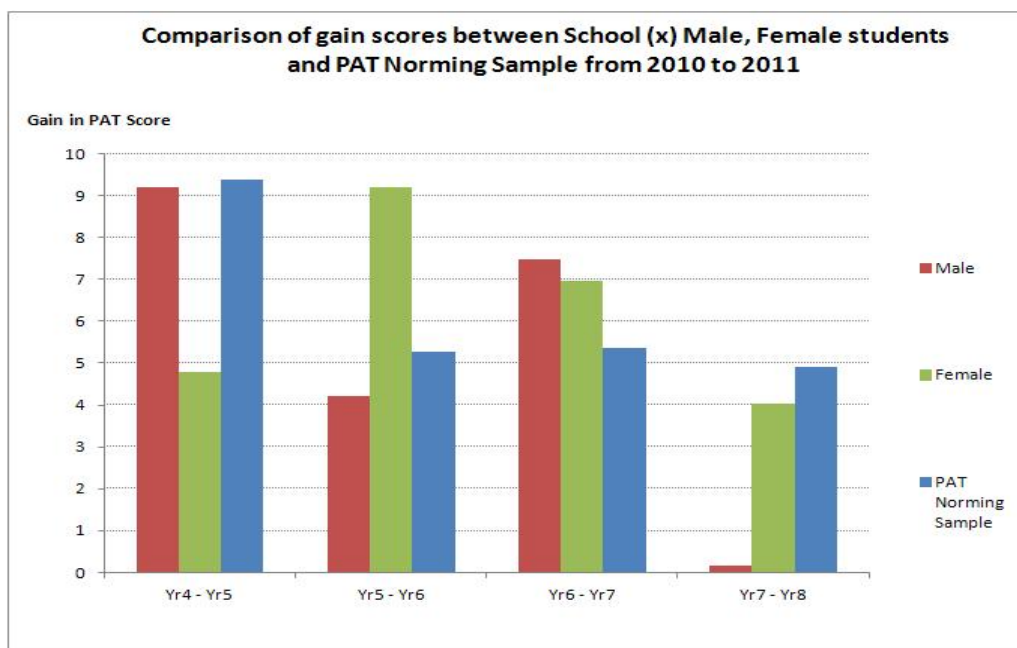

Figure 10 Comparison of gain scores between School (x) Male, Female students and PAT Norming Sample from 2010 to 2011

PAT Growth Analysis 2010 – 2011

- Sub group analysis can be included – such as
    - Gender (as per this template)
    - New intakes i.e. Year 6 from current school compared to new year 6 intake from other schools
    - Class (with caution due to numbers involved)

- The *Executive Summary* will be an overall summary/explanation of what the analysis shows, and will aim t o answer specific questions which may have been asked by the client from the onset, (if data allows).

- This template shows analysis for 2 consecutive years sitting, but this can be extended for as long as the cohort is using the test.

- Individual profiles are an option (can be represented by a ● in figure 1), although these should be used with caution due to the error margin associated.

- Minimum numbers for cohorts are required (especially if wanting to analyse class groups or certain sub groups).

- Like school comparison norms are a possibility, although at the moment ACER is only using the National Norm Reference data for the ACER tests.