

# Launching into Learning Longitudinal Study 2007 – 2014 Progress Report 2010

Final – 17 December 2010

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Department of Education  
Educational Performance Services



Tasmania  
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## I Executive summary

This report is part of the ongoing longitudinal study of the *Launching into Learning* (LiL) program. It is a progress report that concentrates on the results achieved from the 2008 LiL cohort. Performance indicators from *Kindergarten Development Check* (KDC) and *Performance Indicators in Primary Schools* (PIPS) assessments are used to measure any improvements achieved in educational outcomes by children who participated in LiL. Other data collected for the Department by Educational Performance Services is used to expand on conclusions derived from these performance indicators.

The stated overarching goal of LiL is to help children from socioeconomically disadvantaged backgrounds to improve their educational performance through interventions in early development from birth to before Kindergarten. The 2008 LiL program has achieved strong positive results in meeting this goal. Reductions in the number of students with PIPS first assessment scores in the *Below expected range* (Below range), the lowest performance category, have been achieved for both reading and numeracy.

The size of the improvement associated with the 2008 LiL has approximately doubled from the previous year's program. Since the 2008 LiL cohort had the opportunity to participate in the program for an additional year over the 2007 LiL cohort, the increase in the observed benefits of LiL may be the result of a compounding effect for children who attended more than one year of the program. An analysis of this will form a part of the forthcoming report on the 2009 LiL program.

The size of the LiL program has grown over the 2007-2008 period. In Tasmania 10.5% of 2009 Prep students had regularly<sup>1</sup> attended LiL in 2007. For 2010 Prep students the corresponding figure is 27.3% of students<sup>2</sup> having regularly attended the 2008 LiL program. In 2008, LiL was offered at 112 Tasmanian schools with 1299 students participating regularly. Analysis of the program has produced the following findings:

- The LiL group<sup>3</sup> had an improvement of 7.3 percentage points<sup>4</sup> in reading performance:
  - the LiL group had 10.1% of reading scores in the 'Below range'<sup>5</sup> compared to 17.4% for the non-LiL group<sup>6</sup>.
- The LiL group had an improvement of 6.7 percentage points<sup>4</sup> in numeracy performance:
  - the LiL group had 10.9% of numeracy scores in the 'Below range' compared to 17.6% for the non-LiL group.
- The LiL group achieved a 10.5 percentage points<sup>4</sup> increase in the number of children who achieved all KDC performance indicators when compared to the non-LiL group. See figure 1.2.
- The biggest performance gains occurred in the children from more disadvantaged socioeconomic backgrounds. See figure 1.1.
- Follow up analysis on the previous group, on the 2007 LiL cohort, shows that the improvement in performance gained from LiL was maintained.
- On average, the LiL children attended 3 days more in Prep than the non-LiL group.
- On average, children from higher socioeconomic backgrounds participated in the 2008 LiL at higher rates than those from lower socioeconomic backgrounds.
- On average, children from all socioeconomic backgrounds obtained an increase in performance through participating in LiL. See figure 1.1.
- Interviews with LiL stakeholders suggest that, in addition to improving the immediate educational outcomes for children, the LiL program also produces additional positive effects for the community. By actively involving parents LiL provides them with the necessary skills and resources needed to facilitate their child's educational development. The LiL program also helps parents build substantial ongoing support networks.

<sup>1</sup> Regular participation is defined as attendance at 75% or more of LiL sessions in the year.

<sup>2</sup> Children attend LiL two years prior to Prep. Thus, for example the 2008 LiL group attends Prep in 2010.

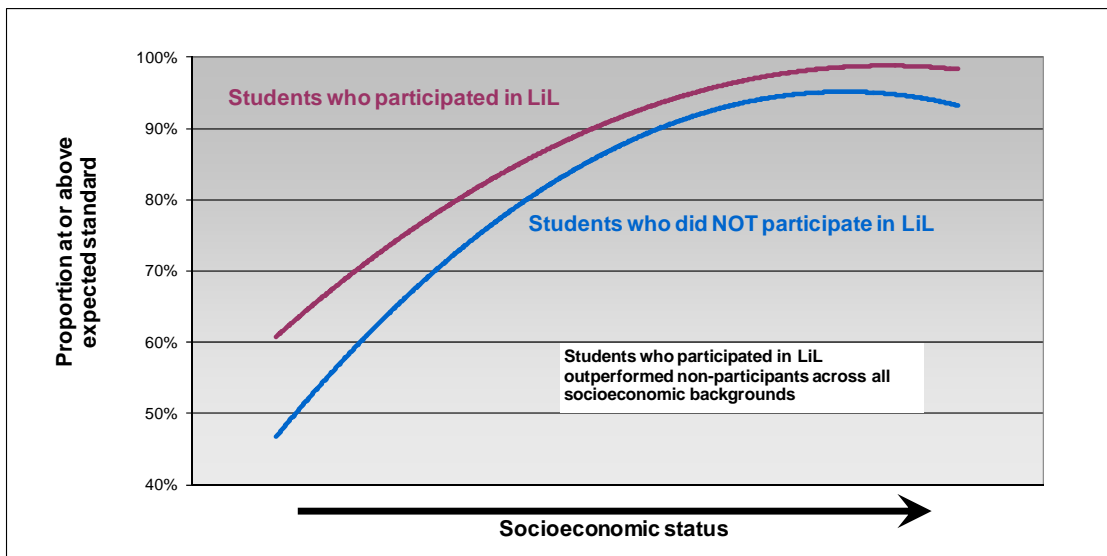
<sup>3</sup> These are children who regularly participated in 2008 LiL.

<sup>4</sup> The percentage points are fractions of the whole LiL group

<sup>5</sup> This is the grouping of lowest performance PIPS assessment raw scores, those below expected standard.

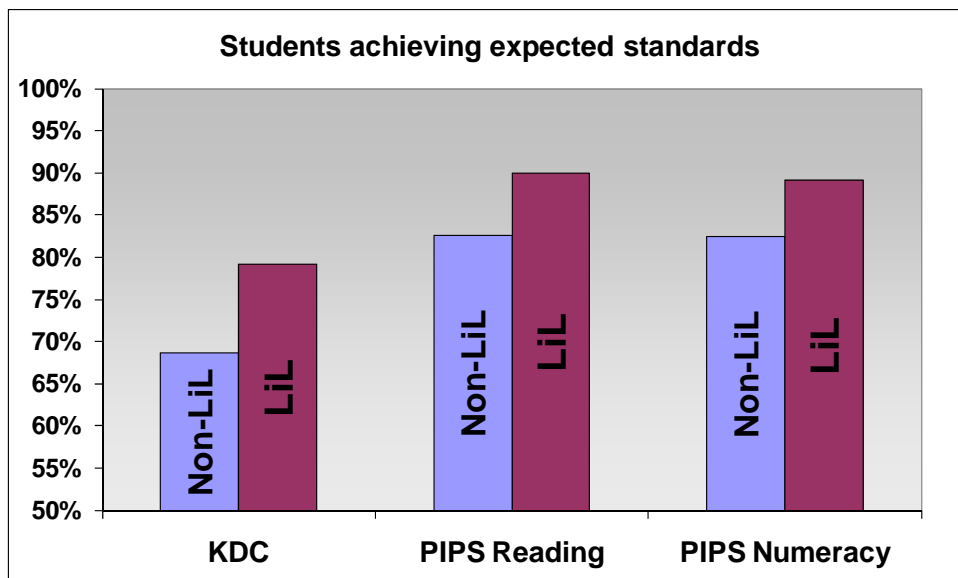
<sup>6</sup> Prep 2010 children who attended schools that offered LiL in 2008 but did not participate in LiL regularly.

**Figure 1.1: 2008 LiL cohort, reading performance in Prep 2010**



**Details:** This diagram shows the percentage of students who achieved 2010 PIPS first assessment scores at or above the expected standard (performing in ‘Within range’ or above). The results for children who participated in the 2008 LiL program are compared to those at the same schools who have not participated in LiL. Improvements in performance occur for children from all socioeconomic backgrounds.

**Figure 1.2: Improvements due to LiL in all main academic performance measures**



**Details:** The diagram above compares the percentage of students achieving assessment results at or above the expected standard across the three main academic performance measures used in this report, KDC, PIPS reading and PIPS numeracy. The consistently positive influence of LiL is shown in the way children who participated in the program achieve better scores across all measures.

## 2 Background

### 2.1 Launching into Learning Background

The *Launching into Learning* (LiL) initiative aims to give Tasmania's youngest children the best possible start in life. The initiative is about providing support and intervention in the early years in recognition that this will be more effective in achieving a wider range of successful outcomes for students than interventions later in life. The philosophy of LiL is to support parents as their child's first, ongoing and often most influential teachers.

LiL enables principals and staff to create a school culture that values learning in the early years. This leads to the design of appropriate strategies and programs, and facilitates the coordination and integration of relevant services in their school community. LiL develops programs responding to the learning needs of young children in each community. The initiative maintains a focus on working with parents, partnerships with other services, early literacy and numeracy, school readiness of future students and working with families with young children who find it hardest to access services.

LiL began with a 4 year \$12.6m commitment (2006–2010) to better support poorly resourced children and families in Tasmania. In August 2008, the Premier announced that funding for the program would be recurrent. The goal is to help give children prior to Kindergarten the best possible start in life and at school. Schools are creating models and designing programs in family friendly settings that respond in each community to the learning needs of young children and their families and focus particularly on:

- working with parents
- partnerships with other services
- early literacy and school preparedness
- intervention and prevention
- families with young children who find it hardest to access services

### 2.2 Longitudinal Study

In 2009, the Secretary of the Department of Education requested Educational Performance Services (EPS) to undertake a longitudinal study to measure the effects of LiL on student outcomes. This study looks at the performance of students at government schools as measured by the *Kindergarten Development Check* (KDC), *Performance Indicators in Primary Schools* (PIPS) and Year 3 *National Assessment Program – Literacy and Numeracy* (NAPLAN) results over the period from 2008 into the future. The analysis of NAPLAN results in the context of LiL will commence in 2012 when the 2007 LiL group of children attend Year 3. A stronger LiL influence on NAPLAN results is expected in 2013 because of the larger improvements seen in KDC and PIPS for the 2008 LiL group.

This report presents the analysis of the 2008 LiL program. The 2007 LiL program has been analysed by EPS previously. The collection of attendance data for the 2009 LiL program is being currently finalised and a report on this LiL group will be produced at a future date. The analysis of LiL by EPS is an ongoing project and results from each year combine to enhance our understanding of the impacts this program has on participating children and their families.

## 3 Methodology

### 3.1 Data collection

LiL attendance data was collected from surveys of 104 Tasmanian schools that provided LiL programs in 2008. The number of students attending LiL regularly (defined as attendance of 75% or more LiL sessions for the year) was reported via the surveys as 1299 students. Among the regular attendees, 1171 students have been matched up with PIPS first assessment data for Prep 2010. The LiL group is defined as those children who attended LiL regularly and the remainder of children in these schools is assigned to the non-LiL group even if some of them attended LiL irregularly. Hence, the effect of partial LiL attendance on educational performance is not assessed directly in most parts of the analysis but some influences of partial LiL attendance can be seen indirectly in the data presented in section 5.4 *Raw scores as bounds for LiL improvements*.

The data on KDC and PIPS results, absences and all other details used in this report have been extracted from existing EPS databases. The majority of performance indicators derived for this report is based on the PIPS assessment scores.

The ages of children attending LiL correspond to the year before Kindergarten and some are younger. The data for these students are not captured in the Schools Administrative Computing System (SACS), nor are their details recorded regularly in a uniform electronic fashion by the LiL schools. Attendance records are submitted to EPS through surveys and are based on the best recollection of the staff and their record keeping methods. Some of the student details provided by the LiL schools could not be matched to any existing enrolment records. Data on these 'missing' students was not included in the analysis beyond counts of group sizes and measures that allowed 'not stated' entries. The possible explanations for the lack of matches include a combination of inaccuracies in the details provided by the schools, some of the children being too young to be enrolled in Kindergarten or Prep by the time of the analysis and some not enrolling in the government school system in Kindergarten or Prep.

Partial LiL attendance is not assessed directly in the analysis of the 2008 program as the collection of reliable data under present circumstances is judged too problematic.

### 3.2 Confounding variables

Confounding variables are influences that affect calculated measures. Thus, in order to avoid biases in comparisons between groups the confounding variables have to be matched or corrected for.

In this report a non-LiL group is used as a control in calculations of several measures. The standard approach used here is to choose the non-LiL group from students that did not participate in LiL but attended the same schools where LiL was offered. This approach provides the twin benefits that it logically defines the non-LiL group as students that could have potentially participated in LiL but did not and it reduces the influence of school level confounding variables by selecting the comparison group from the same school background.

The main confounding variables in this study have been addressed as follows:

- the variations due to different teachers and schools were removed by assembling both the LiL and non-LiL groups from only the students that attended the LiL schools, i.e. students in both groups had the same school level influences.
- The influence on calculated performance indicators of differences in the socioeconomic backgrounds of various student groupings has been extensively described and analysed.
- The influence of gender on the results produced for this report which is addressed at the end of this section.

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### **3.3 Data completeness**

Rather than choosing a fixed group of students for whom data are available for all assessments and measures used in this report, at every step all students with relevant data for the specific calculation are included. For example, when calculating the KDC results, the averages are calculated over all students for whom KDC data exists rather than discarding data for those without later PIPS assessments. This avoids discarding data for students for whom not all information is available, and is a valid approach when averages for logically defined groups are compared. In all cases the sizes of and the selection criteria used to assemble these groups of students are stated clearly.

## 4 Results

### 4.1 KDC assessment for the LiL group

The results of the second Kindergarten Development Check in 2009 show a marked improvement in the performance of students that regularly participated in the 2008 LiL program. The percentage of children at risk is reduced from 28.8% for non-LiL students at schools that offered LiL in 2008 to 20.5% for 2008 LiL students.

In the previous 2007 LiL program the performance of students improved as well but by a smaller amount, the percentage of children at risk reduced from 27.3% for non-LiL students at schools that offered LiL in 2007 to 25.4% for 2007 LiL students. The second KDC assessments in 2006 and in 2007 at the 2007 LiL schools (in the years before the introduction of LiL at these schools) show that the results are similar until being affected by children participating in the program. In 2007 the cohort demographics are similar for the LiL and non-LiL groups. This emphasises that LiL has an effect on the educational performance of children.

Furthermore, allowing for cohort differences the size of the improvement for the 2008 LiL group is much greater than for the previous year's group. This is consistent with the PIPS first assessment results showing a greater improvement for the 2008 LiL group than for the 2007 LiL group after accounting for the cohort differences. This consistency supports both KDC and PIPS results and indicates more strongly that a real increase in the positive effects that LiL has on student performance occurred in between 2007 and 2008.

**Table 4.1: Achievement on second Kindergarten Development Check**

	% at risk KDC RP2 <sup>7</sup>	% achieved KDC RP2	
<b>2008 LiL students (Kinder 2009)</b>	<b>20.5%</b>	<b>79.2%</b>	Difference = +10.5%
<b>2008 LiL schools non-LiL students (Kinder 2009)</b>	<b>28.8%</b>	<b>68.7%</b>	
<b>All students statewide (Kinder 2009)</b>	<b>23.6%</b>	<b>74.9%</b>	
<i>... continued for the 2007 LiL group</i>			
<b>2007 LiL students (Kinder 2008)</b>	<b>25.4%</b>	<b>74.6%</b>	Difference = +1.9%
<b>2007 LiL schools non-LiL students (Kinder 2008)</b>	<b>27.3%</b>	<b>72.7%</b>	
<b>2007 LiL schools ALL students (Kinder 2006)</b>	<b>30.2%</b>	<b>69.8%</b>	
<b>2007 LiL schools ALL students (Kinder 2007)</b>	<b>31.4%</b>	<b>68.6%</b>	
<b>All students statewide (Kinder 2008)</b>	<b>23.2%</b>	<b>76.8%</b>	

**Details:** Comparison of the Kindergarten Development Check (KDC) results for the 2007 and 2008 LiL programs. Results for the LiL and non-LiL groups are compared against each other, statewide results and previous years at the same schools. The differences are equal to the improvement in the percentage of students achieving minimum standard between the LiL and non-LiL groups. The percentages do not add up to 100% in relevant groupings because assessments for some students are unknown.

<sup>7</sup> Kindergarten Development Check Reporting Phase 2

## 4.2 PIPS assessments

The ongoing longitudinal assessment of the LiL program by Educational Performance Services shows significant improvements in early literacy and numeracy for children who attend it regularly. For students that attended LiL in 2007 the number in 'Below range' category for the PIPS reading first assessment was reduced to 20.5%, whereas for the 2008 LiL cohort this figure was reduced to 10.1%. The corresponding statewide figure for the 2008 cohort was 12.4%. Equally positive results were achieved in Numeracy. Thus the improvements achieved in the 2008 LiL program are greater than in the year before, but the precise changes are overlaid with a shift in the socioeconomic background of the children and the effect the increasing size of the LiL program has on overall results in Tasmania. Currently around a quarter of Prep students have benefited from regular LiL attendance and their achievements are improving the average performance of the state.

### 4.2.1 The entire Launching into Learning group

The PIPS first assessment of Prep year students is conducted early in the year. Thus, the results are available for the analysis of the 2008 LiL group at the time of writing this report. The results and performance referred to in this section of the report are those based on the PIPS first assessment.

The previous analysis of the 2007 LiL group laid the groundwork for the principle that PIPS results can be compared between LiL and non-LiL students at the same schools in order to derive LiL influenced performance changes. In the Table 4.2 the percentages of students in the 'Below range' are about the same at the 2007 LiL schools for all students in 2007 Prep and 2008 Prep as they are for the non-LiL group in 2009 Prep. The 2007 Prep and 2008 Prep results correspond to non-LiL groups with similar school backgrounds and are calculated for all students at these schools because they had no LiL at the time. These data also point to the stability of average non-LiL results for a group of schools.

The average performance of LiL schools is also compared to the Prep results for the whole state. This comparison indicates how the composition of the group of schools affects the average results. For both the 2007 and 2008 LiL groups of schools the average non-LiL performance is significantly lower than the statewide results as judged both by the average standard scores and by the percentage of children in 'Below range'. This result is consistent with the aim of targeting the LiL program at schools with larger numbers of children from socioeconomically disadvantaged backgrounds.

The average performance of the entire 2008 LiL group is better than the average performance at all government schools in Tasmania as judged both by average standard scores and the number of students in 'Below range'. The average LiL student actually performs better than the average student in a Tasmanian government school. This is a strong positive result and a larger improvement in performance than was obtained due to the influence of the 2007 LiL program.

Table 4.2 shows that the 2008 LiL program achieved a reduction in the percentages of 'Below range' scores from 17.4% to 10.1% for reading and from 17.6% to 10.9% for numeracy, improvements of 7.3 and 6.7 percentage points of the entire LiL group respectively.

The results in the previous year for the 2007 LiL program were a reduction in the percentages of 'Below range' of scores from 24.7% to 20.5% for reading and from 20.6% to 17.4% for numeracy, improvements of 4.2 and 3.2 percentage points of the entire LiL group respectively.

The number of schools offering LiL programs grew in 2008. In order to check if the selection of schools caused or contributed to the larger improvements derived from LiL, a subset of children was chosen from the 2008 LiL group. The subset includes those children who attended the 2008 LiL program but only at those schools that also offered LiL in 2007. The results for the subset group are highlighted in green in the Table 4.2.

The calculations for the subset group show that the average scores for these schools are lower when compared to the entire 2008 LiL group. This suggests that the schools which started offering LiL in 2008 have on average better performing students, a result perhaps connected with differences in socioeconomic backgrounds of students. The reductions in the number of students with scores 'Below range' remain large for the subset schools and compare consistently with the whole group of 2008 LiL schools, 7.2 compared with 7.3 percentage points in reading and 11.2 compared with 6.7 percentage points in numeracy. The shifts in the standard scores are similarly consistent. Thus, the increase in the size of educational performance

improvements obtained from the 2008 LiL is not caused by the increase in the number of schools offering the program.

## Tables 4.2: Analysis of *Launching into Learning* for 2007 and 2008 groups

### Performance in READING for PIPS first assessment

	Number of students	Average Standard Score in Reading	Below range	
2008 LiL students (Prep 2010)	1171	50.8	10.1%	Difference = + 7.3%
2008 LiL schools non-LiL students (Prep 2010)	1581	48.4	17.4%	
All students statewide (Prep 2010)	4283	50.0	12.4%	
Subset 2008 LiLs (Prep 2010)	351	49.4	11.7%	Difference = + 7.2%
Subset 2008 LiL schools non-LiLs (Prep 2010)	556	47.6	18.9%	
... continued for the 2007 LiL group:				
2007 LiL students (Prep 2009)	453	48.3	20.5%	Difference = + 4.2%
2007 LiL schools non-LiL students (Prep 2009)	720	47.1	24.7%	
2007 LiL schools ALL students (Prep 2007)	1153	47.3	26.6%	
2007 LiL schools ALL students (Prep 2008)	1200	47.2	27.0%	
All students statewide (Prep 2009)	4304	50.5	15.6%	

### Performance in NUMERACY for PIPS first assessment

	Number of students	Average Standard Score in Numeracy	Below range	
2008 LiL students (Prep 2010)	1171	50.9	10.9%	Difference = + 6.7%
2008 LiL schools non-LiL students (Prep 2010)	1581	48.1	17.6%	
All students statewide (Prep 2010)	4283	50.0	12.8%	
Subset 2008 LiLs (Prep 2010)	351	50.5	10.0%	Difference = + 11.2%
Subset 2008 LiL schools non-LiLs (Prep 2010)	556	47.1	21.2%	
... continued for the 2007 LiL group:				
2007 LiL students (Prep 2009)	453	49.1	17.4%	Difference = + 3.2%
2007 LiL schools non-LiL students (Prep 2009)	720	47.3	20.6%	
2007 LiL schools ALL students (Prep 2007)	1153	47.8	21.8%	
2007 LiL schools ALL students (Prep 2008)	1200	47.9	20.9%	
All students statewide (Prep 2009)	4304	50.2	14.2%	

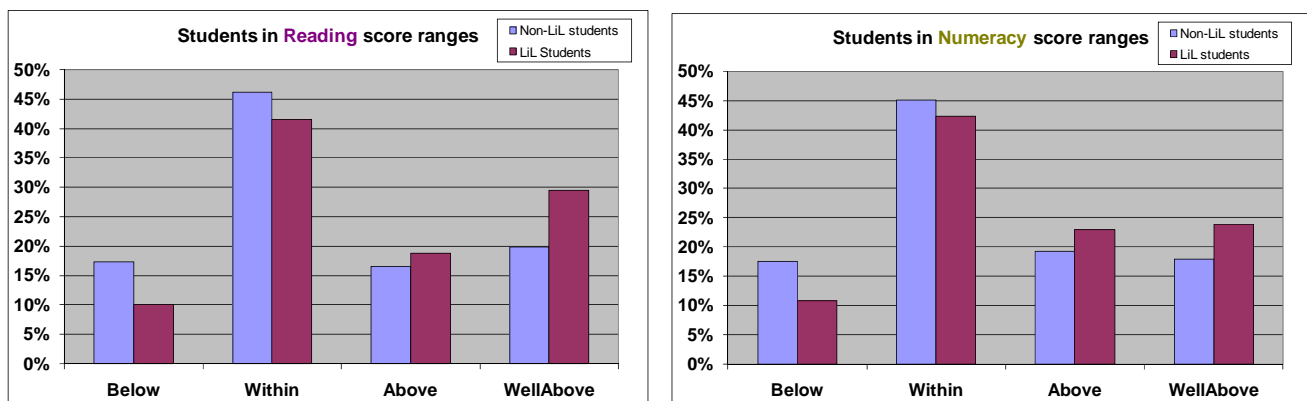
**Details:** PIPS first assessment results for 2008 LiL and 2007 LiL compared against several non-LiL groupings. The 'Number of students' refers to the count of students in the specified group. The 'Average StdScore' is the average PIPS first assessment Standard Score for a given group. The 'Below range' is the percentage of students in the group with PIPS scores Below the expected range. The differences are the sizes of improvements in the 'Below range' results when the LiL group is compared to the corresponding non-LiL group in the same table; they correspond to and are calculated from the percentage values beside them.

## 4.2.2 Improvement across all performance levels

It is important to recognise that children at all levels of educational performance obtain a benefit from regular LiL participation. The improvements LiL creates are not confined to reducing the number of students with scores 'Below range'. The influence of LiL improves the performance of all students that regularly participate in it. The figures 4.3 below also show increases in the percentages of LiL students in the above average ranges of PIPS scores when compared to non-LiL students. Thus, on average, all LiL children obtain higher scores and move to higher score ranges.

This analysis shows that children are not simply pushed just across the line of performance that divides off the scores 'Below range' but gain improvements across all the score ranges.

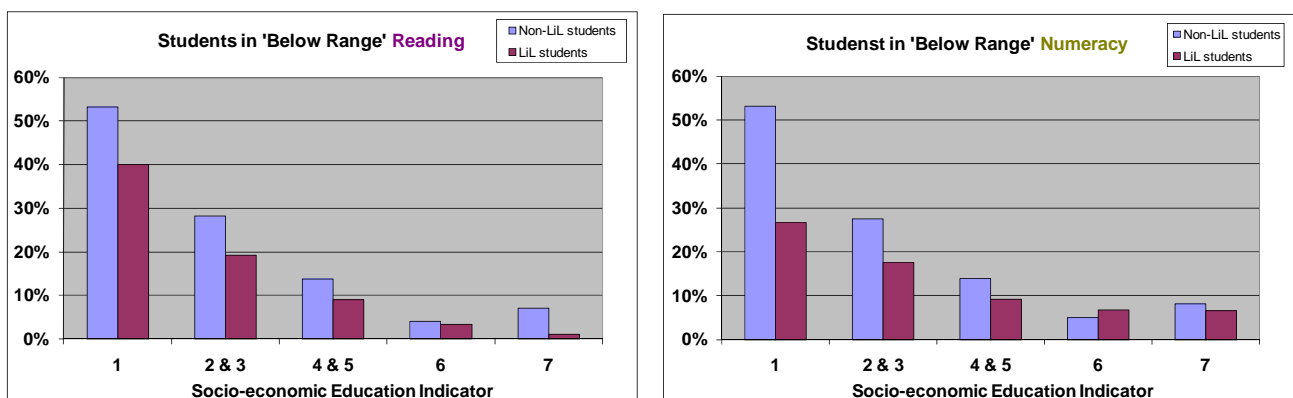
**Figures 4.3: Students in all score ranges for PIPS first assessment**



**Details:** The percentage of 2008 LiL and non-LiL students in 2010 in all PIPS score ranges from 'Below' to 'Well Above'.

The socioeconomic backgrounds of students correlate with their academic performance. Hence, the improvements across all the score ranges should translate into improvements for all socioeconomic groupings. This effect is shown in figures 4.4 below. Thus children from all socioeconomic backgrounds improve their educational performance through participating in LiL.

**Figures 4.4: Students in 'Below Range'**



**Details:** The percentage of 2008 LiL and non-LiL students in 2010 in PIPS 'Below Range' with some grouped socioeconomic indicators (please see Table 4.5 below for the definitions of socio-economic education indicators). The number of LiL children in the Below Range is smaller than the number of non-LiL children for all socioeconomic backgrounds; though a larger improvement is obtained for children with lower socioeconomic backgrounds. The socioeconomic education indicators 2 and 3 are grouped together and 4 and 5 are grouped together. The reason for this is that PIPS first assessment results within these two groupings were about the same. The other education indicators were ungrouped because average PIPS scores were different between them. This similarity between educational performance results for some different socioeconomic groupings also exists on other assessments like NAPLAN.

**Table 4.5: Explanations of the Socioeconomic Education Indicator codes**

<b>Education Indicator</b>	<b>Description</b>
<b>0</b>	Not stated/Unknown
<b>1</b>	Year 9 or equivalent or below
<b>2</b>	Year 10 or equivalent
<b>3</b>	Year 11 or equivalent
<b>4</b>	Year 12 or equivalent
<b>5</b>	Certificate I to IV (including Trade certificate)
<b>6</b>	Advanced Diploma/Diploma
<b>7</b>	Bachelor degree or above

**Details:** Parental education background codes from the *Data Implementation Manual* produced by Ministerial Council on Education, Employment, Training and Youth Affairs Performance Measurement and Reporting Taskforce. The highest educational background of the parents is used as the socioeconomic status indicator most likely to influence children's educational performance.

### 4.3 PIPS second assessment for the previous LiL group

PIPS assessments are conducted twice during Prep in order to monitor the changes in student performance between early and late in the year. The results for both PIPS assessments in 2009 Prep are available at this time and can be used to check if the improvements seen in PIPS first assessment for the LiL children are maintained after the influence of about one year of schooling. It is important to perform this check because the possibility exists that the influence of regular school attendance becomes dominant for all children and the improvements due to LiL disappear.

The 2007 LiL cohort had fewer PIPS scores in the 'Below range' than those at the same schools that did not participate in LiL. The improvement in reading is 3.1 percentage points for the second assessment compared to 4.2 percentage points for the first. Similarly, in numeracy the improvement is 3.5 percentage points for the second assessment compared to 3.2 percentage points for the first. These numbers show that a similar level of improvement due to LiL is maintained between the beginning and end of Prep year. In all cases the percentage improvements are fractions of the whole groups they refer to as presented in Tables 4.6 below and Tables 4.2 of PIPS first assessment results in this report.

This analysis indicates that the improvements in student performance due to LiL are maintained even after the strong influence the Prep year has on children's development. This suggests that investment into LiL represents a long term boost to children in addition to the gains they obtain from later schooling. LiL does not unnecessarily replicate the effects of later school attendance but has a distinct positive influence on performance.

**Tables 4.6: 2009 PIPS second assessment for the 2007 LiL program**

#### Performance in READING for PIPS second assessment

	Number of students	Average of StdScore Reading	'Below range'
LiL students (Prep 2009)	441	47.9	19.5%
LiL schools non-LiL students (Prep 2009)	549	45.8	22.6%
LiL schools ALL students (Prep 2007)	1002	46.7	25.7%
LiL schools ALL students (Prep 2008)	1037	46.7	21.7%
All students statewide (Prep 2009)	4290	50.0	14.3%

Difference = +3.1%

#### Performance in NUMERACY for PIPS second assessment

	Number of students	Average of StdScore Numeracy	'Below range'
LiL students (Prep 2009)	441	47.4	20.2%
LiL schools non-LiL students (Prep 2009)	549	46.4	23.7%
LiL schools ALL students (Prep 2007)	1002	46.9	24.2%
LiL schools ALL students (Prep 2008)	1037	46.8	22.9%
All students statewide (Prep 2009)	4290	50.0	15.5%

Difference = +3.5%

**Details:** Second PIPS assessment results for the 2007 LiL group compared to second PIPS assessment at the same schools for previous years and statewide results for the same year.

## 4.4 Gender

The 2008 LiL group has a nearly even gender distribution with 49.1% of students being male and 50.9% being female. However, the gender distribution for the non-LiL group is skewed towards males at 54.2% with females making up 45.8%. All 2010 Prep students (the LiL and non-LiL students in a single grouping) at the 2008 LiL schools have a gender distribution of 52.1% males and 47.9% females.

Gender distribution at the 2008 LiL schools in Prep 2010 is therefore skewed towards males. There are 4.2 percentage points more males than females at these schools. However, this skewness is reversed for the LiL group which has 1.8% more females than males. Thus in 2008 female children participated in LiL at a higher rate than male children.

Table 4.7 below shows the differences in the 'Below range' students by gender. For both reading and numeracy females perform better – the percentages of females in the 'Below range' are consistently lower for reading and numeracy and for LiL and non-LiL groups. However, as shown in the *Improvement* column, the gains in reading and numeracy are similar for both genders even when their starting performance levels are not equal. In addition the gender specific improvements are about the same as the overall gains in reading and numeracy (as quoted in the Table 4.7 details). Thus, the differences in the percentages of males and females between the LiL and non-LiL groups do not affect the calculated overall LiL improvements.

**Table 4.7: Below range PIPS scores by gender**

		LiL students	Non-LiL students	Improvement
<b>Males</b>	<b>Reading</b>	13.2%	20.5%	+7.3%
	<b>Numeracy</b>	13.0%	20.2%	+7.2%
<b>Females</b>	<b>Reading</b>	7.1%	13.7%	+6.6%
	<b>Numeracy</b>	8.7%	14.5%	+5.8%

**Details:** The percentage of 2010 PIPS first assessment scores in the 'Below range' grouped by gender. The *Improvement* column gives the performance change from the non-LiL to LiL groups in the 'Below range' percentages. This change is a measure of LiL influence. These changes should be compared to the overall performance gains (calculated for both genders together) of +7.3% and +6.7% for reading and numeracy respectively.

## 4.5 Indigenous students' participation

The number of Indigenous students that participated in 2008 LiL is combined with the relevant group of non-LiL 2010 Prep students to produce the denominator for the percentages in this section because enrolment data for the non-LiL group does not exist at the time when LiL occurred (for the same reasons as already explained in other sections of this report).

Overall the schools that offered LiL in 2008 had 8.0% of students with an Indigenous background. Among the Indigenous group the participation rate at all the schools that offered LiL in 2008 was 32.5%. By comparison the Non-Indigenous 2008 LiL participation rate was 46.2%.

This means that on a statewide basis Indigenous students were less likely to participate in 2008 LiL than Non-Indigenous students.

Table 4.8 below shows that participation in LiL improves the average educational performance of Indigenous students both in reading and numeracy. The higher proportions of Indigenous non-LiL students with PIPS scores in 'Below range' show that these student begin with a lower average performance but still strongly benefit from the LiL program.

**Table 4.8: Below range PIPS scores by Indigenous status**

		LiL students	Non-LiL students	Improvement
<b>Indigenous</b>	<b>Reading</b>	19.7% (71)	23.4% (154)	+3.7%
	<b>Numeracy</b>	16.9% (71)	25.3% (154)	+8.4%
<b>Non-Indigenous</b>	<b>Reading</b>	9.5% (1100)	16.8% (1427)	+7.3%
	<b>Numeracy</b>	10.5% (1100)	16.8% (1427)	+6.3%

**Details:** The percentage of 2010 PIPS first assessment scores in the 'Below range' grouped by Indigenous status. The *Improvement* column gives the performance change from the non-LiL to LiL groups in the 'Below range' percentages. The bracketed numbers in green are the actual counts of student in a group emphasising the relation of the percentage figures to the noise in data caused by the size of a particular group.

## 5 Corrections for socioeconomic background

The gender balance differences between the LiL and non-LiL groups do not affect the size of the calculated improvements as explained in the 4.4 *Gender* section of the report. The confounding variables at the schools levels are also accounted for. This leaves the differences in the socioeconomic backgrounds of LiL and non-LiL students as the main confounding variable affecting the calculated improvements and the most difficult factor to account for.

It is known that the socioeconomic background of students is correlated with their educational performance. On average, students from advantaged backgrounds outperform those from disadvantaged backgrounds. In order to test whether the LiL intervention has worked or not it is necessary to account for any performance changes between the LiL and non-LiL groups due to socioeconomic differences.

### 5.1 The socioeconomic selection effect

The socioeconomic status of children's families strongly affects their performance across a range of indicators through a variety of causes. Children with lower socioeconomic status backgrounds perform on average less well than those with higher ones. If children from the lowest socioeconomic backgrounds are chosen preferentially, any average educational performance scores calculated for this group will in general be lower than for the whole group from which they were selected even before any other influences are applied.

Hence it is possible that a biased makeup of the group over which a statistic is calculated will affect the result and produce an apparent effect not caused by any real LiL influences other than the selection of the group. For example stacking a sports team with the best performing players will produce a difference in performance between those selected and not selected. This is the so-called '*selection effect*'. In the case of LiL assessment, it has to be shown that any results produced, positive or negative, are not caused by the selection effect. In real examples of analysis the changes caused by selection effects will combine with effects caused by other factors. In a reverse example to the above, if children from higher socioeconomic backgrounds were more likely to participate in LiL, the LiL group's average performance would be higher than the overall group's regardless of the performance changes caused by LiL.

In order to untangle the influence of LiL on student performance from the above described selection effect this section presents the comparison of socioeconomic backgrounds for various student groupings in Tasmania.

The socioeconomic backgrounds for the LiL and non-LiL groups are about the same in 2007 but are slightly unbalanced in 2008. On the statewide level, students with higher socioeconomic backgrounds were more likely to participate in the 2008 LiL program than students with lower socioeconomic backgrounds.

The data presented in the Table 5.1 below shows only slight variation in the socioeconomic makeup between the 2007 LiL and non-LiL groups. Thus the socioeconomic background selection effect will not significantly affect the 2007 LiL performance increases derived from comparing these groups.

**Table 5.1: Detailed distribution of Socioeconomic Status**

		%students per SES-Education Indicator											
Student Groupings		1	2	3	4	5	6	7	0	Combined 1 to 3	Combined 4 and 5	Combined 6 and 7	
2008	LiL students – Prep 2010	1.2	14.7	5.9	7.5	41.1	7.9	15.6	6.1	21.8%	48.7%	23.5%	
	LiL schools non-LiL students – Prep 2010	2.9	20.1	6.8	10.3	38.0	7.1	12.6	2.3	29.8%	48.2%	19.6%	
	All students statewide – Prep 2010	1.8	15.2	5.7	8.7	37.1	8.9	20.9	1.8	22.7%	45.8%	29.8%	
... continued for 2007:													
2007	LiL Students – Prep 2009	2	22	9	11	36	6	8	5	33%	47%	14%	
	LiL schools non-LiL students – Prep 2009	6	23	8	12	33	6	10	3	37%	45%	16%	
	LiL schools ALL students – Prep 2007	3	24	8	10	36	6	8	6	35%	46%	14%	
	LiL schools ALL students – Prep 2008	4	24	9	10	35	6	8	4	37%	45%	14%	
	All students statewide – Prep 2009	3	16	5	9	35	9	21	2	24%	44%	30%	

**Details:** Detailed information on socioeconomic distribution of students for the 2007 and 2008 LiL schools and statewide for their respective Prep years. The data for the single indicators is shown to provide precision and the combined or aggregated figures are provided for clarity. The percentage figures for Prep 2010 in the ‘Combined’ columns are derived from summing the underlying student counts across the indicators, not by summing the percentage values given for the single indicators. This approach avoids rounding off errors. Thus, there may be differences in the last digit between the entries in the ‘Combined’ columns and the sums of corresponding entries in this table. The 2010 Prep student counts for statewide results are derived from Census 2 data and include all students attending Prep at all government schools in Tasmania irrespective of whether PIPS, KDC or other information is available for them. The students for whom SES education indicator is not available are counted as ‘0 - Not Stated/Unknown’.

The socioeconomic profiles of the 2008 LiL and non-LiL groups are more divergent than observed in 2007. During the 2008 LiL program children from different socioeconomic backgrounds participated in LiL at different rates. In Table 5.1 above the 2008 figures for socioeconomic backgrounds differ more often than not by significant amounts between the LiL and non-LiL groups. Thus, the performance improvement figures calculated for the 2008 LiL program are likely to be affected by the selection effect around the socioeconomic background. Furthermore, the direction of the selection is such that children with higher socioeconomic backgrounds are more likely to participate in LiL and vice versa. The trend in the 2008 figures is consistent across and clearly evident for all the socioeconomic education indicators.

The inclusion of higher proportions of better performing students from higher socioeconomic backgrounds in the LiL group and their simultaneous removal from the non-LiL group will put the LiL group at a higher average level of performance when compared to the non-LiL group without any LiL influence. The calculated reading and numeracy performance improvements is the sum of the actual performance gain and the difference created by the selection effect. It could be argued that the real gains in performance due to LiL are lower than calculated. However, data analysis is further complicated by the fact that although all students across all socioeconomic backgrounds increase their educational performance through participating in LiL, the students from the lowest socioeconomic backgrounds tend to obtain the largest improvements.

The fuller and more correct assessment is the acknowledgment of the selection effect in the 2008 LiL program and the recognition that the size of performance improvements calculated by comparing LiL to non-LiL students will be increased by some amount through the selection of better performing students with higher socioeconomic backgrounds into the LiL group and lowered by a different amount because the same students will obtain a smaller performance increase from LiL. The amounts of these opposing changes are not calculable from the available data and it is undeterminable which one is greater. Thus, the question of what constitutes a ‘real’ quantitative improvement due to the LiL program is highly complex. This final point is answered in detail in the ‘Raw scores as bounds for LiL Improvements’ section of this report.

The participation rate for a socioeconomic grouping is the number of students that participated in LiL divided by the sum of those that did and did not participate. The problem with the current data is that at the time of LiL the non-LiL group is unknown. Instead the comparison is made at the time of Kindergarten or Prep. Thus,

in order to calculate a participation rate LiL students would have to be summed with non-LiL students from a year or two later.

Instead the percentages of students with the same socioeconomic background are compared between the LiL and non-LiL groups. For example, if a non-LiL group has a higher percentage of students with a lower socioeconomic background than the corresponding LiL group, this shows the depletion of the ‘concentration’ of those students from the LiL group and their movement into the non-LiL group and indicates that students from lower socioeconomic backgrounds are less likely to participate in LiL. This may appear to be a more complicated way of presenting the information but it avoids the logical and practical difficulties associated with directly mixing the LiL and Kindergarten/Prep attendance data (or discarding data for LiL students not matched to Kindergarten/Prep attendance) – due to the reasons explained in detail in the ‘*Learning Service Analysis – LiL participation*’ section of this report on the non-existence of centralised LiL enrolment records.

## 5.2 The attempted SE Corrections

Differences in socioeconomic background distributions between the LiL and corresponding non-LiL groups will affect the measured improvements in academic performance due to LiL. This effect has to be accounted for in order to obtain a more accurate result for the influence of LiL.

As part of analysis in this report multiple methods of correcting for the differences in the socioeconomic background of students have been applied to the data. All the methods involve ways of adjusting the socioeconomic distribution of either the LiL or the non-LiL group to match the other and calculating improvements in academic performance from the differences between the two. The methods differ in how the adjustments are calculated. In order to check for consistency of the results the first two methods are applied ‘*symmetrically*’: first the socioeconomic distribution of the LiL group is adjusted to that of the non-LiL group (LiLs to NonLiL status) and second, the socioeconomic distribution of the non-LiL group is adjusted to that of the LiL group (NonLiL to LiL status). This approach tests a variation of the question: “*What academic performance would the LiL group have if it did not participate in LiL?*” and vice versa. The detailed steps for these methods are complex and not included in this report for conciseness but are available by request from EPS. The results of the attempted corrections are summarised in the Table 5.2 below.

**Table 5.2: Results for socioeconomic background corrections**

<b>Correction Method</b>	<b> \Delta  Reading Below</b>	<b> \Delta  Numeracy Below</b>
Method 1 LiLs to NonLiL status	6.6%	3.0%
Method 1 NonLiLs to LiL status	<b>7.5%</b>	3.0%
Method 2 LiLs to NonLiL status	5.7%	5.1%
Method 2 NonLiLs to LiL status	5.8%	<b>5.8%</b>
Method 3 LiLs to NonLiL status	<b>3.7%</b>	3.1%
Method 4 LiLs to NonLiL status	4.9%	<b>1.5%</b>
<b>SE Uncorrected LiLs vs NonLiLs</b>	<b>7.3%</b>	<b>6.7%</b>

**Details:** Summary of 2008 LiL improvements in the Reading Below and Numeracy Below as calculated in various methods of correcting for the selection effect around the differences in the socioeconomic background of LiL and non-LiL groups. The  $|\Delta|$  values are the differences in the percentages of students in the ‘Below range’ of scores between LiL and non-LiL groups – all values are positive and indicate improvement due to LiL. The *Uncorrected* entries are the LiL improvements for these indicators without applying any corrections for socioeconomic background.

The results of the various correction methods vary with a spread large enough to include the ‘SE Uncorrected LiL’ results. Thus there is no reason to choose any of the correction methods in preference over the others. This means that due to the inaccuracies in the data, most likely connected with the relatively small counts of students in the study, a precise correction for the differences in the socioeconomic backgrounds of 2008 LiL students and the corresponding non-LiL groups is not possible.

When the students in the ‘Below range’ of PIPS scores are subdivided by socioeconomic indicators the counts are on the order of 10. As a result, a change of a few students has a large effect on the results of a correction method increasing its sensitivity to data ‘noise’ and errors. This means the correction methods are trying to

interpret this data beyond its accuracy. Thus, the sizes of the improvements in academic performance attributed to LiL have to be validated in alternative ways – these are described in the following subsections.

### 5.3 Indicators of LiL success

Due to the nature of the data the exact sizes of performance improvements due to LiL are confounded by a combination of variables. In the analysis of the 2008 LiL data the situation becomes so complex that these exact sizes become undeterminable directly. However, all indicators point to LiL having a positive effect on academic performance and the data allows the establishment of bounds for the size of the improvement (please see section 5.4 'Raw scores as bounds for LiL improvements').

Together, all analyses point to the same conclusion: that LiL has a significantly positive influence on student performance.

Statewide, for the Prep 2009 cohort there were 15.6% and 14.2% of PIPS scores in 'Below range' for reading and numeracy respectively (the cohort corresponding to 2007 LiL). In 2010 the corresponding scores were 12.4% and 12.8% (corresponding to the 2008 LiL). Thus an improvement in statewide performance occurred at the same time as the size of the LiL program has grown.

At state level socioeconomic and gender distributions should remain about the same between 2007 and 2008. Other variables influencing educational performance like teachers and schools should also remain stable. The stability of statewide socioeconomic distribution is confirmed in the tables in the PIPS Assessment section of this report.

The confounding variables remain stable on a statewide basis. The significantly higher numbers of students participating in LiL, when combined with the strong improvements in the 'Below range' and other educational measures the program creates, should be strong enough to produce an effect on a statewide basis. Thus the improvement in statewide performance between 2007 and 2008 in the 'Below range' measure provides further evidence that the LiL program has a positive influence on the educational performance of students.

When the data for the 2008 LiL program is subdivided into smaller groups, by gender, a subset of schools or by a socioeconomic indicator, in all cases an improvement in educational performance is seen among the children who regularly attended LiL. Improvements are seen across reading or numeracy and for other measures such as KDC or attendance. Some of this consistency is presented in this report. For example, it is seen in the results for gender subdivisions or the various other groupings of PIPS scores. More examples exist in the analysis used for this report but are not directly presented (these details can be made available upon request to EPS).

Thus no matter how the data is sliced or which educational performance measure is assessed an improvement due to LiL is seen.

### 5.4 Raw scores as bounds for LiL improvements

The 'Below range' and other PIPS scores grouping are based on raw scores in order to enable the comparison of these criteria over time. Accordingly, the arguments in this section revolve around the raw scores<sup>8</sup> and not the standard scores<sup>9</sup>. In this case, the bounds are value ranges within which the sizes of the improvements have to fit even if the exact position is undeterminable.

The average PIPS first assessment raw reading scores increase in 2010 for the non-LiL students at the schools that offered LiL in 2008 – this is the time when the oldest children who participated in LiL in 2008 start attending Prep. The increase is well outside the range of non-LiL raw reading scores in previous years. This suggests that at schools where LiL is offered the non-LiL group is still influenced by the provision of LiL. Most likely the improvement in the average raw reading score is due to partial LiL attendance: the children at these schools who attended LiL less than regularly are not counted as part of the LiL group; however, they gain some benefit from the program. Perhaps LiL also creates other positive benefits by affecting the whole community and through indirect pathways increases the academic performance of its children. The identification of the

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<sup>8</sup> The unaltered scores from the PIPS assessment which reflect changes in results from year to year

<sup>9</sup> Scores which have been standardised to fit a distribution

precise causes for this effect is not required to establish that it is occurring and affecting Prep children at the LiL schools.

Crucially, since the raw scores for the non-LiL students at the LiL schools have actually improved and not decreased in 2010 it becomes possible to constrain the size of the improvement due to LiL even without being able to establish an accurate correction for the differences in the socioeconomic backgrounds between those children that did and did not participate in the program.

The explanation for this is best approached through arguing the negative case. If the raw scores in 2010 for the non-LiL students had decreased in comparison to previous years and in combination with the fact the socioeconomic background of LiL students is higher than non-LiL students, the sizes of the quoted improvements for the percentages of students scoring in the lowest performance category of 'Below range' would most likely be overestimates. A decrease in the raw scores would indicate that the increased proportion of students with higher socioeconomic backgrounds who attended LiL regularly raised the average scores for the LiL group above any LiL influence and at the same time the removal of those best performing students decreased the average performance of the non-LiL group. Clearly if the LiL group is preferentially composed of the best performing students, its average scores will be higher by an additional amount not due to LiL.

Instead, the opposite of the above negative case happened, with the raw reading scores in PIPS first assessment for the 2008 LiL. The raw reading scores for the non-LiL group increased. Since we know that the LiL group does have a higher socioeconomic background than the non-LiL group, without other influences, the raw scores for the non-LiL group should have been lowered. It is clear then that the lowering of the non-LiL raw scores due to removal of the better performing students is less than the increase caused by association with LiL (most likely partial LiL attendance).

Thus, while the raw scores for the LiL group are raised by more than the influence of LiL through the selection of better performing students, the LiL improvements are calculated from comparing them to the non-LiL group whose raw scores are raised as well through different causes. The sizes of the LiL and non-LiL groups of students are similar, 1171 to 1581 respectively (only students for whom raw score results are available are counted) and this means that socioeconomic selection effect for these two will affect the average group raw scores by about the same amount but in opposite directions. The groups are joined and 'balanced' – students removed from one will appear in the other. This symmetry is needed to constrain the size of the improvement as explained in this section.

In this complex situation it is not possible to untangle the relative sizes of the raw score shifts due to the socioeconomic selection of the groups and most likely partial LiL attendance. It is also not possible to determine whether the increase in the scores for the non-LiL group is large enough that when the LiL and non-LiL groups are compared, the size of the calculated improvement is larger or smaller than the 'real' (free from the socioeconomic effect) influence of LiL.

It can be said that because the raw scores for the 2010 non-LiL are better than for the non-LiL groups in previous years, the effect of LiL on those who did not regularly attend is greater than the socioeconomic selection effect. The raw scores for the non-LiL group are raised by an amount larger than the amount they are lowered by due to the selection effect.

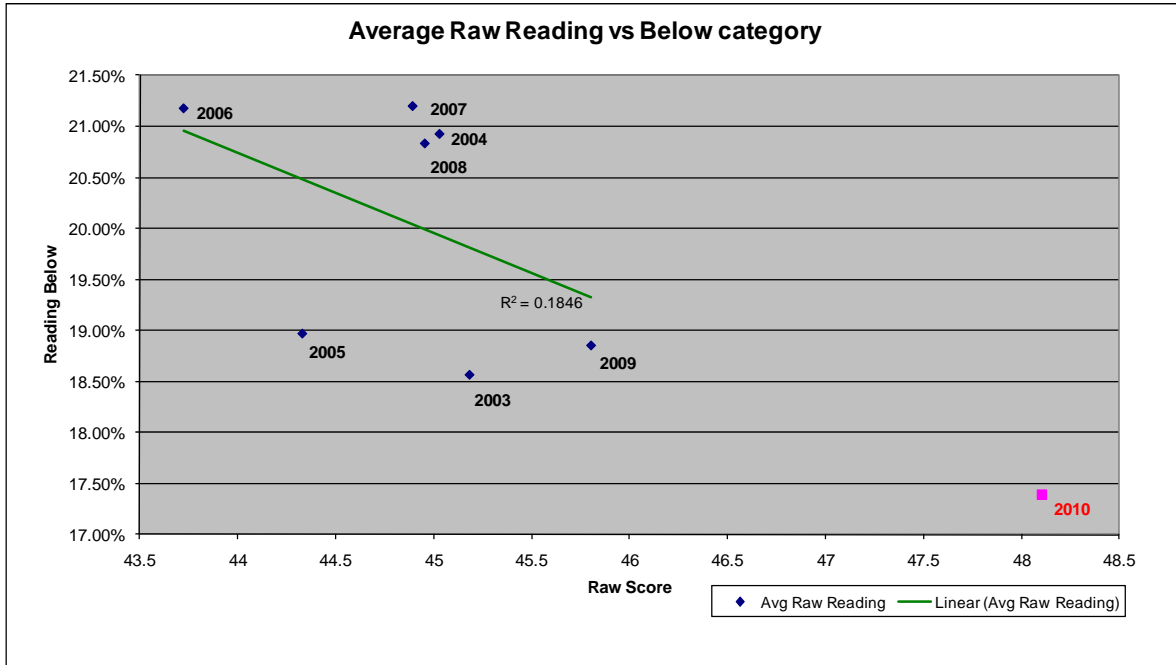
Furthermore, a clear statement can be made from this data that if LiL improvement is looked for in all the children at LiL schools, both the LiL and non-LiL group combined (so far in this analysis the influence of LiL outside the regular attendance group, the LiL group, has not been counted). The consequence of these facts around the raw scores is that when the reduction in the number of children in the 'Below range' is assessed for both the LiL and non-LiL groups combined, the real reduction in the number of children in the 'Below range' is at least as big as calculated from comparing the percentages between the LiL and non-LiL groups separately.

The reduction in the number of children in the 'Below range' for the LiL group may or may not be overestimated (this is undeterminable from current data), but any overestimation, if it exists, is more than compensated for by reducing the number of children in the 'Below range' among those who did not regularly attend LiL (the non-LiL group) through effects associated with LiL.

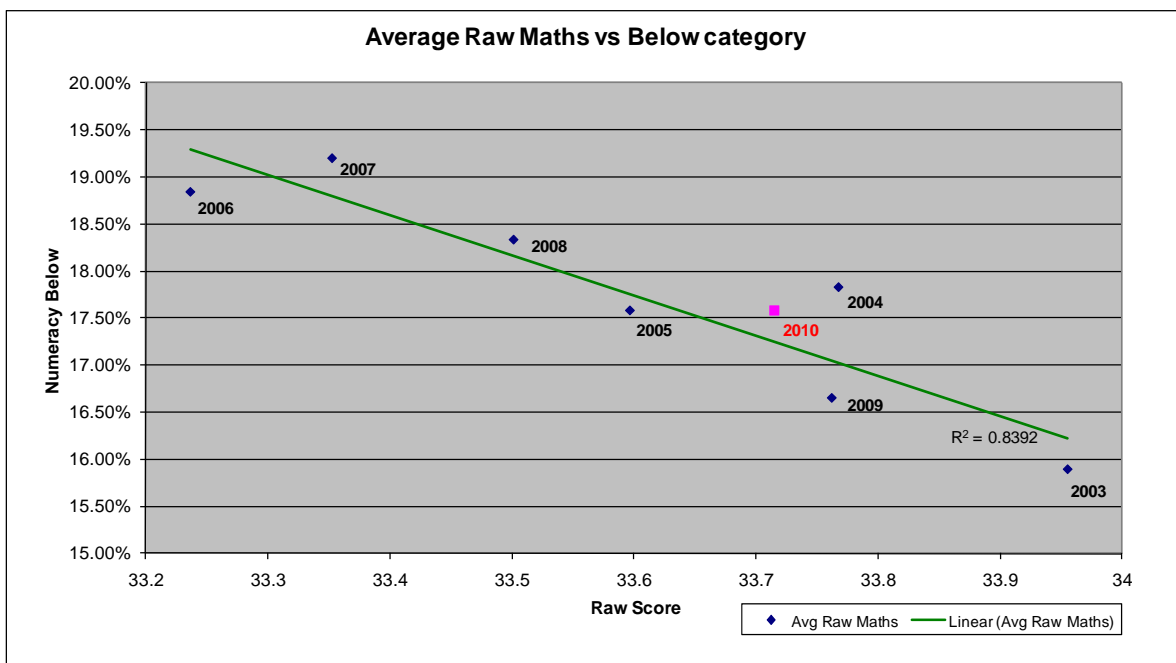
The same argument as above can be made for the raw maths scores because the 2010 non-LiL group scored in about the same range as previous non-LiL groups. Since as mentioned above we know that the LiL group has proportionally more children from higher socioeconomic backgrounds, if the same effect as above did not apply to the raw maths scores, the 2010 value should be worse than the range for previous years.

While slightly counter-intuitive, the following conclusion applies: the percentage points improvements, as quoted in the PIPS results section, applied to the LiL group provide the minimum count (the real number is equal or higher but undeterminable) of the reduction in students in the 'Below range' for both the LiL and non-LiL groups. This highly complex description of the result is forced on by the limitation in the data available for analysis.

**Figures 5.3: 2008 LiL schools: non-LiL students raw scores vs Below range**



**Details:** The average PIPS first assessment raw scores for reading and maths plotted against the percentage of children in the respective 'Below ranges' at schools where the 2008 LiL program was offered for years prior to the 2008 LiL group reaching Prep and the PIPS assessment. This shows over time the stable average raw scores spread without the influence of LiL. For comparison the average raw scores for 2010 PIPS first assessment for the 2008 non-LiL students are plotted in red. The red points are intended to show the distribution of raw scores for the non-LiL groups up to the present and to emphasise that with the beginning of LiL they refer to a subgroup of students.



## **6 Additional positive effects of LiL**

### **6.1 Effects on attendance**

For Terms 1 and 2 in 2010, Prep children who had regularly attended a 2008 LiL program had a lower average rate of full day school absences than the non-LiL group. The LiL children attended 1.6% more of all school days (about 3 more days) in this time period. Thus, well after the children concluded their participation in the LiL program, it has a continuing positive influence on their school attendance.

In the Prep age group student attendance is at least partly determined by the influence of parents on the child. Hence the improvement in attendance rate suggests that the LiL program influences students as well as parents.

### **6.2 Community and LiL stories**

An assessment of the LiL program in terms educational performance measures alone will not provide a full description of its role in the community. It is important to understand in more detail how LiL functions and what effects it is having in addition to the changes in performance measures. This understanding can guide further analysis and puts the figures derived in this report in context. At any point in time it may be impossible or impractical to quantitatively analyse some aspects of a program but qualitatively describing them acknowledges their existence and keeps them visible until perhaps they can be analysed in more detail. To expand on this topic EPS has started gathering materials from people associated with LiL about their experiences with the program.

In interviews with stakeholders of children participating in LiL, several themes were apparent:

- LiL develops community networks through the community. Parents state that this helps them to cope with children and for children to grow up in a better environment. This occurs via a range of mechanisms from the parents offering each other help and advice to finding out about and getting access to additional support services.
- The involvement with LiL gets parents engaged in and provides them with the skills to support their children's education. This provides long term benefits in educational outcomes.
- The setting of and the location where programs are delivered is important. The location and setting affect how people interact in a group. In the initial parts of a program a supportive environment can help develop confidence in parents and children to join and continue attending the activities. An appropriate location removes or reduces practical barriers to access.
- Attending LiL helps children with confidence in social interactions and transition into Kindergarten. This observation has been made repeatedly by different parents, teachers and school principals.
- The program educates the community and parents about the importance of a child's development in the early years before they attend Kindergarten.