

# Government school performance in the ACT

## Analysis Paper

paper prepared by

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## **Government school performance in the ACT**

The most recent results from international comparisons of student performance show that across Australian states and territories the ACT sits at the top of the tables (Thompson, De Bortoli and Underwood, 2016; Thompson et al. 2016). It ranks first in mathematics, in science and in reading. For example, based on results from the 2015 Programme for International Student Assessment (PISA) 15 year-old students in the ACT are on average performing 17 points above students in other parts of Australia in Science and 13 points higher in Reading. This equates to students in the ACT being 7 months more advanced in Science learning than other Australian students and 5 months more advanced in Reading skill acquisition. Similar results are achieved for primary school Year 4 students in Science and Mathematics based on learning assessed in the Trends in International Mathematics and Science Study (TIMSS) (Thompson et al., 2016). The ACT as a system also performs at a higher rate than most other OECD nations, achieving at well above OECD averages on all measures.

These results are outstanding, surely a source of affirmation to schools and the Directorate, and a cause for celebration. However, how much comfort should be taken in the results? The challenges that many other systems face in Australia and overseas—rural and remote locations, social disadvantage, larger indigenous concentrations, socially diverse populations—are not challenges that ACT schools face in anywhere near the same way. If these are taken into account how well are the ACT's government schools really doing?

This paper presents results from analyses of school performance that either compares results against comparable or like schools from other jurisdictions or presents results from models that measure outcomes for schools after adjusting for differences in student intake and school context. The first presents results on school performance using assessments of student achievement and learning in key skill domains. The focus is on measuring the performance of ACT schools through comparison with like schools in other jurisdictions using appropriate techniques to control for the socio-economic and other differences between schools in the ACT and schools elsewhere. Included in this part of the work is an analysis of the performance of students in the ACT from lower SES backgrounds compared to students from similar backgrounds in other jurisdictions. The second part of the paper looks inside the workings of the ACT school system to examine some of the influences that are driving government school performance in the ACT. This includes giving consideration to the shifts in parental demand and competition among schools, and the way it affects the work of schools.

### **Performance on academic skills**

One of the aims of this paper is to compare how well ACT schools are performing compared to schools in other states and territories. The definition and measurement of school performance presents a complex array of conceptual and technical challenges. Its broad objective is to gauge how well schools are doing on a range of measures, relative to the performance of other schools across Australia. Unfortunately, there are few sources of data

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available in Australia to measure school performance at a national level or across state and territory boundaries. This means that it is not possible to compare schools across a broad range of measures capturing such things as student engagement, student health and well-being, and transition success as well as academic learning. Currently, comparable measures of performance are limited to student academic achievement skills measured through the National Assessment Program – Literacy and Numeracy (NAPLAN) program. While not adequate for measuring how well schools are serving students and their communities in a broad way, NAPLAN data do provide an important guide to assessing how well schools are performing in promoting the acquisition of academic skills, an important function of schools. NAPLAN is not a direct measure of curriculum content covered in school programs, but rather an assessment of selected literacy and numeracy skills at given year-levels (and ages). It is not clear that test score results are a measure of school learning or achievement, but they do provide an assessment of skills that we might expect children to possess at given ages and for schools and teachers to help develop.

[REDACTED] types of data were available for the study of school performance. The first was school-level estimates of student NAPLAN achievement in Reading and Numeracy. The data were available for all schools across Australia that participated in NAPLAN in 2013. The value of this data is that it is comprehensive, covering all schools in every state and territory, providing an opportunity to compare the performance of schools in the ACT against like schools in other jurisdictions. The weakness is that it does not distinguish between the effects of individual student characteristics and school attributes because it is at a school level.

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### School-level NAPLAN data

Table 1 presents the results of regression analysis modelling school differences in NAPLAN achievement. Two outcome measures are used: (1) mean scores in Reading and Numeracy at Year 5 and then Year 9, and (2) the percentage of students in the top-two bands of Reading and Numeracy at Year 5 and then Year 9. The proportion of students in the top two bands of NAPLAN is being used in at least one state (Victoria) as an aspirational measure of school performance and quality. The use of such a threshold has certain advantages in school performance measurement, by enabling schools and students to be compared to a clearly defined benchmark, rather than making relative comparisons which may shift over time.

The modelling used in the analysis included controls for differences across schools in:

- socio-educational advantage (measured using The Index of Community Socio-Educational Advantage or ICSEA)
- SES concentration effects (percentage of student from the top ICSEA quartile)
- proportion of students from language backgrounds other than English
- proportions of females
- school size (enrolments)

The analysis was restricted to government city schools and excluded selective-entry schools. This was to ensure fair comparisons with ACT schools which are not selective-entry and which are city-based. It should be kept in mind in viewing the results that equivalent students to those in selective-entry schools in other jurisdictions are in the population of students in ACT schools. This may raise the performance of the ACT in the analysis. However, because the focus is on school performance, selective-entry schools have been excluded.

**Table 1: NAPLAN achievement levels: Government city schools only, 2013<sup>a</sup>**

		Mean scores				Percentage in top two bands			
		Year 5		Year 9		Year 5		Year 9	
		Reading	Numeracy	Reading	Numeracy	Reading	Numeracy	Reading	Numeracy
<b>State or Territory</b>	ACT	-8.84**	-20.12**	-5.96*	-25.07**	-5.65**	-9.37**	-1.98*	-12.69**
		-2.88*	-2.85	-8.13*	-5.34*	-1.83*	-0.86	-1.23*	-3.28*
		-10.21**	-19.95**	-3.07	-11.56**	-5.51**	-8.38**	-0.88	-5.28**
		4.25	-2.17	6.11	8.24	3.67*	0.03	1.75	4.17
		3.99**	0.96	1.94	-1.63	1.20*	-0.17	-0.28	-3.84**
		-8.11**	-9.12**	-4.50*	0.92	-4.09**	-2.78**	0.89	1.20
<b>Student Intake</b>									
	ICSEA	0.31**	0.35**	0.30**	0.36**	0.12**	0.08**	-0.01	0.01
	% in top quartile of ICSEA	0.09*	0.13*	0.27**	0.57**	0.27**	0.29**	0.39**	0.94**
	% of LBOTE	-0.08**	0.12**	-0.10**	0.25**	-0.07**	0.06**	-0.03**	0.21**
	% of females	0.35**	-0.10	0.13**	-0.14**	0.14*	-0.10	0.01	-0.06*
<b>School size</b>									
	Enrolments	0.00	0.01**	0.01**	0.01**	0.00	0.01**	0.00	0.01**
<b>R-squared</b>		.78	.71	.86	.82	.74	.63	.62	.69

NOTES: <sup>a</sup> The analysis excludes selective-entry schools  
 Statistical significance: \* = p<0.05 \*\* = p<0.01

[REDACTED]

The results indicate that on almost all performance measures, school social intake (as measured by ICSEA) is a major predictor of school performance and accounts for a large part of the differences across schools in NAPLAN performance. Combined, the control variables account for up to 86 per cent of all of the variance in Year 9 Reading (R-squared value of .86) and over two-thirds of the variance in most other measures.

State and Territory results show that after taking account of intake and context differences, ACT government schools on average achieve negative results on every measure. For example, in Year 5 Numeracy mean scores the ACT records the worst result of any jurisdiction. On average, students are performing 20 points lower than comparable students in [REDACTED]. Twenty points represents almost 6 months of learning and suggests that at a school level by Year 5 students in the ACT are almost 6 months behind students in comparable schools in [REDACTED].

The results are worse at Year 9 where for Numeracy the deficit is almost 25 mean score points, keeping in mind that selective entry schools have been excluded.

Students performing in the top bands of performance are also lower than expected in the ACT after taking account of differences in school intakes. For numeracy the results suggest that on average the proportion of students in the top two bands of Year 9 Numeracy achievement are 12 percentage points lower than what is achieved in [REDACTED], all else equal.

The patterns in Table 1 show that Numeracy is the area of greatest concern. While results are also significantly lower on all Reading performance measures, the Numeracy results are markedly below the rest of the country, compared to what would be expected based on the populations schools are serving in the ACT.

Figure 1 provides a visual display of school performance in Numeracy for ACT schools. It provides two scatterplots, one for Year 5 (left panel) and one for Year 9 (right panel). The plots map school-level mean Numeracy scores against school ICSEA scores. Each dot represents a school with ACT schools marked as green dots and schools in other city parts of Australia marked in blue. Two regression lines are included, one estimating the slope and level of numeracy achievement for ACT schools and one for all other schools. The scores in the figure are raw scores or unadjusted means.

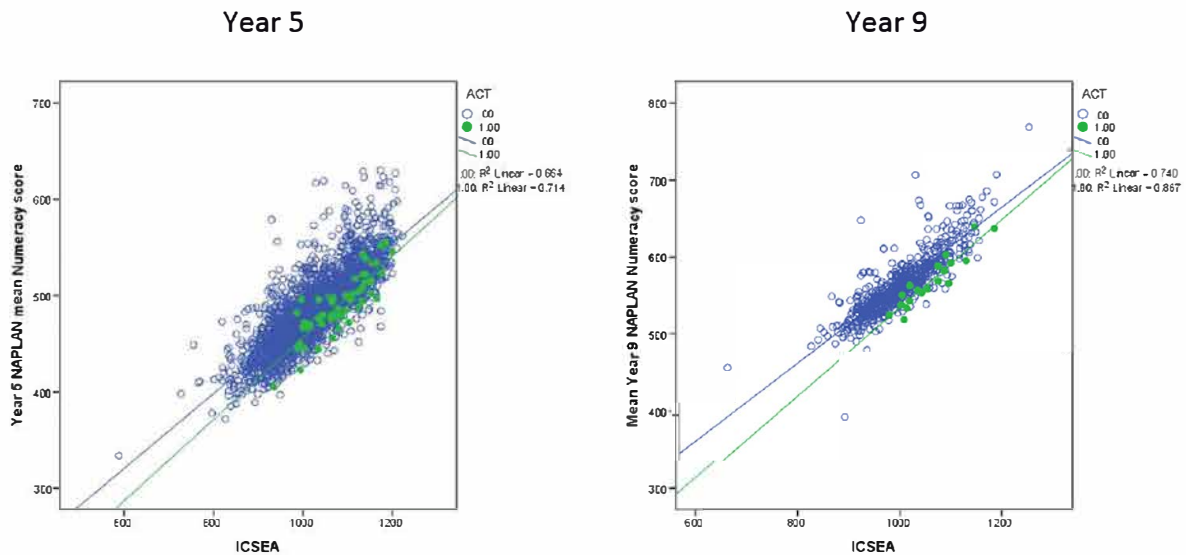
A striking feature is that in Numeracy the ACT schools are performing, consistent with the results in Table 1, at the lower levels of performance for schools of similar ICSEA values. The green line reveals a similar slope to all other schools as a group, but the line is at a lower level revealing a gap in performance that is held across schools, on average. This is particularly noticeable in Year 9 where ACT schools tend to trail almost all schools at the same ICSEA value.

ACT schools have higher ICSEA values as a group. This equates to higher mean scores for NAPLAN compared to schools in other states and territories where the tails of performance reduce raw mean scores. The effect is to conceal the real levels of performance in the ACT

[REDACTED]

which is lower than expected (predicted) based on the student population and weaker than schools serving similar populations in other states.

**Figure 1: Mean NAPLAN achievement scores in Numeracy, by ICSEA: ACT schools compared to government city schools in other states and territories, 2013**



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[REDACTED]

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	2017											
	Q1				Q2				Q3			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Revenue	100	110	120	130	140	150	160	170	180	190	200	210
Cost of Sales	60	65	70	75	80	85	90	95	100	105	110	115
Gross Profit	40	45	50	55	60	65	70	75	80	85	90	95
Operating Expenses	20	22	24	26	28	30	32	34	36	38	40	42
Operating Income	20	23	26	29	32	35	38	41	44	47	50	53
Interest Expense	5	5	5	5	5	5	5	5	5	5	5	5
Income Before Taxes	15	18	21	24	27	30	33	36	39	42	45	48
Tax Expense	3	4	4	5	5	6	6	7	8	8	9	9
Net Income	12	14	17	19	22	24	27	29	31	34	36	39

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## Influences on performance

In looking inside the ACT, a key influence on school performance is the level of school segregation and the effects of residualisation which lead to differences in concentrations of students with different learning needs. Segregation, the separation of populations along social, ethnic and racial lines, is a key driver of scholastic success. The extent of segregation is shown by differences across schools and school sectors in who schools serve. Private schools enrol large numbers of ACT students, especially at secondary level (see Figure 2). The long term pattern shows that enrolments in government schools fell from 2001 to 2008 while the enrolments in private schools, particularly independent schools, grew. Since 2008, government school enrolments have grown suggesting that the long term drift to private schools has weakened.

**Figure 2: Full-time equivalent enrolments in ACT schools, by sector: 2001-2015**



It is important to note that while government school enrolments have increased so have they for private schools. Independent schools have experienced increases every year across the whole period (2001-2015), while Catholic schools have largely done so (apart from 2010-2011 in recent years). So, private schools also continue to grow. It is just that the number of enrolments has grown more quickly in government schools since 2011. As a result, the share of enrolments has increased for government schools from a low of 56.9 per cent in 2011 to 58.6 per cent in 2015. It means that in 2015, 41.4 per cent of students were



attending private schools, the highest rate across Australian jurisdictions and almost 5 points higher than for [REDACTED], which has the next highest rate.

It is not the numbers of students who are drawn away from government schools that is the most important issue, but the types of students. Table 3 presents NAPLAN achievement profiles of Year 3 and Year 7 students in the ACT, by school sector. It shows that Independent schools in particular enrol students with higher level Reading and Numeracy skills (gaps in mean scores suggest they are up to 6 months ahead in learning at entry, on average). These students are drawn away in large number from government schools.

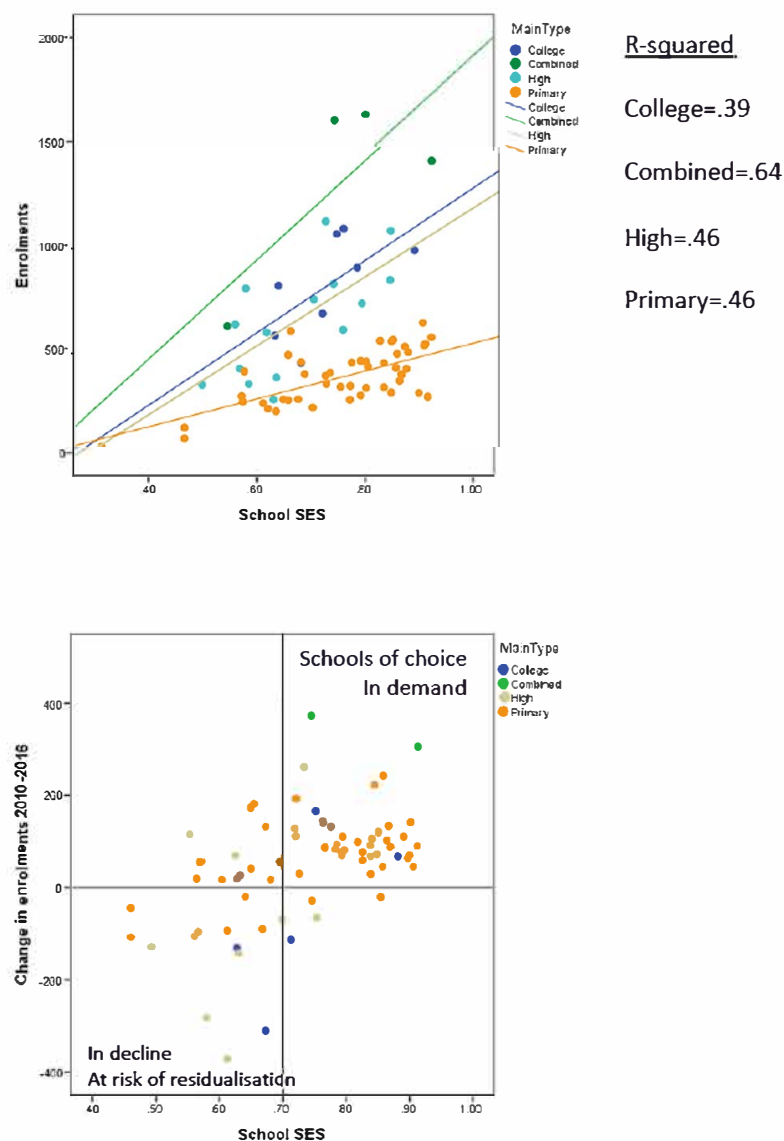

[REDACTED]

Family aspirations and choice are also prevalent. Government schools form a market, in which schools that are not at capacity or are open to expansion allow families to make choices, bypassing some schools in favour of others. The movement of students from aspirational families to desirable schools in both the government and non-government sectors leaves schools in some communities with residues of concentrated poverty or students with higher needs, making it harder for these schools to achieve the same outcomes for students.


The impact of this process of 'residualisation' is the creation of sought-after schools that become large due to demand, and other schools that face the pressure of declining enrolments and a residual population of more disadvantaged students with higher or additional learning and support needs. It may sometimes be felt that this process is unlikely to affect a city such as Canberra where the population is less diverse than the large urban conglomerates that make up Sydney, Melbourne or Brisbane. However, the effects of segregation and residualisation are clearly visible in the ACT.

Evidence of this is provided partly by a strong relationship between school size and the SES intake of schools. Figure 3 presents two panels. The first contains a plot of enrolments against school SES as measured by ICSEA. Schools are coloured according to school type. The strength of relationship can be ascertained by looking at the R-squared values on the right. The second panel plots change in enrolments between 2010 and 2016 against school SES. The middle reference line is set at 0, that is, no change in enrolments in the 6-year period to 2016.

Figure 3: Relationship between school size and SES



The patterns reveal strong relationships between school SES and school size. In general, the higher the SES of the school, the bigger the school. This is true for primary schools, high schools as well as the colleges. Schools serving students from low SES backgrounds are generally smaller.



Schools in the top right quadrant of the bottom panel are those that have increased in size over the last 6 years and they are also higher SES schools. These are the schools in demand, the schools of choice that Canberra families tend to be favouring when enrolling their children. The quadrant diagonally opposite (large reductions in enrolments) contains the schools in decline and at risk of residualisation. These are more often lower SES schools.

There are other markers of the effects of market forces in schooling in the ACT and segregation. Figures 4 and 6 present the relationships between school social intake (as measured by ICSEA) and four key school characteristics: (1) priority area attendance (percentage of students enrolled in their priority area), (2) enrolments, (3) percentage of students with a disability, and (4) percentage of ATSI students. Figures 5 and 7 present the relationships between NAPLAN Numeracy achievement and the four key characteristics.

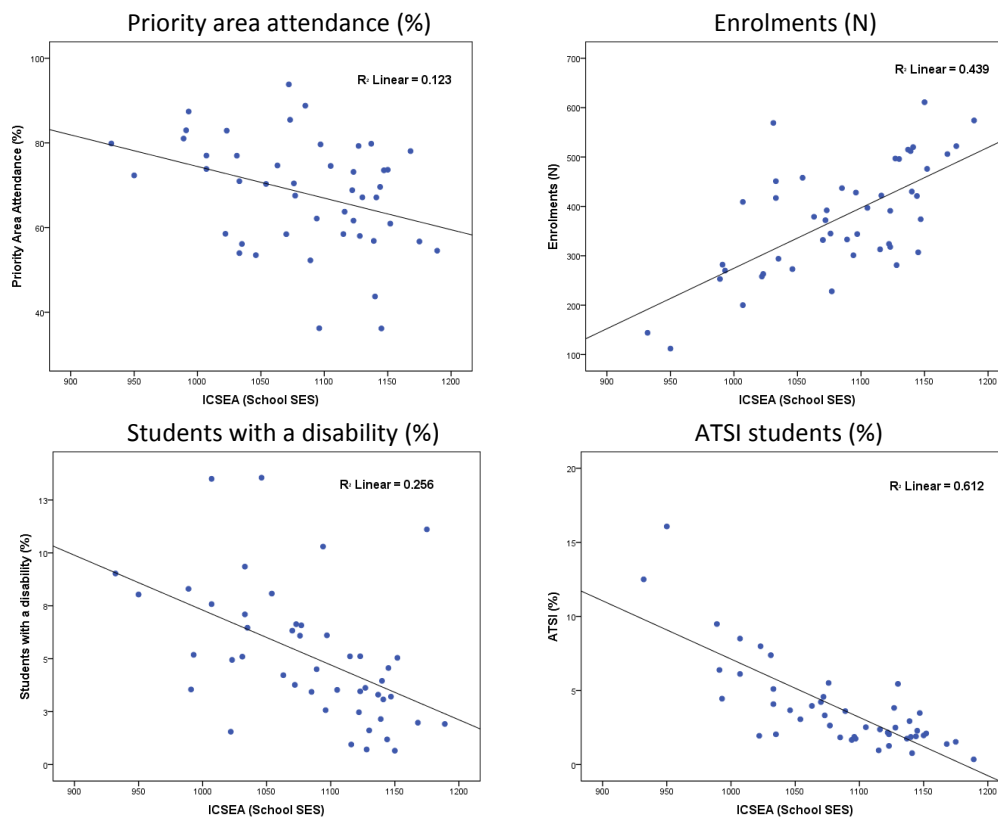
Priority area attendance is a measure of the extent to which students are enrolled in a school in their local area or whether they enrol in schools outside their zone. What is interesting in looking at the patterns is a link between SES and whether students enrol in their priority area or not, and between NAPLAN achievement and whether students enrol in their priority area or not. In demand schools, more often in higher SES settings, more often with higher levels of NAPLAN achievement, are those who enrol more children from outside the local area. Lower SES schools, and schools with weaker NAPLAN results, are less often in demand and more often reliant on students from their priority area. They are also, as a result, more often smaller, and with higher concentrations of students with additional learning needs (students with disabilities, ATSI students).

Relationships with other school characteristics are presented in Table 4 and Table 5 which contain estimates of correlations between various school characteristics (Priority area attendance (%), Enrolments (N), ATSI (%), Females (%), Inclusive support students (%), All students with a disability (%), all students assessed as requiring learning adjustments (%), parents with low education (%), parents with low occupational status (%), ICSEA) and school performance measures (NAPLAN Numeracy and Reading scores, Attendance rates). Table 4 presents the correlations for primary schools and Table 5 for high and combined schools.

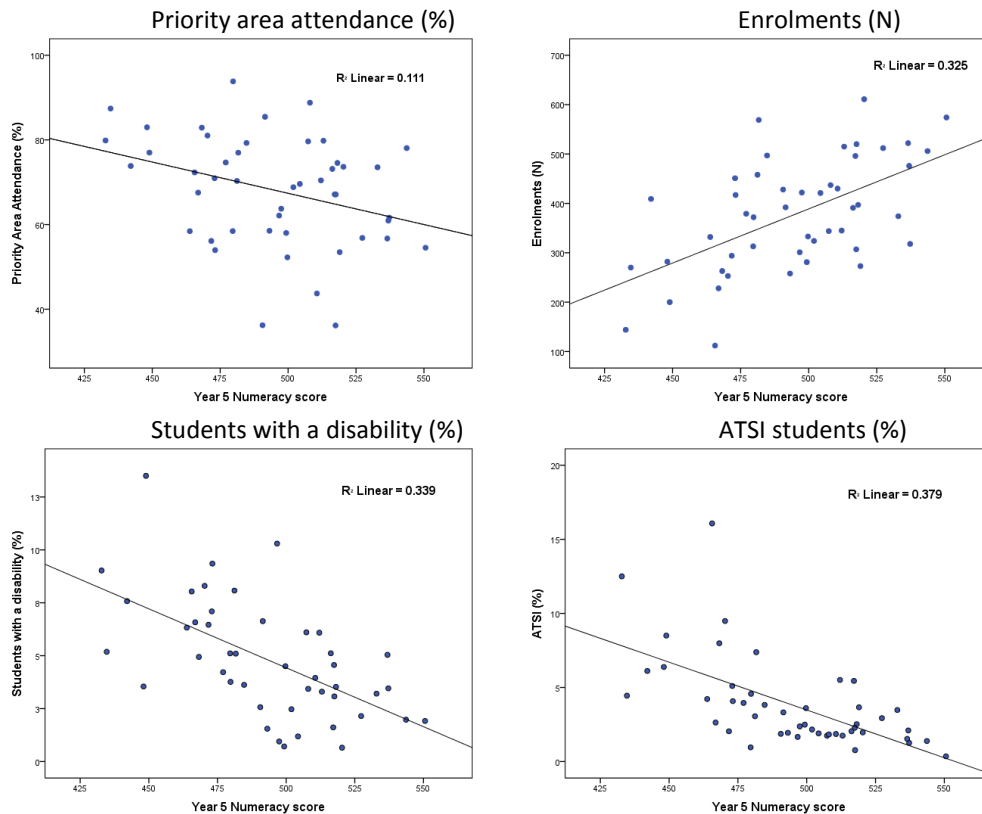
The results show that the social and educational backgrounds of students, as measured by ICSEA and other markers, are highly correlated with school performance. School size, concentration of ATSI students and the concentration of students with a disability are all correlated with performance. Smaller schools, often small thanks to the principles of 'school choice' and the desire of parents to avoid them, struggle to achieve at the same levels of more sought after schools. They tend to be exposed to the effects of residualisation leading to populations with multiple categories of need.

The levels of segregation of students in the ACT, due in large part to residential segregation, the sector organisation of schools and market forces associated with supply and demand, tend to reinforce patterns of inequality and strengthen differences in school performance. This means that students from lower SES backgrounds and other disadvantaged categories of students tend to struggle more because of the extent of segregation.

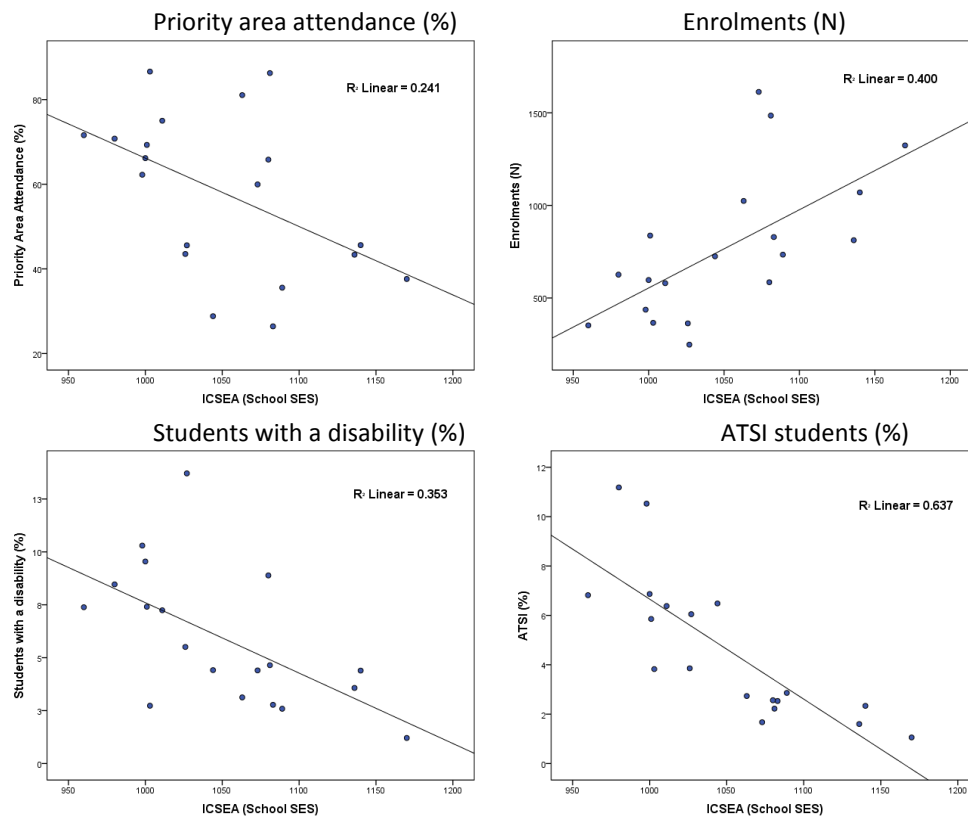
**Figure 4: Primary school social intake (ICSEA) and selected school characteristics: scatterplots**



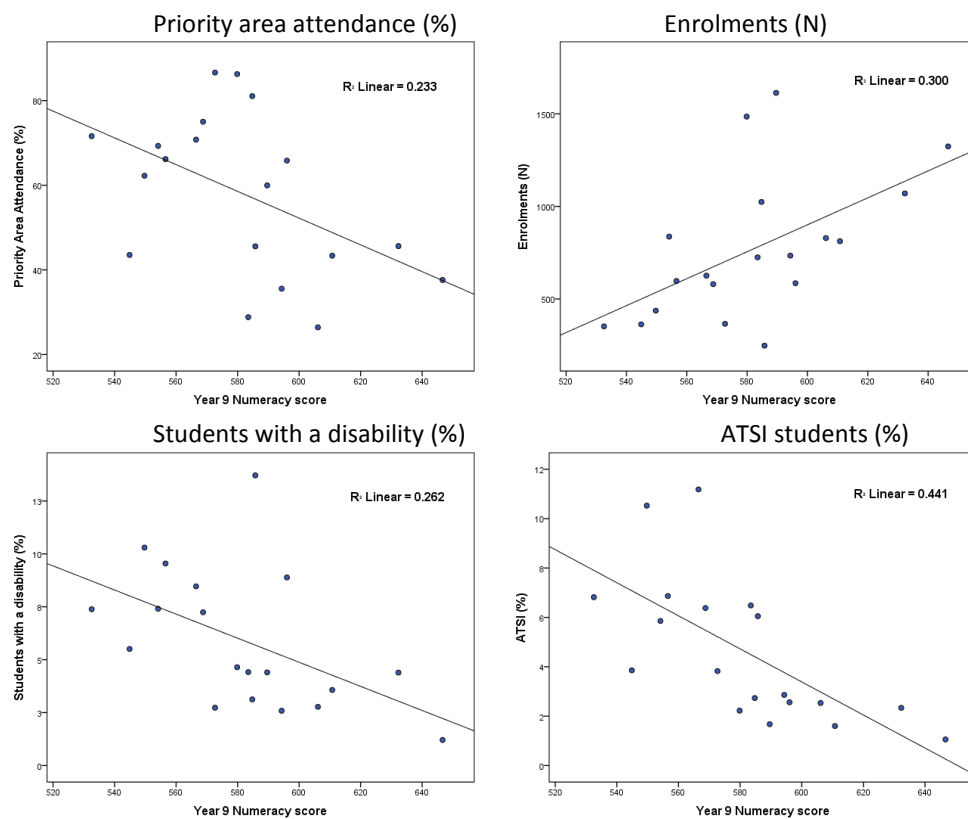
**Figure 5: Year 5 NAPLAN performance and selected school characteristics: scatterplots**



**Figure 6: Secondary school social intake (ICSEA) and selected school characteristics: scatterplots**



**Figure 7: Year 9 NAPLAN Numeracy performance and selected school characteristics: scatterplots**



**Table 4: Characteristics of schools and school performance, primary schools: correlations**

	Characteristics of schools											School Performance		
	Area	Size	Student intake			Disabilities			Family background (SES)					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Priority Area Attendance (%)														
2. Enrolments (N)	0.062													
3. ATSI (%)	.361*	-.532**												
4. Females (%)	-0.001	0.238	-0.220											
5. ESL (%)	0.054	.335*	-0.129	-0.068										
6. Inclusive support (%)	0.233	-0.151	0.144	-0.154	-0.167									
7. Students with a disability (%)	0.018	-.414**	.406**	-.505**	-0.218	.437**								
8. Adjustments needed (%)	0.159	-.535**	.551**	-0.218	-0.101	0.252	.695**							
9. Parents with low education (%)	.415**	-.591**	.829**	-0.193	-0.208	0.104	.458**	.674**						
10. Low occupational status (%)	.398**	-.458**	.767**	-0.162	-0.022	0.171	.400**	.633**	.822**					
11. ICSEA (School SES)	-.351*	.663**	-.783**	0.237	0.279	-0.237	-.506**	-.624**	-.915**	-.856**				
12. Year 5 Reading score	-.337*	.603**	-.667**	0.267	0.27	-0.2	-.442**	-.510**	-.789**	-.694**	.883**			
13. Year 5 Numeracy score	-.333*	.570**	-.616**	0.244	.319*	-0.219	-.378**	-.550**	-.755**	-.667**	.857**	.936**		
14. Attendance rate	-0.277	.568**	-.620**	.337*	.313*	-0.182	-.495**	-.576**	-.669**	-.556**	.714**	.670**	.686**	

\* $p < .05$ . \*\* $p < .01$

**Table 5: Characteristics of schools and school performance, high schools and combined schools: correlations**

	Characteristics of schools											School Performance		
	Area	Size	Student intake			Disabilities			Family background (SES)					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Priority Area Attendance (%)														
2. Enrolments (N)	0.146													
3. ATSI (%)	0.232	-.575**												
4. Females (%)	-.518*	.522*	-0.363											
5. ESL (%)	0.413	.696**	-0.097	0.127										
6. Inclusive support (%)	0.201	-0.350	0.410	-0.357	0.161									
7. Students with a disability (%)	0.220	-.549*	.673**	-.513*	-0.029	.815**								
8. Adjustments needed (%)	0.273	-0.412	0.423	-0.253	0.161	.842**	.805**							
9. Parents with low education (%)	0.450	-.710**	.800**	-.671**	-0.257	0.318	.562*	0.423						
10. Low occupational status (%)	0.410	-.604**	.858**	-.517*	0.011	.585**	.745**	.531*	.868**					
11. ICSEA (School SES)	-.491*	.632**	-.798**	.635**	0.075	-0.418	-.594**	-.510*	-.962**	-.876**				
12. Year 9 Reading score	-.509*	.501*	-.774**	.597**	-0.093	-0.382	-.574*	-.507*	-.884**	-.833**	.947**			
13. Year 9 Numeracy score	-.483*	.548*	-.664**	.606**	-0.037	-0.329	-.512*	-.531*	-.868**	-.813**	.925**	.950**		
14. Attendance rate	-0.136	.862**	-0.406	.617**	.622**	-0.235	-.475*	-0.258	-.662**	-.479*	.591**	.497*	.540*	

\* $p < .05$ . \*\* $p < .01$



## References

Thomson, S., De Bortoli, L., & Underwood, C. (2016) *PISA 2015: a first look at Australia's results*. Melbourne: ACER.

Thomson, S., Wernert, N., O'Grady, E., & Rodrigues, S. (2016) *TIMSS 2015: A first look at Australia's results*. Melbourne: ACER.