

ICSEA 2015: Technical Report

Research and Development

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1. Introduction

The Index of Community Socio-educational Advantage (ICSEA) identifies and quantifies many non-policy, malleable characteristics of a school and its student cohort and thus allows comparisons between schools that serve statistically similar students.

In addition to providing the ICSEA calculations, Australian Curriculum, Assessment and Reporting Authority (ACARA) reports the distribution of students in a school across four SEA (Socio-Educational Advantage) Quarters representing a scale of relative disadvantage ('bottom quarter') through to relative advantage ('top quarter'). The SEA Quarters distribution provides contextual information about the socio-educational composition of the students in a school.

ICSEA and SEA Quarters have been calculated and released annually by ACARA since 2008. During these years, the ICSEA model has been subject to a process of continuous refinement and enhancement. The current ICSEA and SEA Quarters model and calculation procedures are explained in full details in the [ICSEA 2013 Technical Report](#).

The purpose of this report is to provide an overview of procedures and outcomes of 2015 ICSEA and SEA Quarters calculation. Section 2 contains a description of the data sources used for the 2015 ICSEA and SEA Quarters calculation. Comparisons between the 2014 and 2015 ICSEA and SEA Quarters values are presented in Section 3. Section 4 provides parameters extracted and used in SEA estimation and ICSEA multi-level modelling process.

2. Data preparation and data sources

When enrolling a child in a school, all parents are asked to best indicate their occupation, school education and non-school education level attained. The possible answers to the parental occupation/education questions are described in the [Data Standards Manual: Student Background Characteristics](#). All states and territories, government education departments and Catholic system jurisdictional authorities provided ACARA with the parental background data for all students in their schools. This enrollment dataset used for the ICSEA and SEA calculations is referred as the Student Background Dataset (SBD).

Adjustment of school reading performance conditional variable

The estimation of student SEA levels requires, as a conditional variable, the school average NAPLAN reading score (*schwler*)¹. In 2015 ACARA investigated the impact that changes in the conditional variable has in the SEA and ICSEA estimations. It was observed that schools where the average reading score is based on results provided by only few students may show substantial changes in year-to-year *schwler* values.

Such a change could, in some cases, cause larger than expected year-to-year variability in SEA estimates. Such unexpected changes warrant additional treatment of the *schwler*

¹ See section 3.3 on page 6 of the [ICSEA 2013 Technical Report](#)

conditioning variable for very small schools. The threshold for ICSEA reporting is set at no less than five records; thus, to maintain the consistency, it was decided that the same threshold should be applied to select schools that will receive additional treatment of *schwler* values.

3. Overview of 2015 ICSEA calculations and results

Figure 1 shows the comparison of the published 2014 and 2015 ICSEA values. The black line represents a least-squares regression fit and, as it can be seen, it has slope of one and explained variance is 96%. The black cross shows the median in the horizontal and vertical axes. The box-plots at the top and left ends of the graph are a representation of each distribution, where the median, the interquartile range, whiskers at 1.5 interquartile range and the individual points considered as outliers (outside the whiskers) are represented for each dimension. These representations are used in all the following graphs.

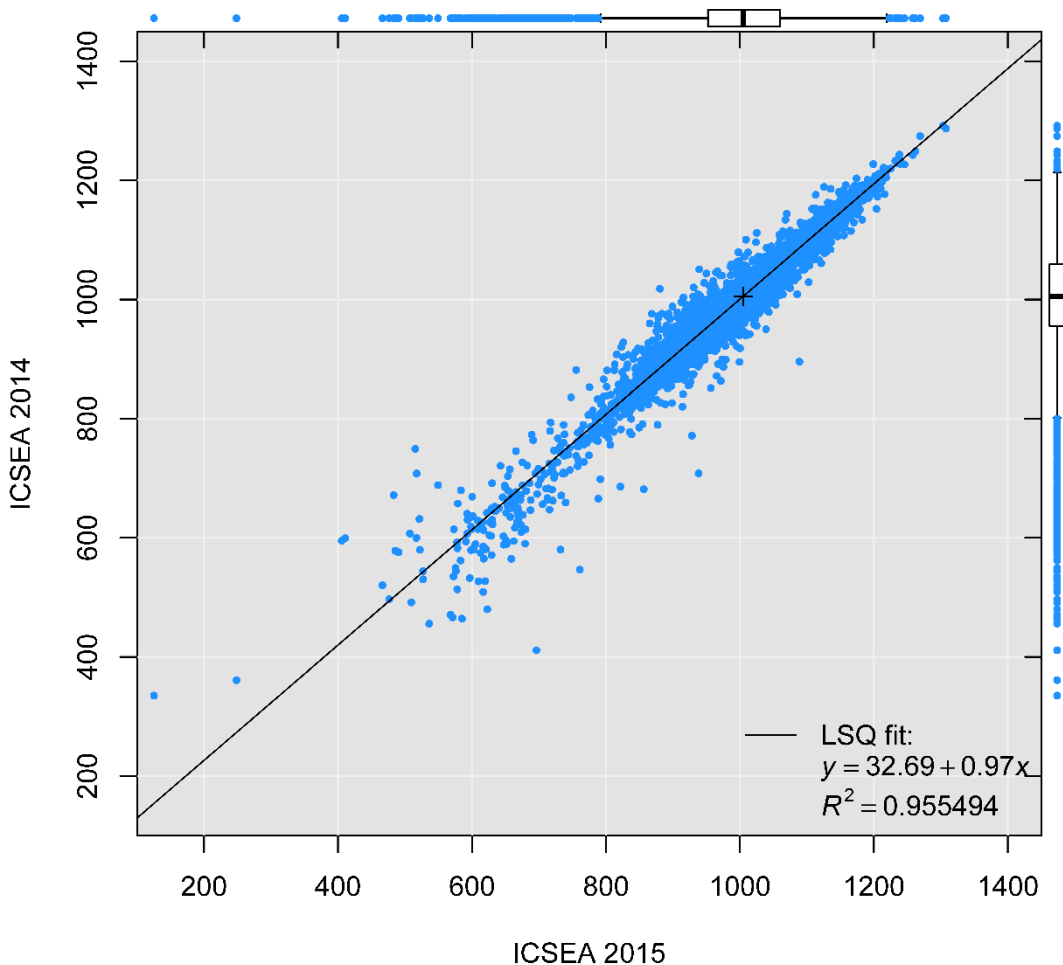


Figure 1: Correlation between 2014 ICSEA and 2015 ICSEA values.

Figure 2 shows the correlation between published 2015 ICSEA and averaged school performance across all NAPLAN 2015 tests and all year levels available in a school. The regression analyses shows that 78% of variance in school performance is accounted for by ICSEA values.

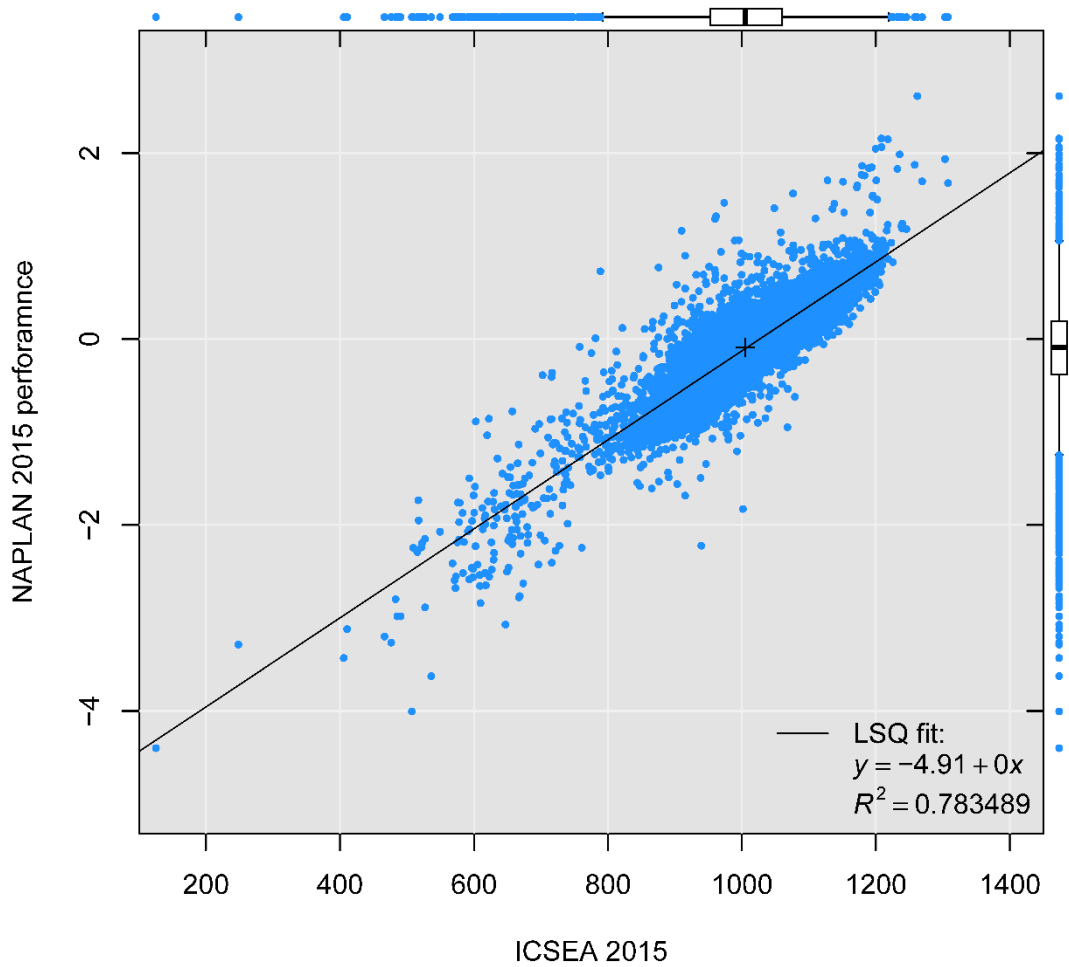


Figure 2: Correlation of 2015 ICSEA school 2015 NAPLAN performance

The SEA Quarters are a broad representation of a school's student distribution. As of 2014, this distribution is based solely on each student's level of socio-educational advantage estimation. This means that the school effect is excluded from the Quarters distribution. Thus, the SEA Quarters provide contextual information of a school's socio-educational demographics. Figure 3 shows a correlation between the 2105 published distribution of students in SEA quarters and 2015 ICSEA values. The overall distribution of students in all for SEA quarters was calculated as follows:

Sum SEA quarters = percentage Q1*1 + percentage Q2*2 + percentage Q3*3 + percentage Q4*4

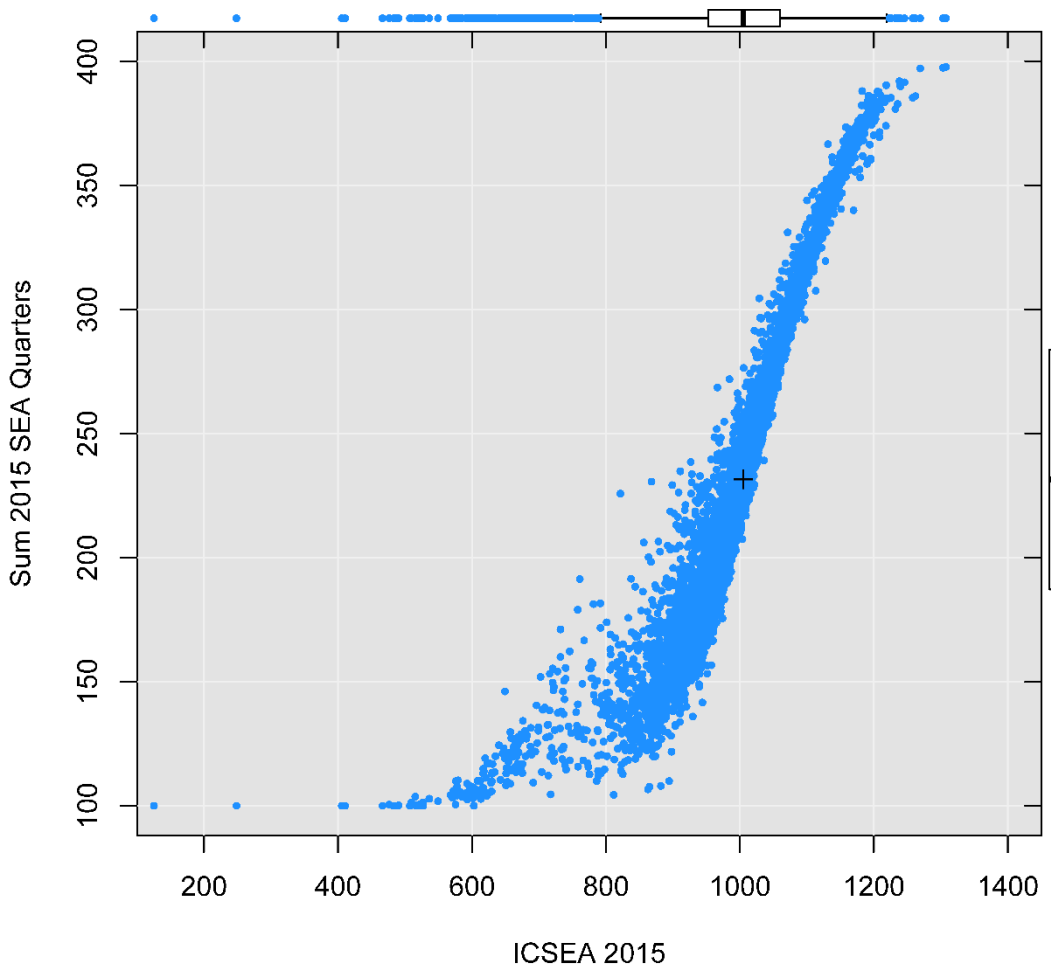


Figure 3: Correlation between of 2015 ICSEA and sum of SEA quarters percentages

Appendix A: Generalised partial credit model parameters (GPCM)

Tables 2 to 9 contain the parameter scaling factors obtained from NAPPLAN 2015 data set using GPCM (see section 3.2 of the ICSEA 2013 Technical Report). The 'Response' column shows the responses available to the parental question; the 'Count' column shows the number of instances of a particular response in 2015; the '%' column shows the percentage that the number of instances amounted to in 2015; the 'Score' column provides the unweighted initial scores for each response category; while the '2015' and '2014' columns show the item weightings extracted from GPCM for corresponding ICSEA calculation cycle.

Table 2: Parent 1: school education

Response	Count	%	Score	2014	2015
Year 9 or equivalent	56,083	5.5	0	0	0
Year 10 or equivalent	182,234	17.9	1	1.31	1.21
Year 11 or equivalent	111,651	11.0	2	1.56	1.47
Year 12 or equivalent	666,691	65.6	3	3.15	3.06

Table 3: Parent 2: school education

Response	Count	%	Score	2014	2015
Year 9 or equivalent	55,521	6.3	0	0	0
Year 10 or equivalent	194,737	22.0	1	1.17	1.16
Year 11 or equivalent	97,347	11.0	2	1.43	1.43
Year 12 or equivalent	538,464	60.8	3	3.02	3

Table 4: Parent 1: non-school education

Response	Count	%	Score	2014	2015
No non-school education	236,875	24.7	0	0	0
Certificate I–IV inc. trade certificate	261,332	27.2	1	0.94	0.96
Advanced diploma / diploma	156,453	16.3	2	2.31	2.31
Bachelor degree or above	305,466	31.8	3	4.02	4.01

Table 5: Parent 2: non-school education

Response	Count	%	Score	2014	2015
No non-school education	171,218	20.4	0	0	0
Certificate I–IV inc. trade certificate	298,156	35.6	1	0.98	1.02
Advanced diploma / diploma	114,026	13.6	2	2.73	2.77
Bachelor degree or above	254,130	30.3	3	4.82	4.84

Table 6: Parent 1: occupation

Response	Count	%	Score	2014	2015
Machine operator	143,172	20.3	0	0	0
Tradesperson/clerk/sales	213,529	30.2	1	0.87	0.87
Professional/manager	180,441	25.5	2	1.98	1.99
Senior manager	169,571	24.0	3	3.44	3.38

Table 7: Parent 2: occupation

Response	Count	%	Score	2014	2015
Machine operator	175,168	21.6	0	0	0
Tradesperson/clerk/sales	219,298	27.0	1	0.84	0.86
Professional/manager	215,624	26.6	2	2	2.07
Senior manager	200,791	24.8	3	3.86	3.92

Table 8: Parent 1: non-paid occupation

Response	Count	%	Score	2014	2015
in non-paid occupation	264,898	27.3	0	0	0
in paid occupation	706,713	72.7	1	0.66	0.69

Table 9: Parent 2: non-paid occupation

Response	Count	%	Score	2014	2015
in non-paid occupation	59,808	6.9	0	0	0
in paid occupation	810,881	93.1	1	0.9	0.97

Appendix B: Multi-level regression coefficients

Table 10 contains regression coefficients used to calculate ICSEA using multi-level regression model across each of the estimates in the set of five plausible SEA values. These coefficient are almost identical ($R^2 = 0.99$) to those used in 2014 and 2013

Table 10: ICSEA Multi-level regression coefficients for 2015

Variable	pv1	pv2	pv3	pv4	pv5
β_0 intercept	-0.007	-0.007	-0.008	-0.007	-0.007
β_1 SEAstudent	0.228	0.228	0.228	0.228	0.228
β_2 ATSI	-0.341	-0.342	-0.342	-0.343	-0.345
β_3 missing ATSI	-0.198	-0.198	-0.200	-0.203	-0.198
β_4 SEAschool	0.243	0.243	0.243	0.243	0.243
β_5 percentage ATSI	-0.005	-0.005	-0.005	-0.005	-0.005
β_6 ARIA	-0.011	-0.010	-0.011	-0.010	-0.010

References

Australian Curriculum, Assessment and Reporting Authority 2012, *Data Standards Manual: Student Background Characteristics*, 6th edn. Retrieved from:
www.acara.edu.au/verve/_resources/DSM_1.pdf

Australian Curriculum, Assessment and Reporting Authority 2014, *ICSEA 2013 Technical Report*. Retrieved from:
www.acara.edu.au/verve/_resources/ICSEA_2013_Generation_Report.pdf
