acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

ICSEA 2016: Technical Report

Research and Development

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 2016 ICSEA and SEA Quarters calculation. Section 2 contains a description of the data sources used for the 2016 ICSEA and SEA Quarters calculation. Comparisons between the 2015 and 2016 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* 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

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

additional treatment of *schwler* values.

3. Overview of 2016 ICSEA calculations and results

Figure 1 shows the comparison of the published 2015 and 2016 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.

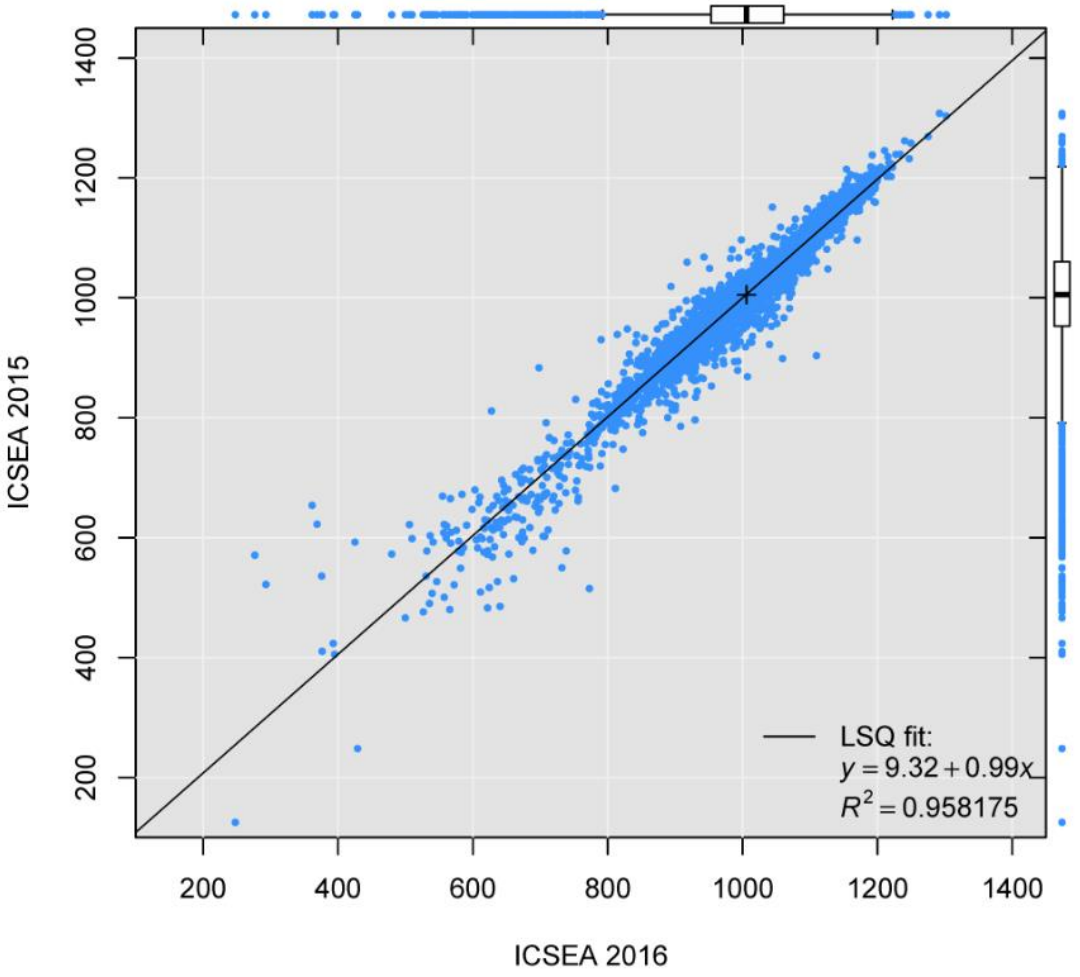

Figure 1: Correlation between 2015 ICSEA and 2016 ICSEA values.

Figure 2 shows the correlation between published 2016 ICSEA and averaged school performance across all NAPLAN 2016 tests and all year levels available in a school. The regression analyses shows that 81% of variance in school performance is accounted for by ICSEA values.

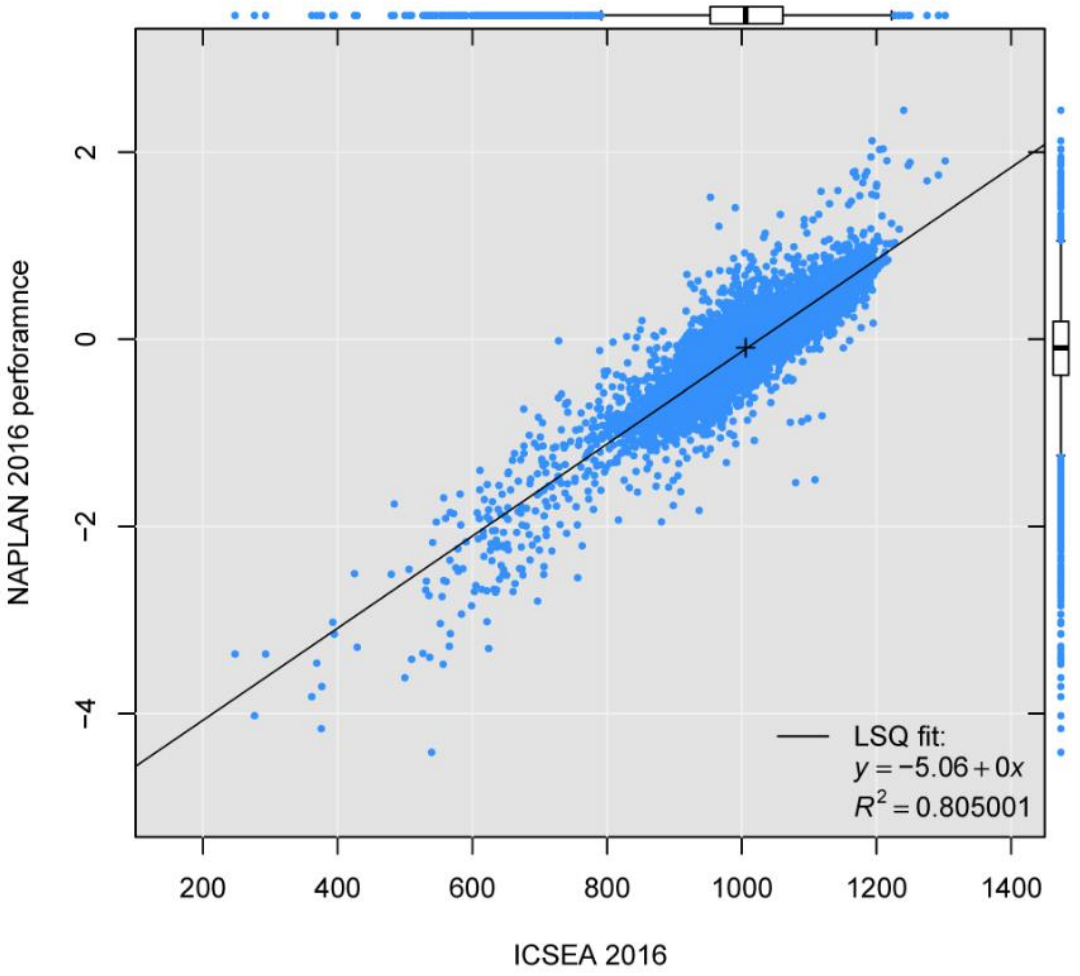

Figure 2: Correlation of 2016 ICSEA school 2016 NAPLAN performance

The SEA Quarters are a broad representation of a school's student distribution. As of 2013, 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 2106 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*

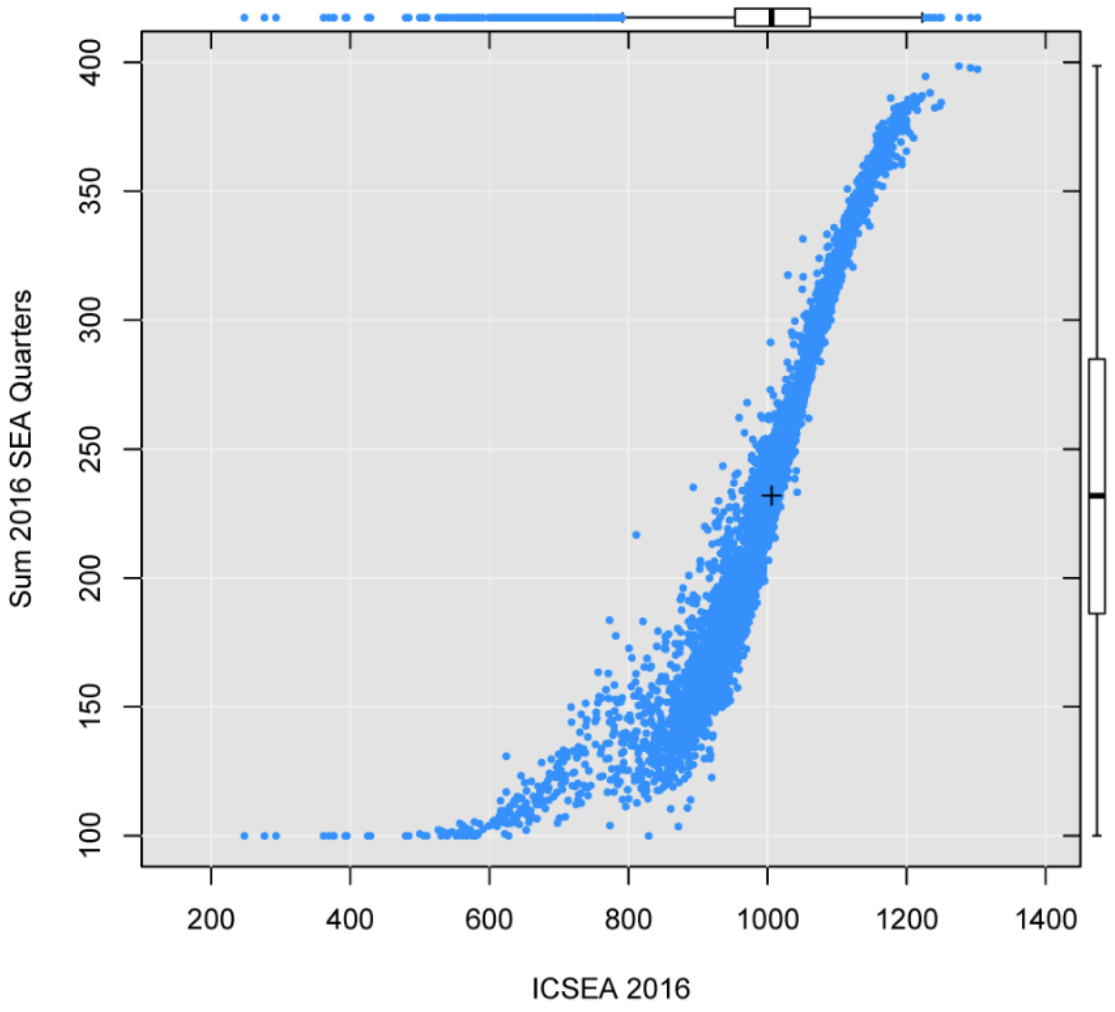

Figure 3: Correlation between of 2016 ICSEA and sum of SEA quarters percentages

Appendix A: Generalised partial credit model parameters (GPCM)

Tables 2 to 9 contain the parameter scaling factors obtained from NAPPLAN 2016 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 '2016' columns show the item weightings extracted from GPCM for corresponding ICSEA calculation cycle.

Table 2: Parent 1: school education

Response	Count	%	Score	2015	2016
Year 9 or equivalent	55,607	5.4	0	0	0
Year 10 or equivalent	176,288	17.0	1	1.21	1.03
Year 11 or equivalent	109,435	10.6	2	1.47	2.07
Year 12 or equivalent	694,758	67.1	3	3.06	3.1

Table 3: Parent 2: school education

Response	Count	%	Score	2015	2016
Year 9 or equivalent	55,011	6.1	0	0	0
Year 10 or equivalent	188,822	20.9	1	1.16	0.94
Year 11 or equivalent	96,952	10.7	2	1.43	1.89
Year 12 or equivalent	562,793	62.3	3	3.00	2.83

Table 4: Parent 1: non-school education

Response	Count	%	Score	2015	2016
No non-school education	232,030	23.5	0	0	0
Certificate I–IV inc. trade certificate	267,265	27.1	1	0.96	1.43
Advanced diploma / diploma	160,856	16.3	2	2.31	2.86
Bachelor degree or above	327,449	33.2	3	4.01	4.29

Table 5: Parent 2: non-school education

Response	Count	%	Score	2015	2016
No non-school education	171,069	19.9	0	0	0
Certificate I–IV inc. trade certificate	305,304	35.5	1	1.02	1.5
Advanced diploma / diploma	116,769	13.6	2	2.77	3
Bachelor degree or above	267,429	31.1	3	4.84	4.5

Table 6: Parent 1: occupation

Response	Count	%	Score	2015	2016
Machine operator	141,973	19.6	0	0	0
Tradesperson/clerk/sales	216,411	29.9	1	0.87	1.18
Professional/manager	184,708	25.5	2	1.99	2.35
Senior manager	180,032	24.9	3	3.38	3.53

Table 7: Parent 2: occupation

Response	Count	%	Score	2015	2016
Machine operator	175,727	21.3	0	0	0
Tradesperson/clerk/sales	223,722	27.1	1	0.86	1.26
Professional/manager	217,196	26.3	2	2.07	2.51
Senior manager	208,331	25.3	3	3.92	3.77

Table 8: Parent 1: non-paid occupation

Response	Count	%	Score	2015	2016
in non-paid occupation	271,045	27.3	0	0	0
in paid occupation	723,124	72.7	1	0.69	0.75

Table 9: Parent 2: non-paid occupation

Response	Count	%	Score	2015	2016
in non-paid occupation	62,745	7.1	0	0	0
in paid occupation	824,976	92.9	1	0.97	1.03

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 2015 and 2014.

Table 10: ICSEA Multi-level regression coefficients for 2016

Variable		pv1	pv2	pv3	pv4	pv5
β_0	intercept	-0.057	-0.056	-0.056	-0.057	-0.056
β_1	$SEA_{student}$	0.238	0.237	0.236	0.236	0.237
β_2	ATSI	-0.300	-0.299	-0.297	-0.300	-0.299
β_3	missing ATSI	-0.177	-0.178	-0.172	-0.179	-0.177
β_4	SEA_{school}	0.276	0.277	0.278	0.277	0.278
β_5	percentage ATSI	-0.006	-0.006	-0.006	-0.006	-0.006
β_6	ARIA	-0.004	-0.005	-0.004	-0.004	-0.005

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