acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

ICSEA 2018: 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[1].

The purpose of this report is to provide an overview of procedures and outcomes of 2018 ICSEA and SEA Quarters calculation. Section 2 contains a description of the data sources used for the 2018 ICSEA and SEA Quarters calculation. Comparisons between the 2017 and 2018 ICSEA and SEA Quarters percentages 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*), see ICSEA 2013 Technical Report. 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] Australian Curriculum, Assessment and Reporting Authority (2014). ICSEA 2013 Technical Report.

additional treatment of *schwler* values.

3. Overview of 2018 ICSEA calculations and results

Figure 1 shows the comparison of the published 2017 and 2018 ICSEA. The black line represents a least-squares regression fit and, as it can be seen, it has slope of one and explained variance is 95%. 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.

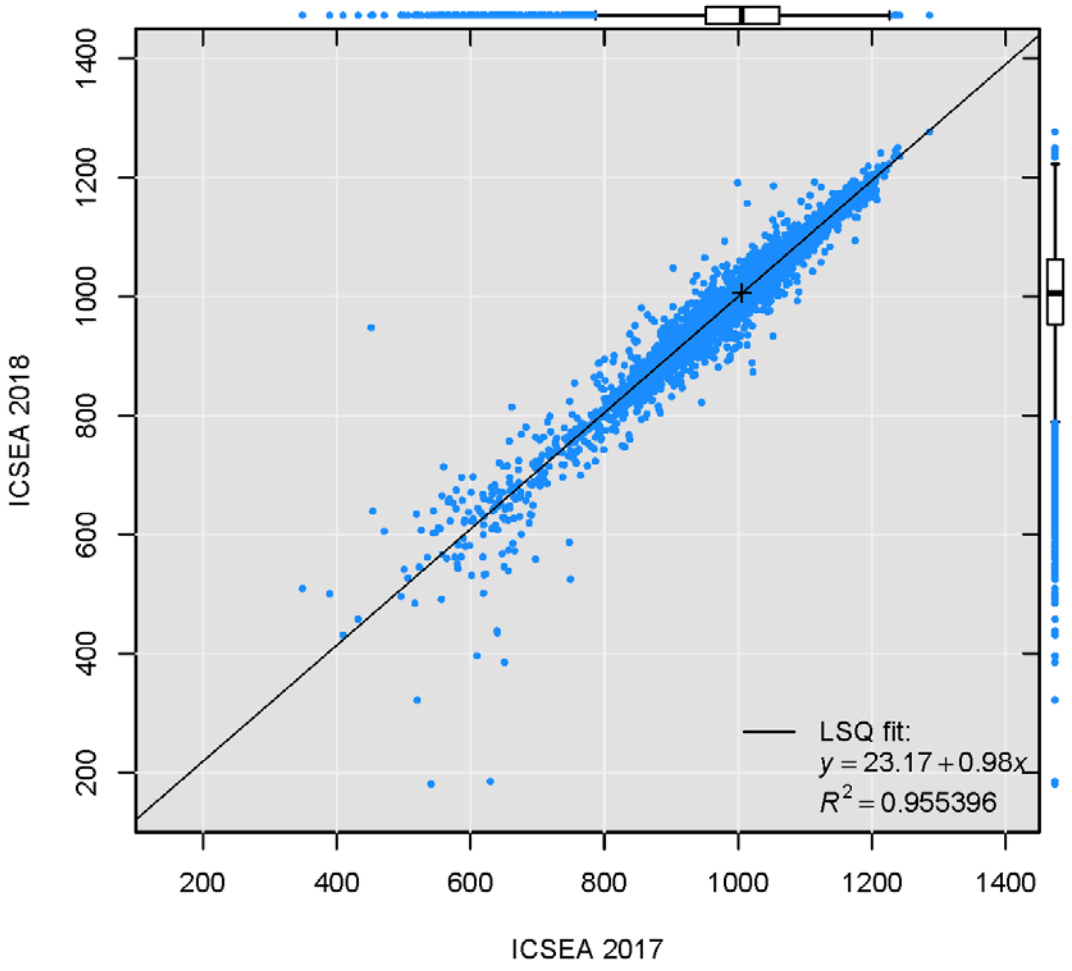

Figure 1: Correlation between 2017 ICSEA and 2018 ICSEA.

Figure 2 shows the correlation between published 2018 ICSEA and averaged school performance across all NAPLAN 2018 tests and all year levels available in a school. The regression analysis shows that 79% of variance in school performance is accounted for by ICSEA.

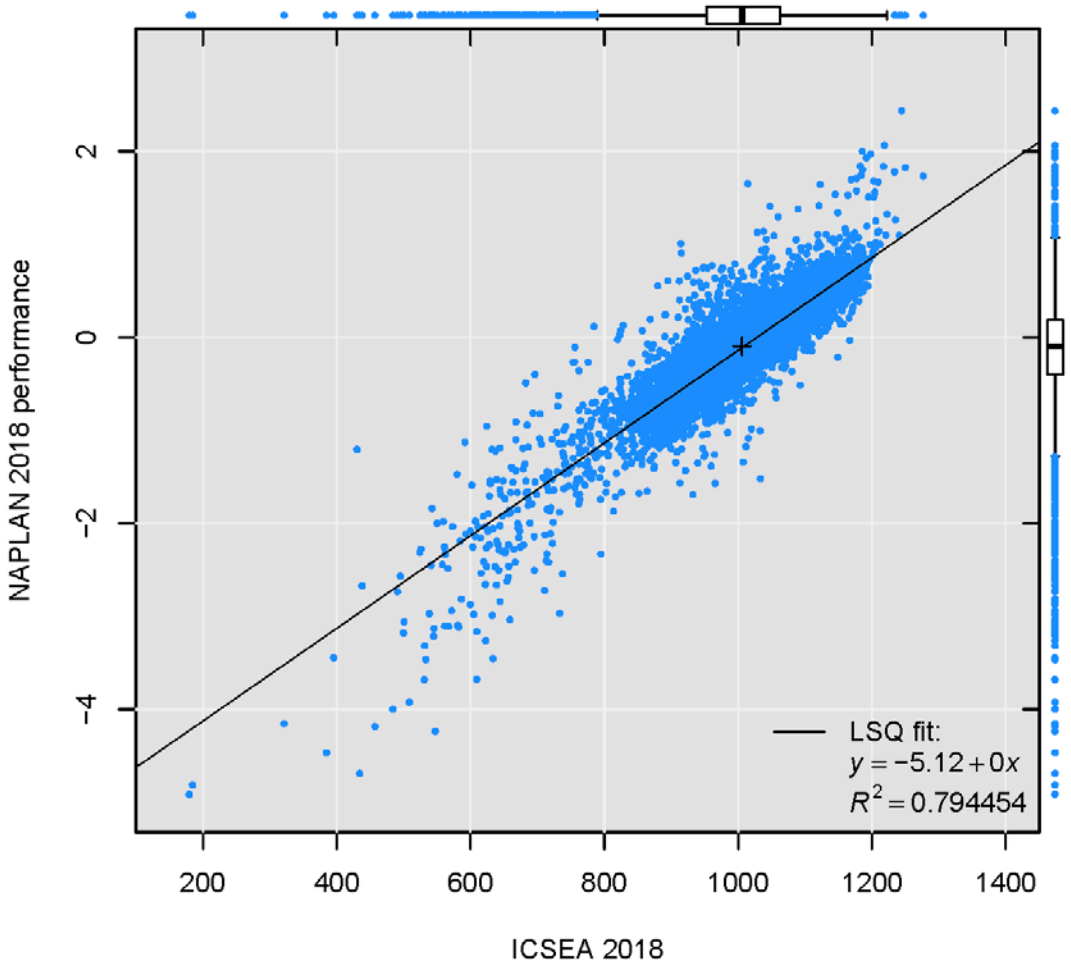

Figure 2: Correlation of 2018 ICSEA school 2018 NAPLAN performance

The SEA Quarters are a broad representation of a school's student distribution. From 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 distribution of students in SEA quarters and ICSEA in 2018. The overall distribution of students in all four SEA quarters was calculated as follows:

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

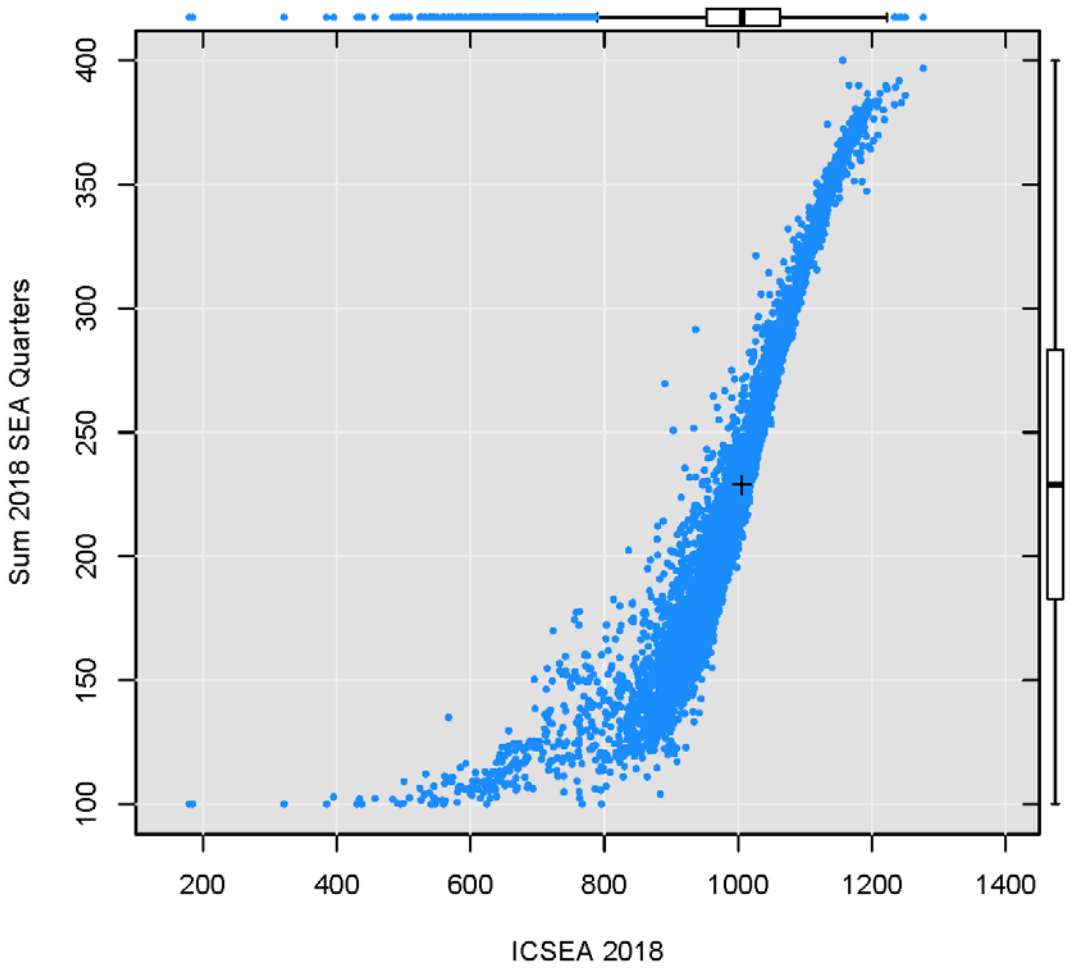

Figure 3: Correlation between of 2018 ICSEA and sum of SEA quarters percentages

Appendix A: Generalised partial credit model parameters (GPCM)

Tables 2 to 9 contain the parameter scaling factors obtained from NAPLAN 2018 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 the '%' column shows the percentage that the number of instances amounted; the 'Score' column provides the unweighted initial scores for each response category; while the '2018' and '2017' columns show the item weightings extracted from GPCM for corresponding ICSEA calculation cycle.

Table 2: Parent 1: school education

Response	Count	%	Score	2018	2017
Year 9 or equivalent	58024	5.19	0	0	0
Year 10 or equivalent	172439	15.4	1	1.05	1.04
Year 11 or equivalent	108160	9.67	2	2.11	2.08
Year 12 or equivalent	779685	69.7	3	3.16	3.11

Table 3: Parent 2: school education

Response	Count	%	Score	2018	2017
Year 9 or equivalent	57250	5.84	0	0	0
Year 10 or equivalent	187444	19.1	1	0.96	0.95
Year 11 or equivalent	95825	9.78	2	1.92	1.9
Year 12 or equivalent	639108	65.2	3	2.88	2.84

Table 4: Parent 1: non-school education

Response	Count	%	Score	2018	2017
No non-school education	228661	21.2	0	0	0
Certificate I–IV inc. trade certificate	290681	26.9	1	1.45	1.44
Advanced diploma / diploma	175922	16.3	2	2.91	2.88
Bachelor degree or above	382881	35.5	3	4.36	4.32

Table 5: Parent 2: non-school education

Response	Count	%	Score	2018	2017
No non-school education	174896	18.6	0	0	0
Certificate I–IV inc. trade certificate	326484	34.7	1	1.51	1.51
Advanced diploma / diploma	127998	13.6	2	3.02	3.02
Bachelor degree or above	310669	33.0	3	4.53	4.53

Table 6: Parent 1: occupation

Response	Count	%	Score	2018	2017
Machine operator	147217	18.5	0	0	0
Tradesperson/clerk/sales	232677	29.3	1	1.16	1.16
Professional/manager	202075	25.4	2	2.31	2.32
Senior manager	211059	26.6	3	3.47	3.48

Table 7: Parent 2: occupation

Response	Count	%	Score	2018	2017
Machine operator	184596	20.8	0	0	0
Tradesperson/clerk/sales	242110	27.3	1	1.27	1.27
Professional/manager	228804	25.8	2	2.55	2.55
Senior manager	230887	26.0	3	3.82	3.82

Table 8: Parent 1: non-paid occupation

Response	Count	%	Score	2018	2017
in non-paid occupation	280670	26.1	0	0	0
in paid occupation	793028	73.8	1	0.81	0.79

Table 9: Parent 2: non-paid occupation

Response	Count	%	Score	2018	2017
in non-paid occupation	73141	7.62	0	0	0
in paid occupation	886397	92.3	1	1.01	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 coefficients are very similar ($R^2 = 0.97$) to those utilised in 2017 and 2016.

Table 10: ICSEA Multi-level regression coefficients for 2018

Variable		pv1	pv2	pv3	pv4	pv5
β_0	intercept	0.050	0.049	0.050	0.049	0.050
β_1	$SEA_{student}$	0.230	0.230	0.230	0.230	0.230
β_2	ATSI	-0.305	-0.306	-0.305	-0.306	-0.307
β_3	missing ATSI	-0.250	-0.248	-0.250	-0.253	-0.253
β_4	SEA_{school}	0.278	0.278	0.279	0.279	0.278
β_5	percentage ATSI	-0.006	-0.006	-0.007	-0.006	-0.006
β_6	ARIA	-0.010	-0.010	-0.009	-0.009	-0.010