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The SACE Review panel's final report: Significant flaws in the analysis of statistical data

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The South Australian Certificate of Education (SACE) is a credential and formal qualification within the Australian Qualifications Framework. A recent review of the SACE outlined a number of recommendations for significant changes to this certificate. These recommendations were the result of a process that began with the review panel "scrutinizing carefully [existing SACE structures for] continuing validity and effectiveness". This paper critiques the "careful examination" of statistical trends and patterns used to build the case for reform. Central to these trends and patterns are measures of retention, socio-economic status and student achievement, all of which are problematic. This paper also challenges the appropriateness of the statistical techniques used in the review. The paper concludes by arguing that making significant policy changes based upon such limited and flawed analyses is problematic.

Educational research, curriculum, education policy, post-compulsory education

INTRODUCTION

The South Australian Certificate of Education (SACE), introduced in 1992-93, is recognised as a credential and formal qualification within the Australian Qualifications Framework (Keightley and Keighley-James, 2001). SACE consists of two stages: Year 11 students typically complete Stage 1 and Year 12 students usually complete Stage 2. Offering in excess of 70 subjects over the two stages to largely post-compulsory education students, the SACE was recently reviewed by a three-person Review Panel (Crafter, Crook, and Reid, 2006). The substantive term of reference required the Review Panel to "achieve a curriculum and assessment framework that will meet the diverse needs of all students and result in high and more socially equitable levels of retention, completion and pathways beyond school" (Crafter et al., 2006, p. 9). The product of the review, a proposed new SACE, represents a substantial shift in "what counts as knowledge, the ways in which it is organised, who is empowered to teach it, [and] what counts as an appropriate display of having learned it" (Apple, 1993, p. 222).

Crafter et al. (2006) make a number of recommendations for the creation of a new SACE based upon principles, design concepts and features that are, they claim, flexible and responsive, credible, inclusive, connected, worthwhile, futures-orientated, and supportive of quality learning and teaching. For example, the Review Panel recommends the replacement of statistical moderation – the method used to adjust students' school-based assessment marks based upon external examination scores – with a method where "significant differences" between internal and external assessments will "signal the need for further discussion with the school and the teacher" and "this may result in adjustments to assessments" (Crafter et al., 2006, p. 132). This and other recommendations emerged from a process that began with the review panel "scrutinising carefully [existing SACE structures for] continuing validity and effectiveness" (Crafter et al., 2006, p. 9).

The Final Report is divided into three major sections: the case for reform, a new SACE within a learning space, and detailed reform proposals. The focus of this paper is the case for reform. In the

Final Report, three chapters are used to present the case: current challenges, the case for reform - statistical trends and patterns, and the case for reform – community views. This paper examines the statistical trends and patterns that were used to build the case for reform. These trends and patterns are fundamental to the Review Panel's case for reform and serve as a primary platform upon which it bases its recommendations.

The Review Panel used a "relatively small number of 'key indicators' [to] highlight some of the more significant trends and patterns in the participation and achievement of young people" (Crafter et al., 2006, p. 31). The trends and patterns identified in the review rely largely upon three measures: retention rates, socio-economic disadvantage, and achievement scores. The use of each measure is explored in detail in this paper.

FULL-TIME APPARENT RETENTION AND THE SACE REVIEW

Three overlapping conceptual definitions of early school leavers can be found in the literature (Dekkers and Claassen, 2001). First, early school leavers may be defined as those students who leave before the end of compulsory-aged schooling. Thus, for example, a South Australian student who leaves the education system before he or she is 16-years old would be classified as an early school leaver. South Australian students typically reach this age late in Year 10 or early in Year 11, with smaller numbers reaching that age in Years 9 and 12. Second, early school leavers may be defined as those students who leave without obtaining a certificate or diploma. Within the South Australian system, they would leave without having satisfactorily completed the requirements of the SACE certificate which are typically satisfied at the end of Year 12. The third conceptual approach views an early school leaver as a student who leaves school to take up employment. Under this conceptualisation, early leaving is problematic only if the leaver does not have the minimal levels of education and training necessary to enter the labour market (Hannan, Hovels, Berg, and White, 1995).

Crafter et al. (2006) used a certificate-based definition together with staying at school to the end of Year 12. They draw the South Australian Minister of Education's attention to the apparently low SACE completion rate, thereby casting the discussion in terms of students leaving the secondary education system without the certificate. They also speak of retention in terms of students, defined as Year 8 or Year 10 cohorts, who stay at secondary school until the end of Year 12, typically one to two years beyond the end of compulsory schooling in South Australia. In adopting this approach, Crafter et al. (2006) are following the convention used by the Australian Bureau of Statistics (ABS). The ABS uses four age-based definitions of apparent retention, reflecting the imprecise nature of their indices. Adapted to South Australia, the four ABS definitions of apparent retention are:

- Apparent full-time retention is defined as the number of full-time students in Year 12, expressed as a percentage of the number who started secondary education in Year 8.
- Apparent full-time retention can be expressed as the number of full-time students in Year 12, expressed as a percentage of the number who started schooling in Year 10.
- Apparent all retention is defined as the number of full-time-equivalent students in Year 12 expressed as a percentage of the number of Year 8 students.
- Apparent all retention is defined as the number of full-time-equivalent students in Year 12 expressed as a percentage of the number of Year 10 students.

The ABS full-time retention rates, from Year 10 to Year 12, are shown in Table 1. Crafter et al. (2006) correctly state that the South Australia full-time retention rate is reasonably static and is

the second-lowest rate of the eight regions monitored, although arguably the ACT and NSW figures are confounded by a number of factors including the movement of students from NSW to ACT. Crafter et al. (2006) use these low full-time retention rates for South Australia as a major plank upon which to build their argument for an overhaul of SACE.

Table 1. Apparent Full-Time Retention Rate, from Year 10 to Year 12 (Source: ABS Schools Australia, 2005, Cat. No. 4221.0)

Year	Aust.	ACT	NT	Tas	WA(b)	SA	Qld	Vic.	NSW
Government									
1998	69.4	110.0	62.4	62.3	67.6	64.2	73.0	73.7	64.8
1999	69.6	107.1	70.0	67.5	67.8	64.8	73.2	73.5	64.7
2000	69.6	105.0	69.9	71.6	67.3	61.9	73.9	74.4	64.2
2001	70.6	112.1	70.6	70.5	67.0	61.7	74.8	76.8	65.1
2002	72.2	101.0	73.1	75.3	69.7	61.9	76.5	77.5	67.4
2003	71.9	101.0	78.7	76.4	64.8	61.8	76.4	77.3	68.1
2004	72.2	100.8	90.8	76.5	66.7	62.9	75.0	77.2	68.6
2005	71.3	99.5	76.2	67.2	66.3	64.4	72.7	77.0	68.5
Non-government									
1998	83.4	68.6	54.8	69.4	80.3	85.2	86.8	88.3	80.5
1999	83.6	72.2	52.6	72.7	79.1	84.4	88.0	87.3	81.2
2000	83.6	65.2	43.9	71.6	80.2	84.1	87.8	88.3	81.2
2001	84.5	68.7	52.1	70.5	81.9	85.0	89.1	89.6	80.9
2002	85.9	75.2	49.8	74.1	82.1	86.9	89.8	91.5	82.1
2003	85.9	76.3	46.5	76.2	81.9	87.9	90.6	91.8	81.0
2004	86.1	72.6	43.1	75.9	82.4	87.7	91.5	91.9	81.3
2005	85.4	74.5	54.2	69.2	82.3	86.2	91.2	90.2	81.3
Total									
1998	74.1	79.4	60.4	64.2	71.8	71.2	77.7	79.1	69.8
1999	74.4	92.5	64.7	68.9	71.5	71.4	78.3	78.7	70
2000	74.4	88.7	62.2	71.6	71.6	69.5	78.7	79.7	69.8
2001	75.4	93.3	64.9	70.5	71.9	69.6	79.7	81.6	70.3
2002	77	89.8	66.2	75	73.9	70.6	81.1	82.9	72.4
2003	76.9	90.3	68.7	76.4	70.6	70.8	81.5	82.9	72.7
2004	77.2	88.4	75.2	76.3	72.4	71.6	80.8	83	73.2
2005	76.5	88.1	69.5	67.8	72.2	72.1	79.3	82.2	73.2

However, the focus on full-time students is misleading. South Australia has the highest number of part-time students of any state or territory (ABS, 2003). In 2002, 20.0 per cent of all South Australian Year 12 students were studying part-time (ABS, 2003). This is mainly due to the number of students who decide to work part-time and study part-time. It is also a reflection of study patterns emerging in the SACE itself. In some schools, it is relatively common for students to start their SACE studies in Year 10 and take a reduced load in Year 12, thus spreading out a two-year program over three years. Such students are technically part-time students in their final year of secondary education, even though they are in effect fully engaged with SACE. For example, SSABSA reports that 3,597 students from independent schools fulfilled the

requirements for entry into a South Australian university in 2005 (SSABSA 2005) and yet the ABS (Cat. No. 4221.0, Table 9, 2005) reports that there were only 2,947 full-time Year 12 students in those schools in this year. The ABS, aware of these and other patterns, issues the caution: "because of this pattern of education in SA, it is important to look at the all students [i.e., full-time-equivalent] retention rate as well as the full-time rate" (ABS, 2003). As shown in Table 2, when the full-time-equivalent retention rate is used, South Australia's apparent retention rate is above the national average, and slightly smaller than Tasmania and Australian Capital Territory.

Table 2. Apparent Full-Time-Equivalent Retention Rates, from Years 10 to Year 12 (Source: ABS Schools Australia, 2005, Cat. No. 4221.0)

Year	Aust.	ACT	NT	Tas	WA	SA	Qld	Vic.	NSW
				Government					
1998	74.4	110.4	82.2	87.2	73.3	85.3	73.2	76.4	68.4
1999	75.0	107.3	93.3	104.2	73.2	84.8	73.4	76.5	68.6
2000	75.3	105.2	79.9	102.1	71.8	84.1	76.5	77.3	68.1
2001	76.4	112.2	87.4	107.0	73.4	83.1	77.0	80.4	67.9
2002	78.5	101.3	85.9	119.7	74.2	86.4	79.8	81.2	70.1
2003	77.5	102.7	88.3	122.6	65.3	83.7	79.0	81.0	71.4
2004	77.6	101.8	99.7	125.9	68.3	86.1	77.0	80.9	71.6
2005	76.1	100.8	84.4	102.2	67.7	85.0	74.7	80.5	71.1
				Non-Government					
1998	84.0	68.6	54.8	69.6	80.4	89.1	86.9	88.6	81.2
1999	84.1	72.2	55.2	72.9	79.2	87.6	88.1	87.7	81.7
2000	84.1	65.2	46.2	72.2	80.3	87.3	87.9	88.6	81.6
2001	85.0	68.7	53.8	71.2	81.9	88.5	89.2	89.8	81.4
2002	86.4	75.3	52.1	74.4	82.1	90.8	89.9	91.8	82.6
2003	86.5	76.4	48.7	75.6	81.9	92.8	90.8	92.0	81.6
2004	86.6	72.8	45.0	75.3	82.7	92.8	91.7	92.0	81.8
2005	86.0	75.6	54.8	69.3	82.4	91.0	91.4	90.4	81.7
				Total					
1998	77.6	92.7	74.9	82.4	75.6	86.5	77.7	80.9	72.5
1999	78.1	92.6	82.0	95.7	75.2	85.7	78.2	80.7	72.8
2000	78.3	88.9	70.2	94.0	74.6	85.2	80.4	81.6	72.6
2001	79.4	93.3	77.3	97.0	76.2	84.9	81.2	84.0	72.4
2002	81.3	90.0	76.3	107.2	76.9	87.9	83.3	85.3	74.4
2003	80.7	91.3	76.4	109.4	70.9	86.8	83.1	85.3	74.9
2004	80.9	89.0	82.3	109.7	73.5	88.4	82.1	85.2	75.2
2005	79.8	89.3	75.5	92.4	73.1	87.2	80.6	84.4	75.0

The stark difference in the two retention rates can be seen in Figure 1 where the apparent full-time and full-time-equivalent retention rates are graphed for South Australia and Australia. Using the different retention rate indices, it is relatively easy to craft two very different arguments, with dramatically different implications for SACE. Based upon full-time retention rates, Crafter et al. (2006) argue that it is apparent that many students are not completing Year 12 studies, and SACE is failing somewhat dismally to hold students at school. Conversely, using full-time-equivalent

retention rates it could be argued that SACE is doing particularly well at enabling students to complete their education in a flexible fashion using part-time study.

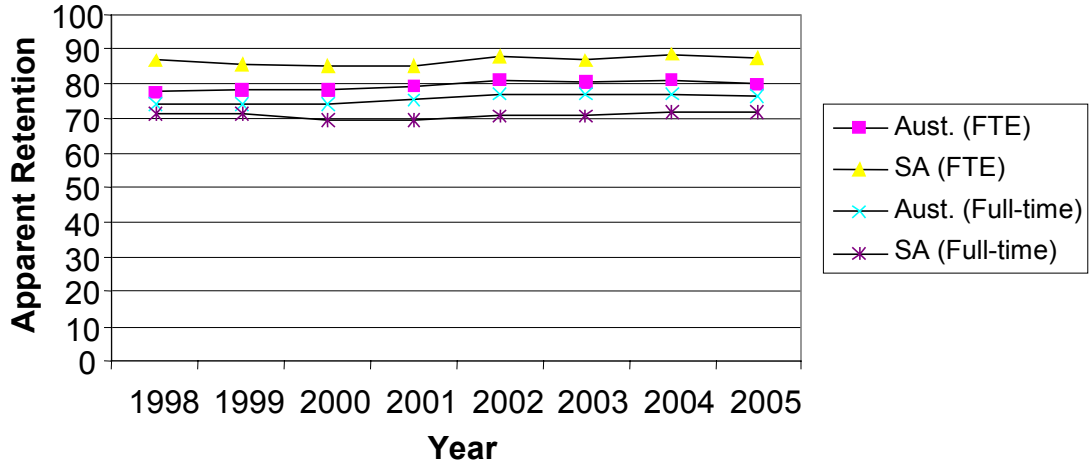

Figure 1. Apparent Full-time and Full-time-Equivalent Retention Rates from Year 10 to Year 12 for South Australia and Australia (Source: ABS School Australia 2005, Cat. No. 4221.0)

Crafter et al. (2006) are at least somewhat aware of the different stories available to them. Referring to the work of Lamb, Walstab, Teese, Vickers, and Rumberger (2004), they write:

> When the retention rate is adjusted to include part-time students, the Years 8–12 apparent retention rate for South Australia rises by some 8 percentage points from the full-time rates shown above, to around 76 per cent, fifth highest in the nation and within 1–2 percentage points of the corresponding figure for Australia as a whole. This improvement in apparent retention reflects the large number of part-time students enrolled in Year 12 in South Australian government schools. (Crafter et al., 2006, p. 32)

However, they refer to the large number of part-time students seemingly as an after-thought. In the main body of the Final Report, Figures 1.2, 2.1, 2.2, 2.4, 2.15, and Table 1.2 are all based upon full-time students. Only two figures, 2.3 and 2.5, in the main body of the Final Report use full-time-equivalent apparent retention rates.

The Longitudinal Surveys of Australian Youth (LSAY) is a multi-wave study of cohorts that reached Year 12 typically in 1978, 1982, 1987, 1992, 1998, and 2001. Fullarton, Walker, Ainley, and Hillman (2003) using LSAY data reported Year 12 participation rates for South Australia in 2001 to be 74 per cent. A potential limitation with the analyses undertaken by Crafter et al. (2006), Lamb et al (2004), and Fullarton et al (2003) is that they exclude students who leave school for at least a year and then decide to re-enter the education system. It is probable that the South Australian re-entry program is most likely responsible for the high full-time-equivalent retention rates. However, a fundamental question needs to be asked: If Crafter et al. (2006) are aware of the problem with full-time retention rates, why were those figures used to build their argument for a revised SACE?

Chapter 1 of the Final Report is the leading chapter in the case for reform. It refers only to full-time retention rates and does not mention full-time-equivalent rates (see Crafter et al., 2006, Figure 1.2) even though the authors acknowledge "South Australia has the highest number and percentage of part-time students in Year 12 in Australia" (p. 20). This chapter further compounds this line of reasoning by also presenting figures for people who are either engaged in full-time

study or full-time work even though South Australia has traditionally had the largest number of people who both study and work part-time (see Crafter et al, 2006, Table 1.2). The Review Panel presented the bulk of their argument using full-time retention rates while at the same time acknowledging that one of the desirable aspects of the current SACE is that it has the flexibility to enable part-time study practices.

There is a substantial difference in retention rates across the school sectors in South Australia. Full-time and full-time-equivalent retention rates for non-government schools are consistently high (see Figure 2). For government schools, the full-time retention rates are typically between 60 and 65 per cent while the full-time-equivalent retention rates approach those of non-government schools and are often above 85 per cent. That being the case, it is apparent that the government schools are offering an attractive part-time study alternative that is meeting the needs of a large number of people. This is most likely due to the adult re-entry high schools strategically placed across the greater metropolitan area (Ramsay, 2004). As noted by Lamb et al (2004):

> South Australia's Re-Entry High Schools provide the clearest example of a second chance system. These are for students who have been out of school for at least six months. The minimum age of most students is about 16 years, but most students are aged 18 years or more. Some re-entry students are at the Grade 8 level academically and have to do bridging courses in order to be re-integrated into the mainstream curriculum. The nature of SACE (being unitised and open) lends itself to part-time enrolment. The average high school discourages part-time enrolment, so a lot of 're-entry' enrolments are part-time students (p. 81).

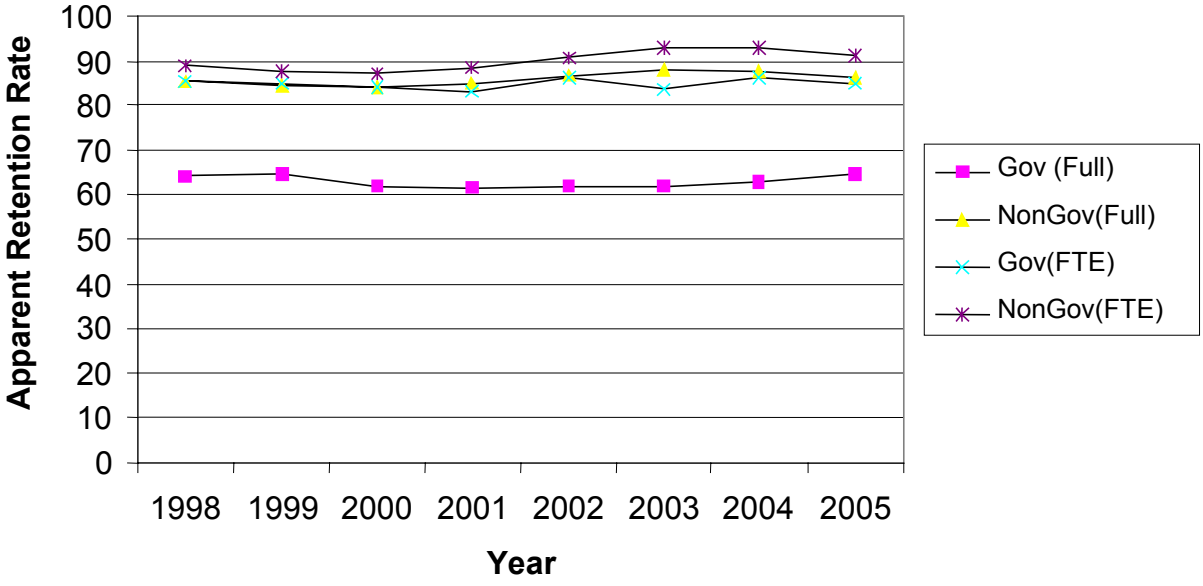

Figure 2. Apparent Full and Full-Time-Equivalent Retention Rates for South Australia by School Type (Source: ABS School Australia 2005, Cat. No. 4221.0)

The high full-time-equivalent retention rates in government schools certainly merit further exploration, starting with how retention rates are and should be calculated. Arguably, however, retention rates are a major problem for government schools and not for Catholic or Independent schools, and this problem is substantially addressed through re-entry schools.

COHORT DEFINITIONS AND THE SACE REVIEW

The retention rates reported by the ABS (2005, Cat. No. 4221.0) and Crafter et al. (2006) are additionally problematic due to the definition of the cohort being studied. A cohort is any group of

people with a common classification or characteristic (Johnson and Christensen, 2004). Cohorts are often used in panel studies where the same individuals are studied at successive points over time. Strictly speaking, the 'student cohort' presented in the SACE Review Report is not a cohort for a number of reasons, some of which are acknowledged by Crafter et al. (2006). Students moving from one schooling system to another, adults re-entering the schooling system, younger school leavers returning, an influx of international students in SACE, and grade retention all point to the changing nature of the cohort at the school, sector, and state level. The grade-based approach used by Crafter, Crook and Reid (2006) assumes (i) no grade retention and (ii) no net loss or gain of students from the school system. The first point is likely to be most problematic where schools implement a grade-promotion policy resulting in, for example, retention of Year 11 students due to low academic performance. The second point is related to the phenomenon of many students changing schools towards the end of their secondary education. Grade-based cohort calculations present an additional problem for SACE-type programs. Specifically, students who take two or more years to complete a full year of study impinge on the accuracy of the calculation and any meaningful interpretation of the statistic.

Crafter et al. (2006) did not utilise any precise or suitable definition of cohort, thereby making their report limited, flawed, and misleading. Exploring the SACE-retention issue using Year 8 as the initial cohort and a non-equivalent Year 12 cohort four years later (see Crafter et al., 2006, Figure 1.2) is misleading since approximately 3 percent of the Year 8 students will leave school before the end of Year 10 (ABS School Australia, 2005, cat. No. 4221.0; see also Crafter et al., 2006, Figure 2.1). The Year 10 cohort is a better indicator of student retention affected by SACE, but the progression of a student cohort would need to take into account the flexibility of the SACE. This flexibility means that SACE study can extend beyond the traditional Year 12 (see Crafter et al., 2006, Figure 2.5). Indeed, the flexibility of the present SACE makes it somewhat meaningless to talk about Year 11 and Year 12, especially when SACE study may commence in Year 10 and be completed beyond the traditional Year 12. Crafter et al. (2006) can be said to have 'manufactured a crisis' by essentially overlooking one of the most prominent features of the present SACE (see also Berliner and Bruce J. Biddle, 1996). Without careful research into why South Australian students are leaving school shortly after they reach the legal school leaving age, it is impossible to say how the present or any future SACE is related to early school leaving.

RESEARCH ON RETENTION

Much research has been conducted on early school leavers. Referring to the work of SSABSA (1999), Cormack (2004), and Lamb et al. (2004), Crafter et al. (2006) argue:

> [T]he fact that the same pattern of withdrawal from the senior years of secondary schooling has been repeated each year for successive cohorts of students over an extended period of time suggests that systemic factors are operating to draw students away from full-time school education in the middle and senior years. (p. 37)

What is noteworthy here is the acknowledgement, for the first and only time in the report, of the importance of the middle-school years. A substantial body of research, national and international, points to the middle-school years as being the time when most students make the decision to leave school (de Vries, 1993; Finn, 1989; Rumberger, 1995). Indeed, some researchers report that students start thinking of leaving school as early as Grade 1 (Alexander, Entwistle, and Horsey, 1997). However, within the South Australian education system, they cannot legally do so until they are 16 years old. If South Australian students are making the decision to leave in the middle-school years, then the curriculum source of the retention problem is much better framed as a South Australian Curriculum Standards and Accountability Frameworks (SACSA) or middle-school issue.

Students decide to leave for a variety of reasons (de Vries, 1993; Dekkers and Claassen, 2001). Push factors, generated within the education system itself, include lack of ability, boredom or irritation, cultural/social isolation and/or discrimination, drug abuse, and detention. For example, fewer than 50 percent of middle-school low achievers are likely to complete school while almost 90 percent of the very high achievers complete school (Marks and Ainley, 1997). Smyth, Hattam, Cannon, Edwards, Wilson, and Wurst (2000) showed that peer harassment is often a serious problem for at-risk students. Lamb et al. (2004) reported that some of the re-entering students were functioning at a Grade 8 level, indicating that there are systematic problems at the middle-school level and possibly earlier.

Students who leave school for push factors "have an aversion towards school or attach very little importance to it for their future lives" (Dekkers and Claassen, 2001, p. 344). Research by Smyth and Hattam (2001; 2002) and Smyth, McInerney and Hattam (2003) shows that schools can contribute to, or ameliorate, the push factors through their culture. Focusing on the middle years, they argue that there are three types of school cultures, only one of which has substantial holding power. Gibson and Bejinez (2002) couch this in terms of high-quality student-teacher relationships. Ainley and Sheret (1992) report that "students who achieve at lower levels can find school equally satisfying in terms of teacher-student relations, status, social integration, the relevance of the work which they undertake, and general satisfaction with school" (p. 72).

School culture research shows that the holding power of schools extends well beyond the formal, academic curriculum. There is mounting evidence that participation in school sporting programs increases retention (Davalos, Chavez, and Guardiola, 1999). In South Australia, most non-government schools have compulsory competitive inter-school sporting programs. Similar sporting programs in government schools have diminished over the past two decades. Other research shows that "high school dropout is more prevalent in schools with low morale than in those with high morale" (Vallerand, Fortier, and Guay, 1997, p. 1172).

Pull factors are attractive factors external to schools, and include training courses and employment. The high full-time retention rates of the early 1990s can be attributed partly to the absence of pull factors. As noted by Lamb et al (2004):

> Declines in available jobs (measured by job vacancies) adds to school retention, as do generally poor labour market conditions, though this also varies by state and territory. The effects are strongest in South Australia indicating that falls in labour market opportunities had a strong impact on the rate of retention. The results, like those reported by Ryan (2003) and Karmel (1995), suggest that general labour market conditions have a marked effect on retention with deteriorating conditions adding to retention. (p. 126)

McNeal (1999) reported that the type and intensity of part-time employment has a significant impact on student dropout. The suggestion is that students are in a position to choose the most attractive culture for their needs: work or school.

Crafter et al. (2006) see the high full-time retention rates of the 1990s as a target: "However, it is clear that the government's goal of restoring retention rates to the levels attained in the early 1990s cannot be achieved by reform in the schooling sector alone. A broader set of policy responses is required." (p. 33) That early 1990s high retention rate can be largely attributed to a global recession and a large decline in youth employment opportunities (Ryan and Watson, 2004), combined with the introduction of adult re-entry schools. While the government may seek to achieve the same high full-time retention rates through a revised SACE, this seems unlikely without significant negative changes in the South Australian economy. Crafter et al. (2006) should have informed the government more fully of factors likely to mitigate restoring retention rates to

previous highs. Simply put, there is no statistical evidence presented in the Final Report that shows that the present SACE is responsible for students leaving school early.

In a study of Dutch early leavers one year after they had left school, Dekkers and Claassen (2001) found that about half of the people had no regrets about their decision to leave early and approximately one-third admitted that it was not a sensible decision and they missed having a diploma. This latter group often left school because of push factors, while those who had no regrets left largely because of pull factors. Dekkers and Claassen (2001) characterise the Dutch school returnee as "often average students who were sometimes disruptive without having real behavioural problems" (p. 349). Enabling students who decide to leave school early to re-enter formal education at a later date may have significant motivational advantages. It would be worthwhile exploring the beliefs, attitudes, hopes, and aspirations of South Australian early school leavers using a longitudinal study design. Such a study would have been very useful in deciding which existing structures of the SACE support or mitigate students returning to school.

By focusing on the SACE curriculum and assessment factors, and using inappropriate retention rates, Crafter et al. (2006) have crafted a very weak, and seemingly misleading, case for reform. They should have drawn more fully upon studies by Lamb et al who wrote that "Failure to establish meaning in the curriculum or to build satisfactory teaching relationships reduces the possibility of successful learning which is the most intrinsic motive for staying on at school" (Lamb et al, 2004, p. 10). Extending Lamb et al's studies to take into account the influences of primary- and middle-school education on retention, Crafter et al (2006) should have explored the early- and middle-school experiences of South Australian students, studying how these experiences impact on the SACE experience. Further, they should have recommended the implementation of quality-of-instructional-experience measures and systems to monitor students' achievement patterns as they progress through the school system (c.f. Lamb et al, 2004).

RETENTION, TERTIARY ENTRANCE RANK AND ACADEMIC CREEP

Crafter et al. (2006) argue that if the academic curriculum was substantively changed, it would enable (or entice) students to complete Year 12. In particular, they recommend that the Tertiary Entrance Rank (TER) be separated from the SACE (see Recommendation 21 in the report). The problem here is that the causal link between early school leaving and examination-orientated subjects or even the SACE is not well established.

The argument from Crafter et al. (2006) basically assumes that there are inadequate curriculum provisions related to an 'academic-dominated' SACE curriculum. This is in spite of the large number of accredited SACE subjects from which students can choose. It is also in spite of the fact that Lamb and Vickers (2006) found that Year 12 non-completion rates "ranged from 28 per cent in schools where Vocational Education and Training (VET) counts towards the Year 12 certificate and there is a strong emphasis on workplace learning to 9 per cent in schools without any VET" (p. viii). Indeed, research indicates that schools with academically challenging curricula have substantially more holding power than schools with non-academically challenging curricula (Lee, Burkam, Chow-Hoy, Smerdon, and Geverdt, 1998).

Crafter et al. (2006) state that "many respondents expressed concern that there had been a trend to make the content of subjects offered at Stage 2 in the SACE more abstract" (p. 62), and that the assessment requirements at Stage 2 had become more 'academic'. What is unclear here is the processes used to make the subjects 'more academic'. Marks, McMillan and Hillman (2001) report that South Australia has the lowest percentage of students of the Australian states receiving a Tertiary Entrance Rank (see Table 4). South Australia also has the second lowest percentage of its population who have a bachelor degree or higher (only Tasmania is lower) (see Table 5). Given

that New South Wales and Victoria have much higher full-time retention rates and also a higher proportion of their Year 12 graduation cohort earning university entry scores and successfully completing a foundational degree, surely an argument could be made to increase the academic thrust of the SACE?

If academic subjects equate to tertiary-entry subjects, then in South Australia it is not clear that these subjects are dominating the curriculum. Perhaps instead the middle- and high-school curricula in some schools are not especially suited to enabling students to make transitions between stages of education? Regardless of the reasons for state-level differences in the percentage of student obtaining a TER, Crafter et al. (2006) appear to be exhibiting a degree of academic cringe. Rather than making the secondary and tertiary sectors work together, the proposed new SACE seeks to split them even further apart (see Recommendation 24 in the report). It is difficult to envisage how the separation of the TER from the SACE will facilitate university entrance for groups at risk. Actively encouraging and facilitating university pathways, especially among under-represented groups, may be a superior strategy.

Table 4. Summary statistics for TER Scores, All Students and By Selected Jurisdiction (Source: Marks, McMillan, and Hillman 2001, p. 65)

Standard Statistics (Weighted)	All	NSW	Vic	Qld	SA
Mean (Standard error)	70.2 (0.5)	69.1 (1.0)	70.9 (0.9)	64.9 (1.2)	79.9 (1.0)
Median	73.8	71.1	72.0	70.0	81.5
Standard Deviation	19.8	22.5	19.5	24.1	10.0
Inter-Quartile Range	31.3	29.1	31.2	47.5	22.0
Percent of Sample with Score (Weighted)	**All**	**NSW**	**Vic**	**Qld**	**SA**
Of Year 9 Cohort	52.6	57.1	62.6	55.4	45.0
Of Year 12 Participants	68.0	73.0	76.8	70.5	59.4

Table 5. Level of highest educational attainment as percentage of State total, 2005 (Source: ABS Education and Work, 2005, Cat. No. 6227.0).

State	Year 10 and below	Year 11 to Year 12	Cert. to Adv. Dip.	Bachelors or above	Total
New South Wales	29.5	24.6	23.3	21.2	100.0
Victoria	23.0	32.0	22.7	21.0	100.0
Queensland	28.7	27.8	25.8	16.6	100.0
Western Australia	26.8	28.1	25.4	18.4	100.0
South Australia	23.9	34.9	23.5	15.7	100.0
Tasmania	39.0	21.3	23.0	15.3	100.0
Northern Territory	22.4	30.1	28.0	18.1	100.0
Australian Capital Territory	17.5	29.7	18.4	32.6	100.0
Australia	27.0	28.3	23.8	19.6	100.0

FULL-TIME RETENTION INDICES AND POSSIBLE RESEARCH

The ABS apparent-full-time-retention-rate index is not suited to the purpose of the SACE review. Firstly, it is an 'all or nothing' index. That is, it does not take into account that completion of the SACE is an incremental task, with many students choosing to spread the task over three or more years. Second, students can decide to leave school for a number of reasons, including taking up apprenticeships. Since some of these reasons can and should be seen in a positive light, both from

student and societal perspectives, the interpretation of the full-time-retention-rate index will always remain problematic. Unless reasons for leaving are classified and incorporated into this index, such difficulties will remain and it will implicitly convey the understanding that leaving school for an apprenticeship or employment in the Australian Defence Forces is not seen as worthwhile. The full-time-retention-rate index used by the SACE Review Panel implies that formal, full-time school-based education is the only valid education. While this is in direct contradiction to the views put forward in other parts of the Report, the fact that Crafter et al. (2006) present major statistics and arguments based upon this index is highly problematic. A more effective approach may be a longitudinal school-retention analysis that uses individual student data, tracking them over time and school-type. Statistical techniques for such studies are well established but appear not to have been used in South Australia to date.

The superficial analysis of the retention research by Crafter et al. (2006) does not do justice to the complexity of student-retention issues in South Australia. Since Catholic schools account for the majority of the non-government schools in South Australia, it would be worthwhile comparing the holding power of Catholic and government schools. Such analyses should take into account the nature of the family background, curricula, school culture and other variables. A fundamental question would be: Do Catholic and government schools with similar intakes have different retention patterns? If so why? The initial analysis would be largely statistical, while the follow-up question would almost certainly benefit from school-based research that incorporated micro-level analyses.

SOCIO-ECONOMIC STATUS AND THE SACE REVIEW

Socio-economic status (SES) is often interpreted as a proxy for the quality of the home learning situation (Raymond and Hanushek, 2003). SES is usually conceptualised as an attribute of an individual (or the person's family or household) that consists of different dimensions. Interest in SES stems in part from class-orientated research that "shows class as life condition is a powerful determinant of all kinds of outcomes" (Sorensen, 1996, p. 1538). While some researchers fuse social and economic status, the terms are not synonymous (Williams, Williams, Kastberg, and Jocelyn, 2005). Wright (2002) reported that Weber centred his class analyses on life chances while Marx rooted his work in the problem of exploitation. Weber (1978) defined social status as "an effective claim to social esteem in terms of negative or positive privilege"' (p. 305). Weber (1978) also held that differential access to goods and opportunities for income is a defining component of economic class

Socio-economic background, and its relationship to achievement, has been subjected to much research. A basic premise of these studies is that "schooling could be said to be fair if there is no impact of a student's socio-economic background" on achievement and post-secondary education (Marks et al., 2001, p. 58).

SES is often measured using objective criteria (Weiss and Fershtman, 1998). The SES index used by Crafter et al. (2006) is the ABS index of relative socio-economic disadvantage. This is the most general of the ABS indices, the others being the urban index of advantage, the rural index of advantage, the index of economic resources, and the index of education and occupation (Trewin, 2001; 2002). The index of relative socio-economic disadvantage includes "all the available variables that either reflect or measure disadvantage" (Trewin, 2001, 2004, p. 1). The index components, shown in Table 6, include income and employment-status variables, and a race variable, the percentage of Indigenous Australians in the area. Thus, being Indigenous, and according to this index having too many Indigenous Australians in an area, is a disadvantage. While it may be that institutional racism is a very important social mechanism, there is nothing innately inferior or superior about being Indigenous, English, Irish, Italian or Chinese. And if there

are institutional mechanisms at play, then these should be documented in the formulation of the index.

There are other concerns with the use of this index. For example, Williams et al. (2005) report that social status, and not economic status or some combination of the two components, is the stronger predictor of achievement. Another interpretive problem with the index is that "while the index may reflect an area's disadvantage, it is not possible to say what aspects of disadvantage are being represented" (Trewin, 2004, p. 1). In census districts where there are pockets of advantage and disadvantage, the "pockets of advantage will not offset the pockets of disadvantage" and "low disadvantage does not equate to high advantage" (Trewin, 2004, p. 72). Trewin (2004) advises users looking for measures of advantage/disadvantage to use the other indices "depending on whether the user wants general advantage/disadvantage; economic advantage/disadvantage; or education and occupation advantage/disadvantage" (p. 72). The ABS index of relative socio-economic disadvantage incorporates the so-called 'objective measures' of social and economic status but can say little about the subjective evaluation of actions and traits at, for example, the school or class level. For example, economic class at the small group level shows "not a hierarchical totem pole of classes neatly stacked up on one another, but overlapping transactional circuits of vastly different scope and content" (Collins, 2000, p. 24).

Table 6. List of variables in ABS Index of Relative Socio-economic Disadvantage (Source: Trewin 2004)

1	% Persons aged 15 years and over with no qualifications
2	% Families with offspring having parental income less than $15,600
3	% Females (in Labour Force) unemployed
4	% Males (in Labour Force) unemployed
5	% Employed Males classified as 'Labourers and Related Workers'
6	% Employed Females classified as 'Labourers and Related Workers'
7	% One-parent families with dependent offspring only
8	% Persons aged 15 years and over who left school at Year 10 or lower
9	% Employed Males classified as 'Intermediate Production and Transport Workers'
10	% Families with income less than $15,600
11	% Households Renting (Government Authority)
12	% Persons aged 15 years and over separated or divorced
13	% Dwellings with no motor car at dwelling
14	% Employed Females classified as 'Intermediate Production and Transport Workers'
15	% Persons aged 15 years and over who did not go to school
16	% Indigenous
17	% Lacking fluency in English
18	% Employed Females classified as 'Elementary Clerical, Sales and Service Workers'
19	% Occupied private dwellings with two or more families
20	% Employed Males classified as 'Tradespersons'

Crafter et al. (2006) used the ABS index of relative socio-economic disadvantage, aggregated it to the local government area (LGA) level, and applied it to the location of school. They reported the correlation between full-time retention rates and socio-economic disadvantage in a graph, with the points on the graph indicating LGA (see Figure 3). They shaded in an area of the graph that excluded two LGA's with above 100 per cent retention rates (Adelaide and Norwood). Acknowledging that "student movement across municipal boundaries distorts these geographical patterns" (p. 34), they claimed that there is a "strong, positive correlation between retention and socio-economic status [of where the school is located] in the metropolitan area" (p. 34).

The unweighted Pearson correlation coefficient between the LGAs and retention rates (excluding Adelaide and Norwood) is 0.80. However, when Adelaide and Norwood are included in the calculation, the unweighted coefficient drops to 0.65. Thus, the SES index apparently accounts for 64 percent of the variation in full-time retention if Adelaide and Norwood are excluded, but only 42 percent if they are included. The exclusion of Adelaide and Norwood without explanation and the use of apparent full-time retention rate is consistent with data-torturing methods. Data torturing involves manipulating the information in a variety of ways until the desired claim is established.

LGAs are heterogeneous in terms of SES indicators. For example, the Port-Enfield LGA includes Port Adelaide (medium status), Osborne (low), Outer Harbor (high), Rosewater (low), and Semaphore (medium). So, while the Port-Enfield LGA has a medium overall SES, it is heterogeneous. The clustered, heterogeneous nature of the data distorts the correlation between SES and retention.

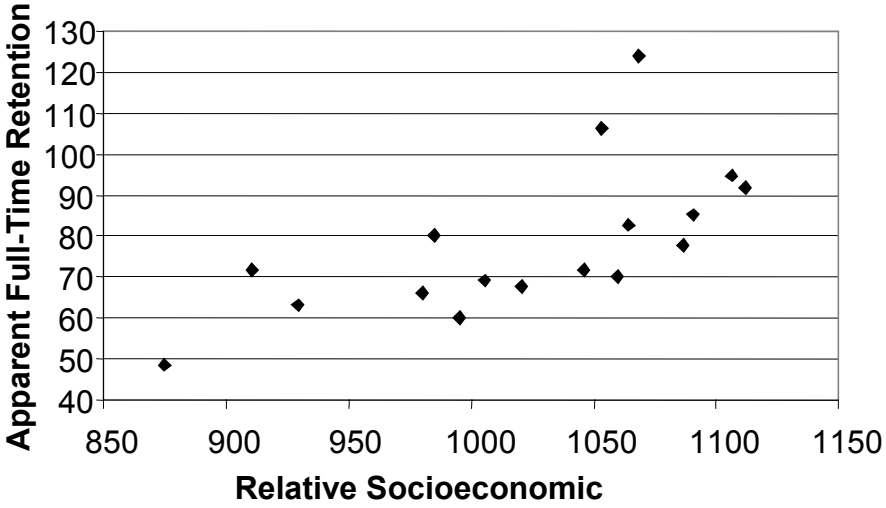

Figure 3 Apparent retention rates, years 10 to 12, fulltime by socio-economic status of local government area and school location (Source: Crafter et al., 2006, Figure 2.2)

To illustrate the problem, consider a simulation study using 10 LGAs, each with 10 suburbs. For this study, the correlation between SES and retention rate was 0.84, marginally higher than that reported by Crafter et al. (2006). The graph for the simulated data is shown in Figure 4 and reflects the strong positive correlation. However, when the 10 local government areas are disaggregated, the correlation coefficient is 0.58. The scatter plot of the 100 simulated suburbs is shown in Figure 5. Bearing in mind that these two graphs (i.e., Figures 4 and 5) are based upon the same simulated data, it is readily apparent that different levels of aggregation provide somewhat different answers. The relationship between SES and retention rates would be expected to change again if we were to repeat the simulation using, for example, cohort or suburb block data. The problem with misleading correlations stemming from aggregated data has been known in education research since the Coleman report (Coleman et al., 1966) and is the major reason for the prevalence of multilevel-modelling techniques in statistical research today (Bryk and Raudenbush, 1992). Win and Miller (2005) recognised this analytical problem, saying that patterns between SES and achievement become distorted when the data are analysed at the aggregate level. Thus, the SES analyses presented by Crafter et al. (2006) are highly problematic.

The local government areas are used to zone some schools and not others. Typically, students are expected to attend their local government school unless they can mount a case for attending one of

several magnet government schools. Magnet schools are government schools offering specific programs for students with, for example, high intellectual or musical potential. However, non-government schools are not generally limited to a specific district and it is common for this school type to draw students from across several LGAs. For example, the LGA of Adelaide with its high apparent retention rate has six non-government schools, several of which offer only Year 11 and 12 education. These centralised, mainly non-government, schools draw students from many LGAs, with some students travelling well over 20 kilometres to attend a school. Correlating LGA SES with retention rates or achievement is therefore misleading, since the LGA of the school and the student do not always concur.

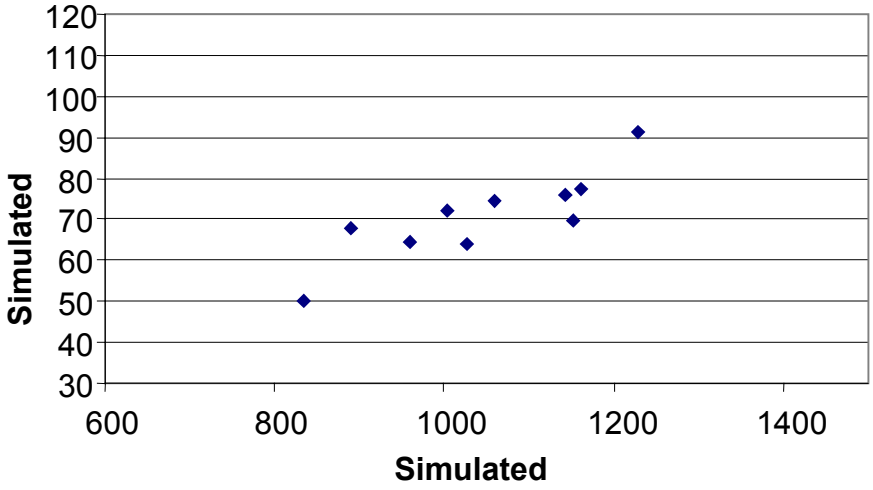

Figure 4. Simulated apparent full-time retention rates and socio-economic status for ten local government areas ($r = 0.84$)

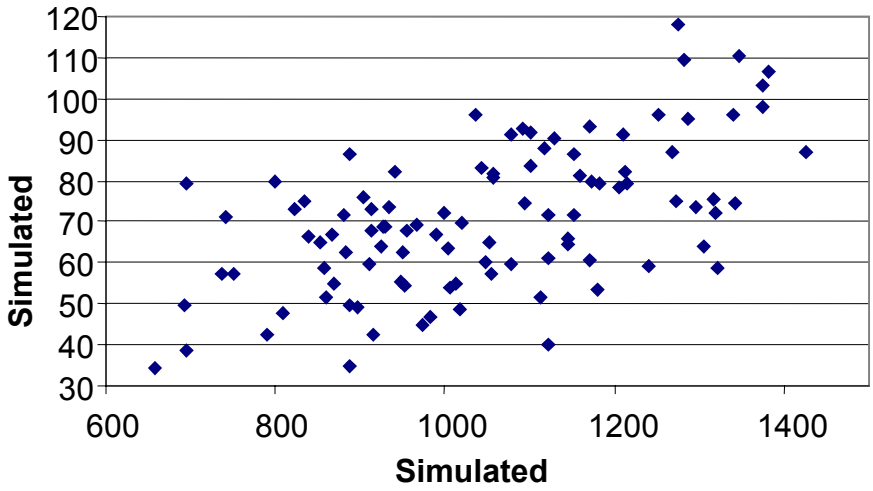

Figure 5. Simulated apparent full-time retention rates and socio-economic status for one hundred suburbs contained in ten local government areas ($r = 0.58$)

International students are unlikely to be evenly spread across the education system. But a question, unanswered by the Review, is how these students are distributed. Their distribution will affect the apparent retention rates. While it is likely that international students will artificially raise the retention rate in some schools, this simply highlights the fact that retention rates and relationships between retention rates and SES, as presently calculated, are an insufficient basis for policy decisions.

In relating full-time retention rates to SES, Crafter et al. (2006) are arguing that dropping out is a SES problem (see also Hansen, Fisherkeller, and Johnson, 1995). This is unfortunate for at least three reasons. First, there has been considerable evidence to date that educational outcomes and SES are related to at least some degree in every country participating in international assessments in the past 40 years (Martin, Mullis, Gregory, Hoyle, and Ce, 2000). That is, regardless of the curriculum, education system, or society, the link remains, albeit in varying strengths. Even those countries that have policies designed to make schools 'equal' have a strong relationship between SES and achievement at the student level. There seems to be little support for the notion that the SES-achievement relationship will disappear.

Second, correlations between variables are not enough since "policy cannot be intelligently conducted without an understanding of the mechanisms" (Deaton, 2002, p. 15). SES might cause higher educational achievement, education achievement may cause SES, or both might be correlated with other factors; indeed, all three possibilities might be operating simultaneously. If retention and educational attainment is affected by income, then education inequality may be best addressed by income-support schemes for the poor (Deaton 2002). Simply redistributing wealth, however, is likely to be problematic, not the least since gains by the poor will be offset by losses by the rich. If income is what matters for education, then its redistribution will only improve educational attainment if additional income has a lesser effect on education among the rich than among the poor (Deaton 2002). However, any policy would need to recognise that most of the variation in achievement and retention is likely to occur within a social or economic class, and not between classes. Thus, policy aimed at increasing retention or attainment should ideally be aimed at students at risk, not at particular social or economic groups.

Third, even if the correlation between retention rate and SES can be interpreted as a causal relationship, it is by no means certain that changing the curriculum will address the supposed retention-rate problem. Power (1984), reporting on a South Australian study examining contributing factors to above-average school retention rates, questioned the extent to which curriculum reform can lead to significant changes in retention rates. Indeed, given the high rate of part-time students in the government school sector, it appears that the present SACE curriculum is doing remarkably well in addressing the retention issue. It may be that a number of students are deciding to leave school for a short period, and then re-entering the system on a part-time, adult basis. Given the high apparent retention rates in Adelaide and Norwood, it would seem pertinent to conduct a study exploring the reasons why students seek an education outside their LGA, the degree of contentment with the decision, and the consequences of that decision.

COMPLETION RATES AND THE SACE REVIEW

Crafter et al. (2006) report that SACE completion rates appear "to have plateaued at a little over 11 000 students a year" (p. 44). According to the accompanying graph in their Final Report (Figure 2.11), this represents, in 2003, 55.5 per cent of the Year 8 enrolments. Obviously, the method of calculation becomes important since they also report that 1994 and 1995 completion rates were 56.8 per cent and 56.6 per cent, respectively, whereas SSABSA reported "there was a substantial increase in the average SACE completion rate, from 63.3 per cent in 1993 to 76.4 per cent in 1994, and to 79.9 per cent in 1995" (SSABSA, 1999, p. 35). The respective completion rates that SSABSA reports for 2002, 2003, and 2004 are 86.1, 86.1, 87.5 per cent, respectively (SSABSA, 2005). The SSABSA rates are computed based upon the number of students entering SACE. That same SSABSA report notes that there are many reasons why students do not complete SACE. While the authors report low return rates for the questionnaire sent to students who did not complete SACE, there appears to be at least three clusters of reasons for not completing SACE. Reasons that were related more or less directly to the SACE curriculum, but may also be related to school curriculum structures included: (1) Subjects offered were not

relevant, (2) Not enough interesting subjects, and (3) Not enough subjects to choose from. Other reasons were more directly related to the school's culture, such as (1) Teachers did not treat students fairly, (2) Did not like school, (3) Did not like teachers, and (4) Did not like school discipline. Other reasons more related to employment included: (1) Wanted to look for a job, (2) Started a TAFE course, and (3) Had a job. It is obvious that only some of the reasons for non-completion are likely to be addressed by curriculum and assessment changes in SACE.

AVERAGE PUBLICLY-EXAMINED-SUBJECT SCORE AND STATISTICAL LOCAL AREA

Crafter et al. (2006) report that students' average scores in publicly examined subjects (PES) vary according to Statistical Local Area (SLA). SLAs are based on the boundaries of incorporated bodies of local governments where they exist. Crafter et al. (2006) state that higher scores are associated with parents being engaged in employment in managerial/administrative and professional occupations, female participation in workforce, and high family income. Similar findings have been reported in a large number of countries. This gives rise to the question of how the new SACE will change this. Further, what other variables are correlated with achievement? If teachers and schools make a difference in the education of students, then surely teacher and school variables will be related to achievement? That Crafter et al. (2006) do not present analyses using teacher and school variables may be interpreted as a tacit suggestion that teachers and school have no impact on student achievement. They claim "a range of academic and socioeconomic factors operate to produce a large degree of social differentiation in school leavers' access to higher education" (Crafter et al., 2006, p. 46). Such a statement calls for a comprehensive explanation of how academic and socioeconomic factors determine achievement and access to higher education (see Cookand Campbell, 1979, p.32).

While not forgetting that many students move across areas to attend school, the computation of an average score without an accompanying standard error of measurement is highly problematic. There is simply no way of determining from the Final Report if any difference between regions is statistically significant or not. This is apart from the question of whether it is psychometrically appropriate to calculate means on essentially criterion-based ranks. A calculation of a mean assumes that a score of 8 out of 20 carries the same meaning across all subjects, and that the difference between 8 and 9 is substantively the same as 14 and 15. There is no evidence that this is the case. The calculation of mean scores across subjects are likely to be even more problematic given the large number of part-time students. For example, if a student spreads her studies over three years, what procedures are in place to ensure that an 18 in a subject carries the same meaning across those three years?

CONCLUSION

The Review Panel appears to have focused rather narrowly on its mandate "To achieve a curriculum and assessment framework that will meet the diverse needs of all students and result in high and more socially equitable levels of retention, completion and pathways beyond school" (p. 9). It has, for example, failed to explore the reasons why students move schools at the end of Year 10 that is evident in the growth of Years 11 and 12 in Adelaide's private schools. It has failed to fully examine what keeps students at school, instead focusing narrowly upon two possible explanatory variables: SES and the so-called academic curriculum.

The Pareto criterion applied to SACE is that the change from the present SACE to that recommended by the Review Panel will make at least one individual better off without making any other individual worse off. In their desire to make SACE more equitable they have largely ignored the successful student, and have instead exhibited a degree of academic cringe. Clearly,

Crafter et al. (2006) have failed to satisfy the Pareto criterion. Another way of evaluating the SACE Review is to utilise Social Choice Theory. Following the work of Sen (1993, 1995, 1999), social choice decisions should be based upon access to advantage, for example access to tertiary education. But it is not clear how the proposed new SACE, based upon insufficient and inadequate research, can deliver this.

The SACE review panel did not build a sound case for its recommendations. South Australia has a high apparent full-time-equivalent retention rate, much higher than the apparent full-time retention rate. Given that SACE is designed to be flexible, something acknowledged by the Review Panel, it is incredulous that the panel then chose to build their case largely on full-time retention rates. Such an approach leaves them open to the charge of data torturing (Mills, 1993). Further, it is widely known that differences in achievement between schools can be attributed to a myriad of factors, extending well beyond socio-economic class and school location. For example, the Review Panel overlooked the difference in teacher experience that is apparent between South Australian regions. Another variable that may be important, but also overlooked, was whether service on SSABSA panels provides teachers with information not available to others. The statistical analyses presented in the report offer simple causal-effect relationships using aggregated data. Such relationships are largely inappropriate to education (Olson, 2004). As noted by Sadovnik and Semel (2001) "Over four decades of sociological research on the educational achievement of low-income children indicate that there is no one causal factor that explains academic underachievement, nor easy solutions to the problem" (p. 30).

Educational research, like education, has a moral imperative. As education researchers, "we have a particular obligation and opportunity to take a leading role in seeing that the research that is done is truly good research" (Hostetler, 2005, p. 21). To allow, facilitate and enable the development and implementation of policies based upon naïve, simplistic, incorrect, or inaccurate research is a clear violation of that imperative. The SACE Review Panel should have avoided one of the cardinal sins of statistical analysis: the tendency of "summary statistics to … construct distorted and misleading pictures" is well known as the 'ecological fallacy' (Connolly, 2006, p. 236; Troyna, 1984). The Review Panel's use of aggregated retention, SES and achievement data is ultimately a fine example of how not to analyse educational data. That their statistical case for reform is substantively flawed suggests that the recommendations contained in the report should be treated with caution.

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