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Data-driven school improvement through the VCE Data Service

Glenn Rowley

Victorian Curriculum and Assessment Authority

Glenn Rowley has been General Manager for Policy, Measurement and Research at the Victorian Curriculum and Assessment Authority since February 2002. He began his career as a secondary teacher in Victorian schools before undertaking graduate studies in educational measurement and evaluation at the University of Toronto, where he completed a Masters degree in 1972 and a PhD in 1975.

Following lecturing appointments at the University of Toronto and La Trobe University, he joined the staff of the Faculty of Education at Monash University in 1983, lecturing in research methodology and school assessment. He was appointed Associate Professor in 1990, Associate Dean (Research) in 1991 and Associate Dean (Staff) in 2001. He has been a member of the Scaling Committee of the Victorian Tertiary Admissions Centre since 1994, and a member of the ACER Council and Board of Directors.

Since joining the VCAA, Glenn has had major involvement with the delivery of the AIM testing program, the changed arrangements for the publication of VCE data and the development and implementation of the VCE Data Service. He is currently working on the development of a new 'Like Schools' measure.

Peter Congdon

Victorian Curriculum and Assessment Authority

Peter joined the Victorian Curriculum and Assessment Authority in 2002 as the Manger of Educational Measurement. Prior to this appointment he was the Head of Assessment Services Psychometric Support Team at the Australian Council of Educational Research, where he worked for 11 years. Peter's main focus of work has been in large-scale testing, involving data analysis, equating and reporting of educational outcomes at individual and group levels.

Peter is a member of the National Measurement Advisory Group of the Australian Government. He has participated in educational standard setting exercises for the Malaysian Government. He has studied psychometrics at the University of Chicago along with various statistical analysis and educational measurement courses at The University of Melbourne. Peter specialises in data analysis techniques including Rasch measurement, multi-faceted analyses, test equating and differential item functioning.

Peter has produced a number of book chapters and journal articles in educational measurement along with numerous presentations at national and international conferences.

Abstract

As the holder of student achievement data spanning three sectors and four levels, the Victorian Curriculum and Assessment Authority (VCAA) has a responsibility to provide these data to schools in ways that enable school staff to use them effectively and easily.

With the discontinuation of the publication of school achievement indices, the VCAA was forced to confront a range of issues surrounding the question of which data belonged to the student, which was the property of the school, and which belonged to the general public. In 2002, a new balance was struck. A key component in this balance was the introduction of the VCE Data Service.

The VCE Data Service is an online service that connects schools to the entire VCE data set going back to 1998, and provides them with the capacity to generate a range of analyses related to their own school, and how its results compare to those of other schools in the State, schools in the same sector (government, Catholic and Independent), and to schools in its Like School Group.

Through VCEDS, senior management teams in each school can easily generate charts and tables addressing a range of questions including the following:

- How were our school's overall results this year? Were they better or worse than in previous years? How do they compare with schools like ours?
- How did our students perform, study by study in terms of completions, Study Scores, examinations and school assessment grades?

- How did our school's results compare to reasonable expectations? Did our students perform as well as students of comparable ability in other schools?
- Is our student cohort changing over time, in ability and/or achievement?
- How can we develop better understandings of the patterns of group performance by identifying how individuals contribute to those patterns?

This paper provides an account of the first two and a half years of the VCE Data Service, outlining the user feedback and the VCAA response to it, and the growth in usage over the period. It concludes with lessons learned and plans for the future.

> When educators study their schools and classes, they seek an answer to the ageless question: Is it good because we've been doing it for a long time, or is it good because we have tangible evidence of its worth? In many instances one must conclude the former because no evidence exists to support the latter (Johnson, 1997).

Because of its unique role in Victorian education, the Victorian Curriculum and Assessment Authority (VCAA) has an important role to play in assisting schools in their efforts to become more effective. The VCAA is the holder of data on student achievement that span three sectors (government, Catholic, Independent) and four levels (Years 3, 5, 7 and 11–12), and at each level it has a responsibility to provide these data to schools in ways that enable school staff to use them effectively and easily.

Like other jurisdictions, Victoria has had to deal with issues of accountability, privacy and the public's right to know. The issue became particularly acute in 2002, in relation to the publication of data on school performance in the end-of-schooling Victorian Certificate of Education (VCE).

Public reporting of the VCE, 1996–2001

From 1996 until 2001, the Victorian Board of Studies and its successor, the VCAA, had provided information to newspapers to facilitate the publication of tables documenting VCE performance by school. Conscious of differences in school intake, it was decided in 1996 not to publish raw achievement data, but instead to publish an index, in which raw achievement is adjusted according to students' performance on another set of measures, the General Achievement Test (GAT).

The GAT is administered in June of the same year, and its key purpose is to enhance the quality control measures on VCE assessment. It is presented to students as a measure of their 'general knowledge and skills in the areas of written communication; mathematics, science and technology; and humanities, arts and the social sciences.'

The achievement indices were created using a multiplicative model in which the three components of the GAT were included at the level of the student, but school GAT means were not. It had very different properties to a measure of growth that could have been developed had the full multilevel modelling described by Goldstein (1995, 1999) and Goldstein, Huiqi, Rath, & Hill (2000) been used. There are many reasons for this.

It is well known that a student of a given ability is likely to perform better when placed in a class of higher achievers than when placed in a class of lower achievers. In schools in which students are generally of high 'ability,' students do perform better than would have been predicted from their ability alone. In schools in which students are generally of lesser 'ability,' students do perform less well than would have been predicted from their ability alone. Hence we should have expected to find higher achievement indices in schools with higher ability students. And, year after year, that is what was found.

The six-year adventure with achievement indices came to an end in 2002. The VCAA took a view similar to that of Goldstein, who had observed, in relation to the value-added measures that he had pioneered, that:

> their use as public accountability measures, e.g. in the form of performance tables or 'value added league tables' is inappropriate and would destroy their credibility and usefulness. If they were ever to become 'high stakes' pieces of information like the current DfEE league tables of examination results, then they would inevitably become distorted and no longer reflect any underlying reality of school performance (Goldstein, 1999).

In arriving at this position, the VCAA was forced to confront a range of issues surrounding the question of which data belonged to the student, which was the property of the school, and which belonged to the general public. In 2002, a new balance was struck. A key component in this balance was the *VCE Data Service*.

Public reporting of the VCE since 2002

From 2002, the achievement indices were discontinued. Instead, a wide

range of information is published, including information about:

- school programs (enrolments in VCE and VCAL, range of VCE and VET studies offered)
- student achievements (satisfactory completions in VCE, VCAL and VET units, median study scores, percentage of high achievers)
- student pathways (percentage applying for and achieving tertiary selection and various employment options).

The information that is made public is the information that the public can use to make decisions about schools. Further, more detailed information is, of course, available from school web sites.

The introduction of the VCE Data Service

The detailed information needed by schools in their planning for school improvement is now made available through a new online service known as the *VCE Data Service (VCEDS)*. This service was launched in November 2002, following several years in which a limited form of 'value-added' VCE reporting had been successfully trialled in a sample of schools. The reports available to schools through *VCEDS* include, but are not limited to, the ability adjusted measures pioneered in the VCE Data Project.

The information provided by *VCEDS* is confidential to the school, and access to it is strictly controlled to protect its privacy. Professional development programs for teachers are provided in February/March each year, focusing on the range of reports available to schools and how they can be obtained and interpreted. Each year, these sessions have been attended by teachers from between 200 and 300 schools.

Since 2004, the professional development program has been followed by a series of consultations in which VCAA staff have met with school leadership teams for confidential advice on the analyses they can generate from their own school data. To provide this assistance, VCAA staff have travelled to all corners of the State, meeting with staff from more than 100 schools in each of the past two years.

What does the VCE Data Service provide to schools?

The *VCE Data Service* does not provide schools with a predefined set of reports. Instead, it puts schools in touch with the entire VCE data set going back to 1998, and invites users to generate reports in response to the issues and research questions that address their concerns. They can, of course, only draw out analyses related to their own school, and how its results compare to those of other schools in the state, schools in the same sector (government, Catholic and independent), and to schools in its Like School Group.

As in the trial that preceded it, *VCEDS* provides ability-adjusted estimates in which adjustment is made in each study for:

- each of the three component GAT scores (Written Communication, Mathematics/Science/Technology and Arts/Humanities)
- the mean GAT score of all students in the school taking the study, and gender.

But this is only a small part of the information provided. Through VCEDS, senior management teams in every school can easily generate charts and tables addressing questions like the following:

- How were our school's overall results this year? Were they better or worse than in previous years? How do they compare with schools like ours?
- How did our students perform, study by study? Are there important differences among groups within the school (e.g., gender, class groupings) and between exams and coursework assessments?
- How did our school's results compare to reasonable expectations? Did our students perform as well as students of comparable ability in other schools?
- Is our student cohort changing over time? Can we detect trends in student ability from year to year, and if so, are these changes matched by changes in student performance over the same period?
- Can we develop better understandings of the patterns of group performance by identifying how individuals contribute to those patterns? Have the results of particular students or groups of students distorted overall patterns of achievement?

School staff are also able to design their own analyses by entering data fields unique to the school and so introducing comparisons tailored to their specific needs. For example, one school might like to see results broken down by campus, another by language background, and another by residential location. An inventive use by one school has been to monitor the long-term effectiveness of an innovative middle school program by comparing VCE performance several years later.

Comparisons between the performance of males and females are, of course, routinely provided, along with those between class groupings and student

year levels. Schools can use *VCEDS* to monitor the performance of Year 11 students taking accelerated VCE programs, and use their findings to assess the wisdom of the advice that students are receiving as they approach their VCE studies.

For each report, *VCEDS* provides users with a choice of a graph, a table, or both. These reports may be sent directly to the printer, or pasted into another application, such as a Word document. In this way, schools can use *VCEDS* to report publicly to parents, or confidentially to department heads or individual teachers. With the information provided through *VCEDS*, schools are able to examine all aspects of their students' achievements in a more detailed way than ever before, and to use the knowledge they gain to identify problems and build upon their strengths.

Schools' experience with the VCE Data Service

The *VCE Data Service* in now in its third year of operation. After the first full year, evaluation largely focused on the question 'How can we make this better?' During 2004, feedback was systematically sought, and the key improvements sought included:

- the capacity to generate detailed reports on assessment grades and scaled (VTAC) ENTER Subject Scores as well as Study Scores in each study;
- access to student results by Home School and/or by Assessing School (for schools that share teaching programs);
- capacity to trace GAT scores over time and their relationship with achievement scores
- more intuitive reporting of adjusted estimates, and
- capacity to study the performance of individuals and their contribution to reports on overall performance.

These and a number of other enhancements were included in a major enhancement of the system in time for the 2004 data upload.

User response to these improvements has been monitored in the course of 27 group professional development sessions attended by 617 senior school staff and 102 individual school consultations in 2005, and has been overwhelmingly positive.

Total usage has grown steadily since the release of the 2004 data in the first week of February 2005. Figure 1 shows the cumulative hits recorded on the first days of February and each month until June. The most heavily-accessed report to this date has been Report 17 (Student Results by Study), which shows a scatterplot of achieved versus predicted Study Scores for each study, with 1692 hits in the four-month period. Another seven reports have exceeded 1000 hits in this period.

In summary, users have drawn most heavily on the following report types, listed in the logical sequence that users might have approached them, rather than their frequency of usage, which is documented in Table 1 (over the page):

- All VCE Studies (overall Study Score distribution)
- Study score distributions, showing multiple studies
- Study score and assessment grade distributions (breakdowns within a single study)
- Study score distributions, plotted over time
- Adjusted score distributions, showing multiple studies
- Adjusted score distributions (breakdowns within a single study)
- Adjusted score distributions, plotted over time
- Scatterplots of achieved versus expected study scores
- Results for individual students, across studies.

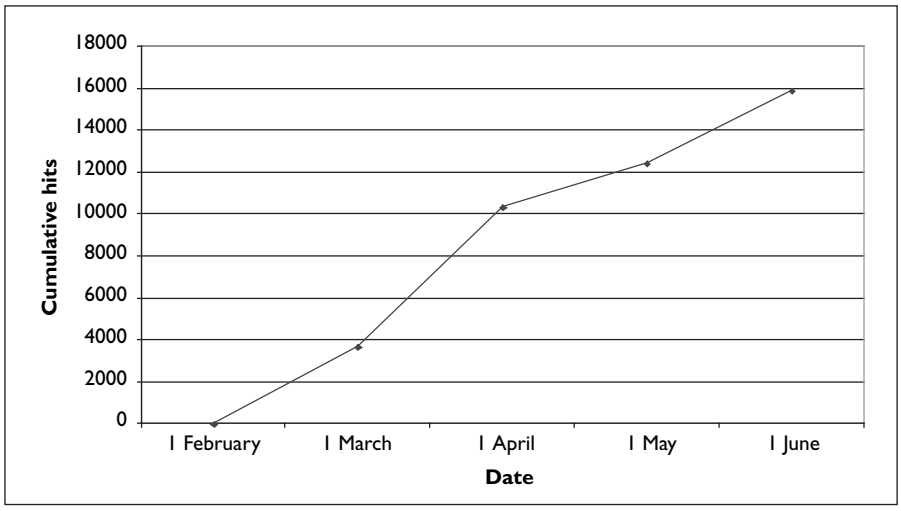

Figure 1 Total VCEDS usage Feb–June 2005

Table 1 Cumulative VCEDS usage by report type: Feb-June 2005

Report type	Mar 1	April 1	May 1	June 1
1. All VCE Studies (Study Score distributions)	296	740	876	1080
2. Assessment Grades (frequencies of each)	188	482	584	722
3. Study Score frequencies	104	265	330	418
4. Completions (Units 3 & 4 & qualifying for a Study Score)	65	160	200	268
5. Study Scores of 40 and above, over time if required	149	374	522	660
6. Location of school within Like Schools Grouping	70	186	233	325
7. Multiple VCE Studies (Study Scores)	284	804	949	1167
8. Single VCE Study (Study Scores and Graded Assessments)	242	769	922	1198
9. Single VCE Study (Study Scores over time)	246	728	895	1152
10. Multiple VCE Studies (adjusted scores)	250	678	802	1016
11. Single VCE Study (adjusted scores)	170	514	601	752
12. Single VCE Study (adjusted scores by time)	233	717	866	1087
13. Single Study adjusted scores (subgroup comparisons))	179	521	611	796
14. Single Study (achieved versus predicted scores)	218	602	723	949
15. GAT and Study Score distributions (single studies)	178	511	613	795
16. GAT and Study Score distributions over time	155	395	494	699
17. Student results by Study (scatterplots of achieved versus predicted)	338	1101	1307	1692
18. Individual student results across Studies	298	781	895	1116

The 'hit count' records each time a user chooses that item from the next higher-level menu. For each hit, many reports can be produced. The usage reports do not enable us to record the number of actual reports accessed, printed or pasted into other documents, nor can we determine the number of schools accessing the service. Changes to the system currently in train will provide the latter information.

Lessons learned from the VCE Data Service

The *VCE Data Service* is built on a philosophy of empowerment. It challenges its users, and those who rise to the challenge are excited by the capacity that they gain by using it. Feedback from users has been consistently positive, and schools are constantly finding new ways of using the information that they now have the power to access.

But empowerment can be resource-intensive. Over 2004 and 2005, VCAA staff have conducted 50 Professional Development seminars in all areas of Victoria, with attendance totalling 1600 senior school staff. In addition, they have held 236 individual consultations with staff from 161 different schools. Over time, the need for this level of support may decline, but with an influx of new users each year, it is unlikely to go away.

Beyond the existing support program, the capacity of VCAA staff to support schools to provide individual support is limited. Many schools are comfortably self-sufficient already, and others can quickly become so with minimal support. Schools may wish to spend part of their limited professional development funds on buying in the expertise that will enable them to become self-sufficient, and in our view this would be money well spent, particularly if it leads to self-reliance and not to continuing dependence on assistance from outside the school.

There are a number of issues that the VCAA needs to address. Some of these are relatively minor, such as how many years of data the system should retain for everyday access. User feedback is telling us that the current seven years is more than sufficient, and that when the 2005 results are uploaded, one or more years could be dropped.

A vital issue for the VCAA to resolve is the uneasy compromise between the desire for ease of access and the need to maintain the confidentiality of the

data. To protect confidentiality, access has been restricted to the Principal of each school, the VASS coordinator, and other users as nominated by the Principal. This may be over-restrictive, particularly in schools where the Principal is not aware of the service or nervous about security issues. The VCAA is planning consultations with user-Principals about the possibility of setting up different categories of users with access to different reports within the service. For example, we could have the category 'Super User,' with access to everything; a 'Department Head' category, with access to reports for a defined set of Studies (such as a Key Learning Area), and a 'Subject Teacher' category, with access to one Study only.

These and a number of other issues will be resolved by consultation with users and implemented in time for the upload of the 2005 results in January 2006.

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Goldstein, H. (1995). *Multilevel statistical models* (2nd ed.) London: Edward Arnold.

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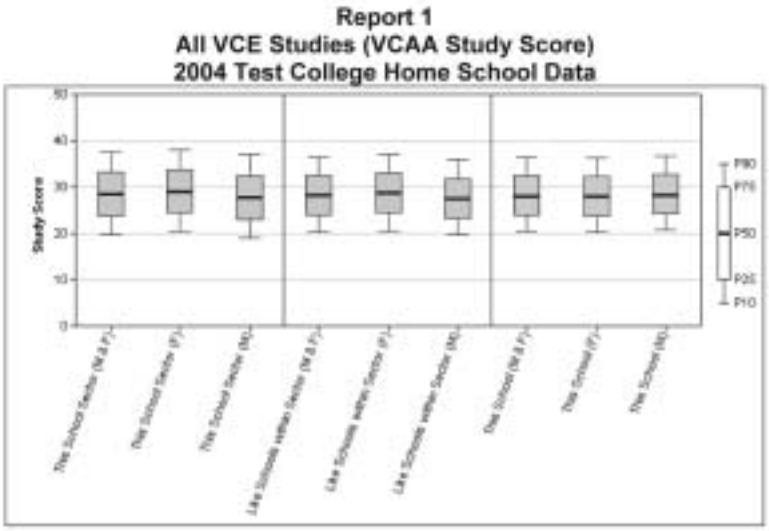
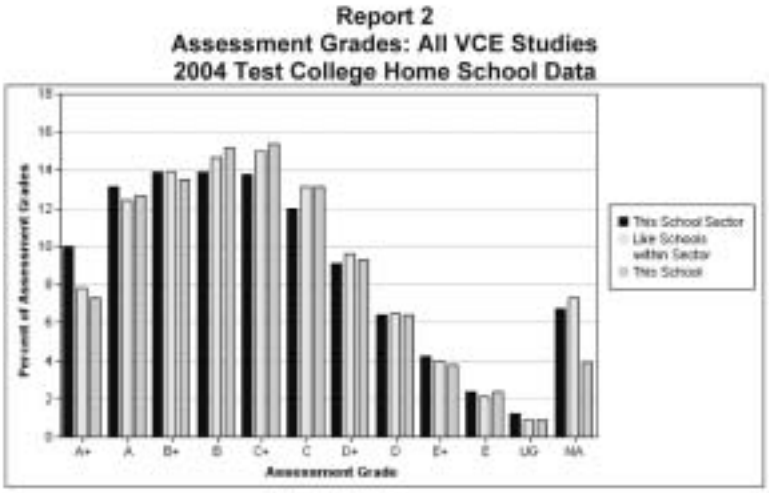
Goldstein, H., Huiqi, P., Rath, T., & Hill, N. (2000). *The use of value-added information in judging school performance*. London: Institute of Education. Available at: http://www.ioe.ac.uk/hgpersonal/Using-value-added-information.pdf

Johnson, J. 1997. Data-driven school improvement, *ERIC Digest, No. 109*. Available at: http://www.ericdigests.org/1997-3/data.html

APPENDIX

Sample reports from the VCE Data Service





Report 3

Study Score Frequencies All VCE Studies
(expressed as a percentage of all assessed studies)
2004 Test College Home School Data

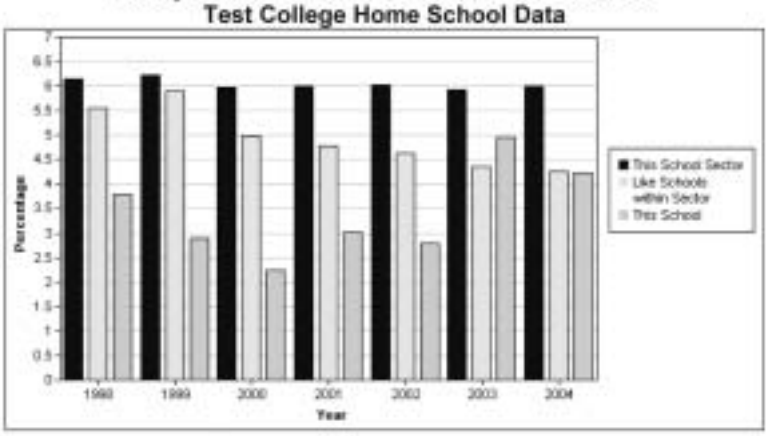
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
This School Sector	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.6	0.8	1.1	1.4	1.8	2.3	2.7	3.2	3.8	4.3	4.8	5.1	5.5	5.7	5.8	5.7	5.6	5.4	5.0	4.6	4.1	3.6	3.1	2.7	2.2	1.8	1.5	1.2	0.9	0.7	0.5	0.4	0.3	0.2	0.1	0.1	0.2
Like Schools within Sector	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.4	0.5	0.7	1.0	1.2	1.7	2.1	2.8	3.4	4.1	4.6	5.0	5.6	6.1	6.2	6.1	6.0	5.7	5.6	5.2	4.6	4.2	3.6	2.7	2.5	2.0	1.5	1.1	0.8	0.6	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1
This School	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.2	0.1	0.3	0.1	0.5	0.8	1.3	1.3	0.9	1.7	2.6	3.4	4.0	4.9	5.9	5.5	5.4	5.5	7.5	6.8	6.0	5.4	4.8	5.0	3.8	3.9	2.5	2.4	1.6	1.7	1.1	1.1	0.7	0.4	0.4	0.2	0.1	0.1	0.1	0.0	0.1

Report 4

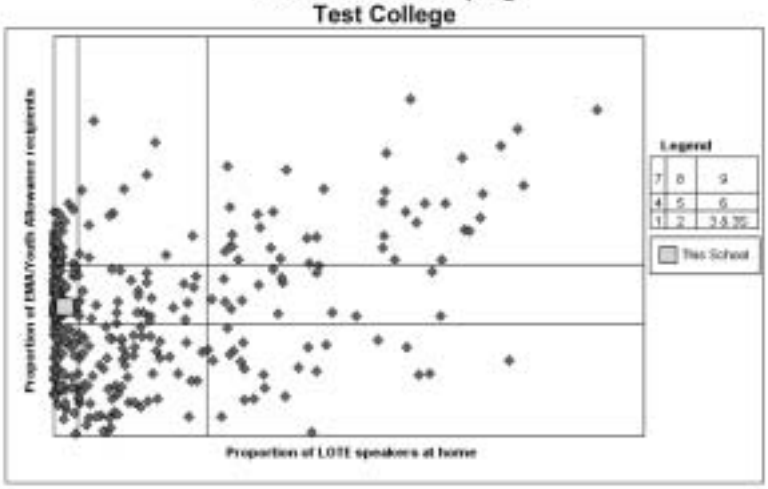
Completions
2004 Test College Home School Data

Code	Study	Number of students	Satisfactory Completions: Unit 3		Satisfactory Completions: Unit 4		Study Scores Awarded	
			Number	%	Number	%	Number	%
English								
EN01	English	491	482	98.2%	473	96.3%	476	96.9%
Health and Physical Education								
HH03	Health and Human Development	101	98	97.0%	99	98.0%	91	90.1%
PE03	Physical Education	110	106	96.4%	109	99.1%	107	97.3%
Mathematics								
MA07	Further Mathematics	263	256	97.3%	255	97.0%	248	94.3%
MA08	Mathematical Methods	155	150	96.8%	153	98.7%	152	98.1%
MA09	Specialist Mathematics	51	49	96.1%	51	100.0%	51	100.0%
Science								
BI03	Biology	89	85	95.5%	89	100.0%	88	98.9%
CH03	Chemistry	75	73	97.3%	72	96.0%	74	98.7%
PH03	Physics	73	72	98.6%	71	97.3%	73	100.0%
PY03	Psychology	89	86	96.6%	87	97.8%	86	96.6%
Studies of Society and Environment								
HI08	Australian History	28	27	96.4%	24	85.7%	28	100.0%
BM03	Business Management	123	119	96.7%	118	95.9%	121	98.4%

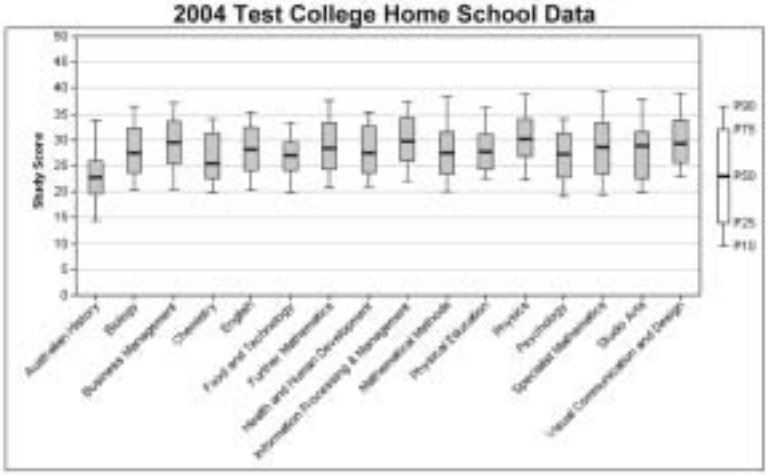
Report 5
Study Scores of 40 and above All VCE Studies
Test College Home School Data



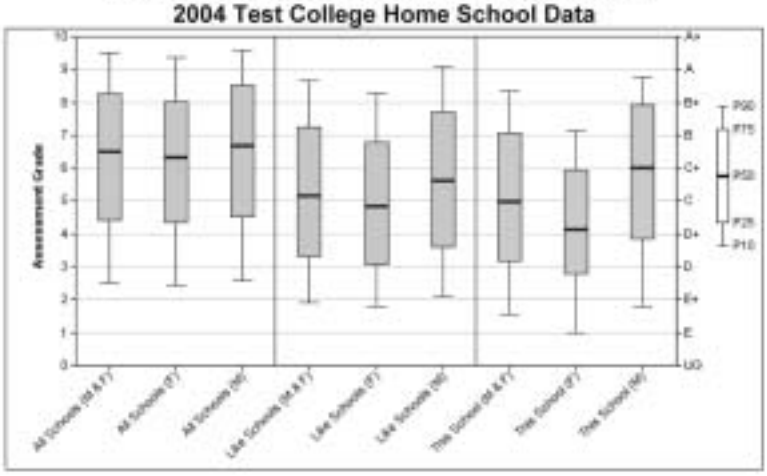
Report 6
Like Schools Grouping
Test College



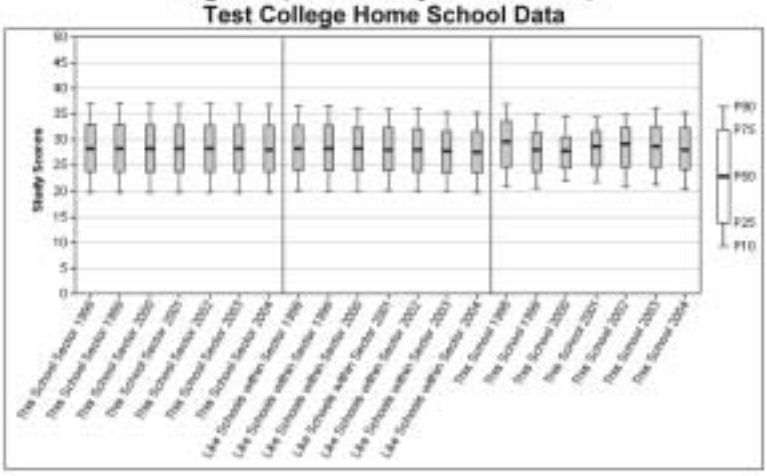
Report 7
Selected VCE Studies (VCAA Study Score)
2004 Test College Home School Data



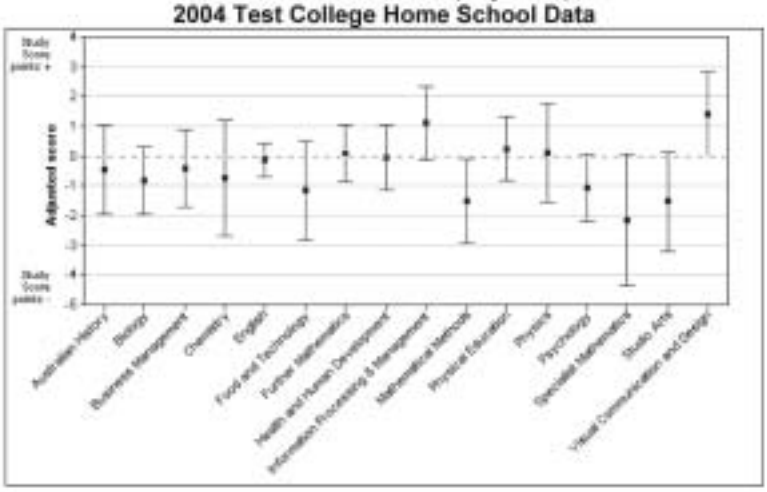
Report 8
Chemistry : Assessment 1 (Written Examination)
2004 Test College Home School Data



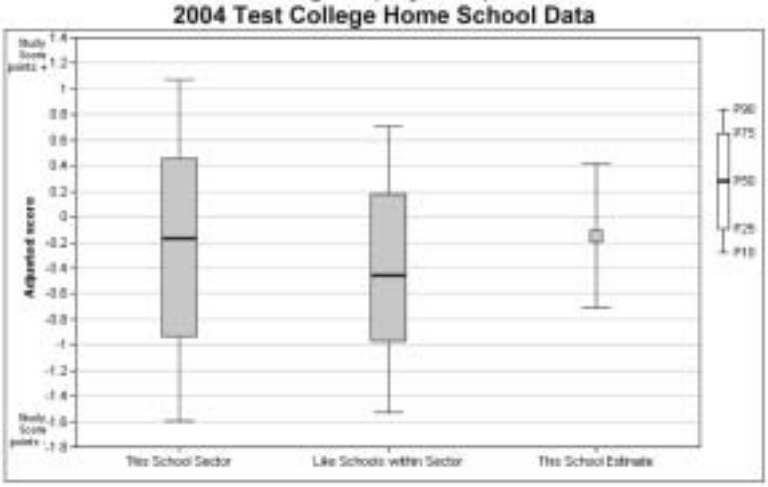
Report 9
English : (VCAA Study Score x Time)
Test College Home School Data



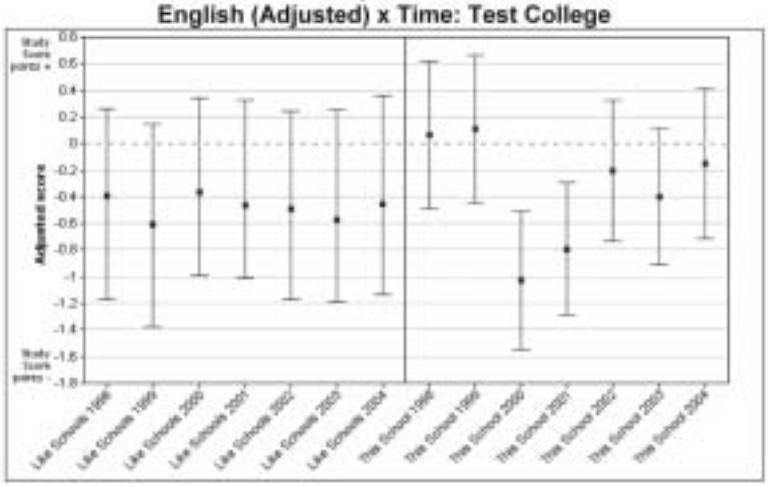
Report 10
Selected VCE Studies (Adjusted)
2004 Test College Home School Data



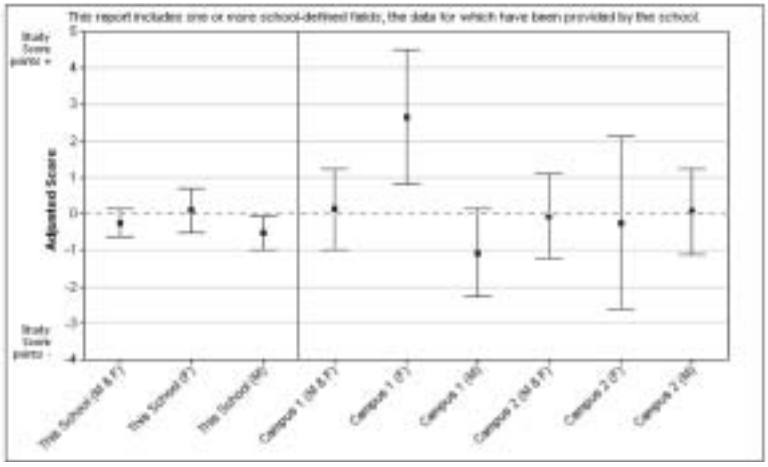
Report 11
English (Adjusted)
2004 Test College Home School Data



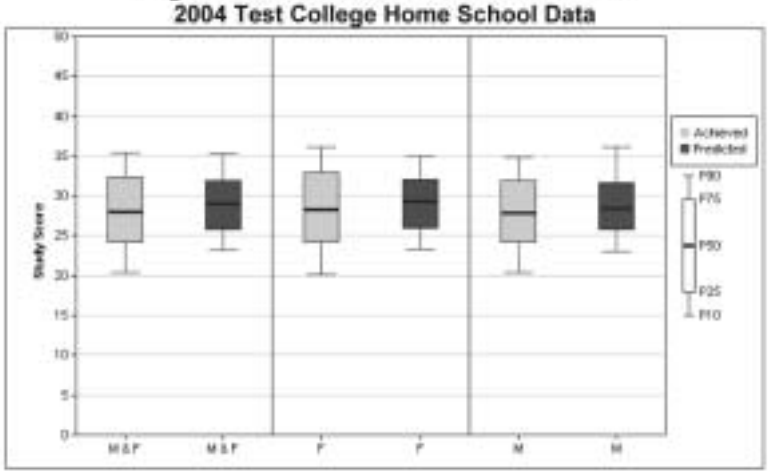
Report 12
English (Adjusted) x Time: Test College



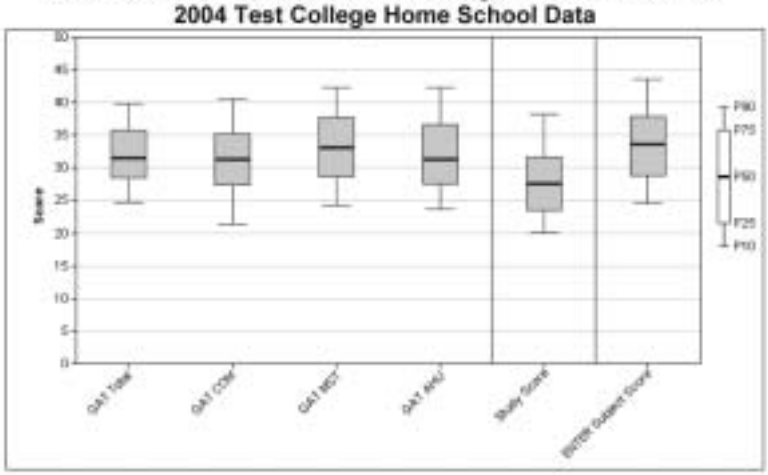
Report 13
Subgroup Comparison (Adjusted) in English
2004 Test College Home School Data



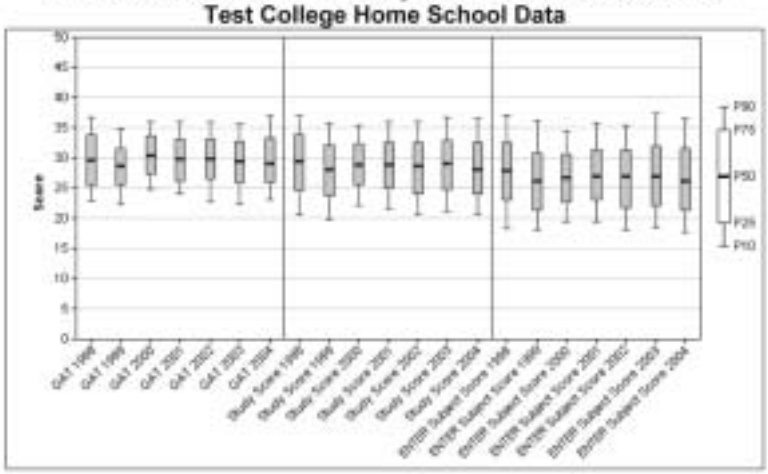
Report 14
English: Achieved versus Predicted Scores
2004 Test College Home School Data



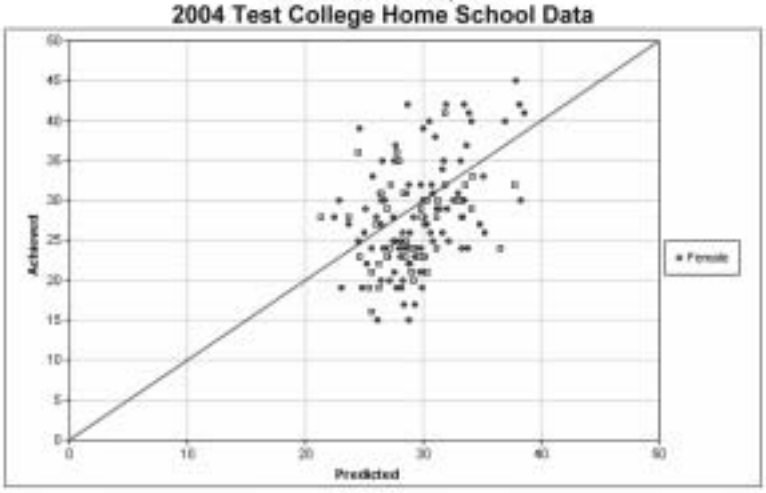
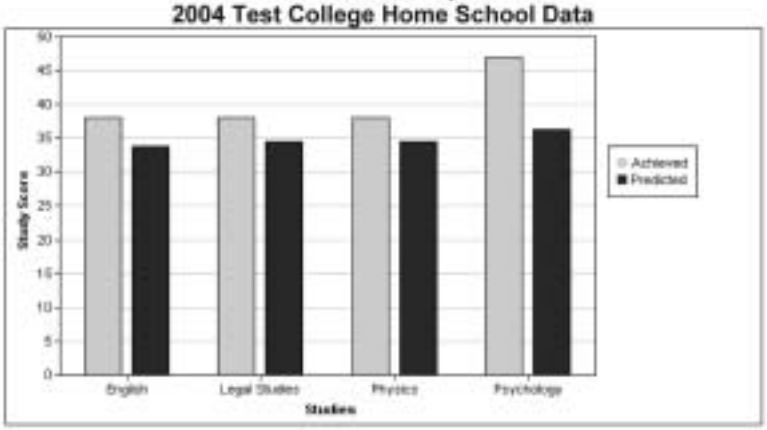
Report 15
Mathematical Methods: GAT and Study Score Distributions
2004 Test College Home School Data



Report 16
All VCE Studies: GAT and Study Score Distributions x Time
Test College Home School Data



Report 17
Mathematical Methods: Student Results by Study
Confidential Report
2004 Test College Home School Data



Report 18
Student Results across Studies Student 2, Test
Confidential Report
2004 Test College Home School Data