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CENTRE FOR RESEARCH IN LEARNING AND CHANGE

Building Enterprise Skills:

The ABW Schools Program 2000 – 2008

UNIVERSITY OF TECHNOLOGY SYDNEY

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Executive Summary

Since the mid 1990s, the ABW Schools program has been providing school students around Australia with a unique opportunity to learn about themselves, to learn about the world of business and to develop both knowledge about business and a range of enterprising skills.

In the period since it began around 100,000 secondary school students have undergone the program and through much of the time, schools have assisted in the ongoing evaluation of the program by having their students complete surveys both before and after the running of the program.

This information is fed back to schools each year and, in addition, has provided important information for assessing and evaluating the program. This has included the publication of a number of reports based on the data collected (over 35,000 individual students have contributed data in the period 2000-08).

This report is the latest in that series and provides an overall view of the program since 2000 and examines in detail some significant features of the data.
Key findings from these analyses include:

- The number of participants grew by 69% from 2000 levels by 2004 and now is averaging around 10,400 participants each year from around 107 schools in most states and territories.
- Participation is growing fastest amongst independent schools (more than doubled since 2000).
- Participation by schools from Regional Centres almost quadrupled. At the same time, participation by Capital City schools grew in the period to 2004 but has now returned to 2000 levels.
- Satisfaction with the program has remained high throughout the period with 75% rating the “program as a whole” to be “Good” or “Excellent” and 85% indicating that they would recommend the program to others.
- The demographics of the student participants has remained relatively stable over time with the key exceptions that:
    - the program is, increasingly, being offered to students in Year 10 and less often in Years 11 & 12, and
    - participants are less likely to be concurrently studying subjects related business in recent years than was the case in 2000.
- Participants from Regional Centres consistently rate the program more highly than do their counterparts from schools in Capital Cities.
- In general, Capital City students change their opinions about business and their interest in it less than do students from regional centres or rural areas.
- While all students increase their scores on attitudes towards their own business skills and towards business in general, the program is most effective in improving the attitudes of regional participants and appears to do this by building on a more positive orientation that they bring into the program initially.
- There are indications that this effect might be explained by the higher prior exposure of this group of participants to business through studying business-related subjects and having family or relatives who own or operate a business.
- The system within which a school operates is related to participants’ beliefs about their skills and understanding of business, but does not appear to impact on their career intentions.

Introduction

The ABW Schools Program is an innovative Enterprise Education program designed for secondary school students. The program involves one (or sometimes a cluster of two or more schools) allocating an entire week during which an entire year cohort undertake an experiential learning program. This involves self-managed teams of students (as CEO, Marketing Manager, etc) competing against each other within a computer simulation of the economy. Originally the simulation involved teams operating a manufacturing business but other simulations in hospitality, retail, and IT have now been developed and are used by many schools.

The ABW Schools Program has been continuously operating for 15 years and has grown substantially since its initial inception in western Sydney. Throughout most of this period, the program has continually monitored its performance and the reactions of its participants.

The participants are asked to complete a simple, mostly multiple-choice, survey before they begin each program and a similar one following the program that also includes questions about their reaction to the program they've just completed. Schools are asked to arrange the completion of these surveys and to return the results to Australian Business Week limited for analysis and feedback. Not all schools have complied with this request but, in general, around two-thirds of schools provide data for the evaluation.

While remaining largely consistent over the whole time, these surveys have changed over the years to provide additional and/or more focussed information. One form of the survey was in use up to 2000, a modified version was introduced in 2001 and this was further modified in 2003.

Since 1995, the regular reports have evaluated the program and, in many years, have focused on some specific aspect of the program and/or its participants (Hawke 1999; Hawke 2000; Hawke 2001; Hawke 2002; Hawke 2003; Hawke 2004).

This report looks at the program over the period 2000 to 2008 and draws mainly on the data supplied by participating schools. The aim of this report is to provide an overall perspective of the program, how it is changing and the sorts of analyses that the data allows. The report is in two parts. The first represents a series of snapshots of some of the analyses that have been conducted on the data and the second looks at trends in the program overall. Many of these rely on single cohorts and are based on analyses reported in earlier volumes in this series of reports.

The ABW Schools Program 2000-2008

The size of the program

The ABW Schools program began as a very small program but grew rapidly well beyond its initial existence in north-western Sydney. The program's growth escalated rapidly until 1999 following the input of Commonwealth funding to enable the program to extend nationally. After 1999, growth continued at a slower rate until it peaked in 2003 and 2004 when 116 school programs operated nationally (some involving multiple schools). Since 2004, the number of programs has declined slightly and appears to be stabilising at around 107 programs per year (Figure 1).

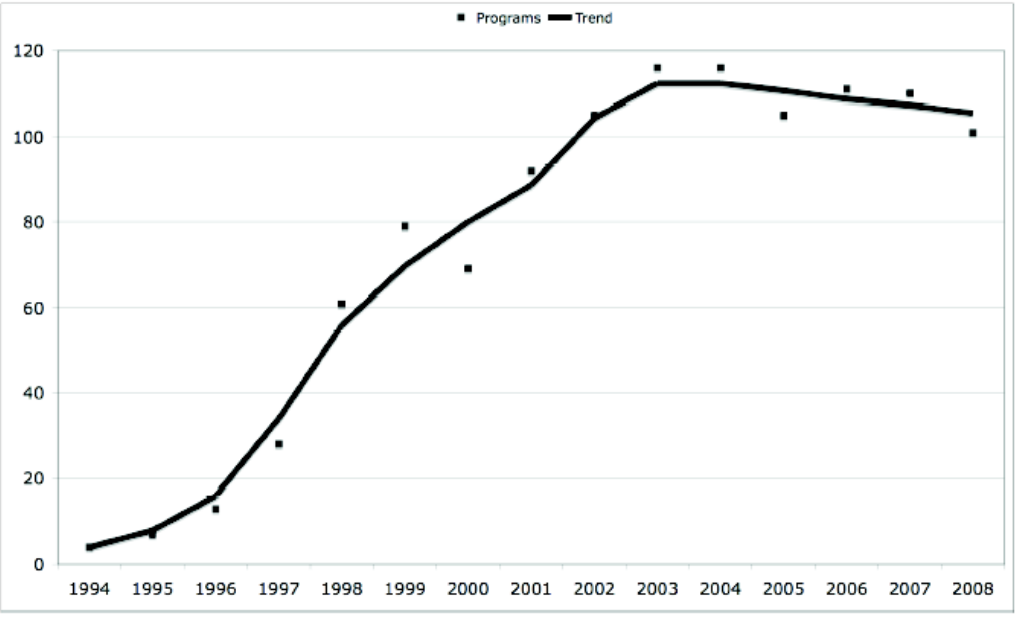

Figure 1 Number of school programs operating per year

A similar picture is seen in terms of total participant numbers. Figure 2 shows that total participants peaked at 11,143 in 2004 and have now settled at around 10,400 in recent years.

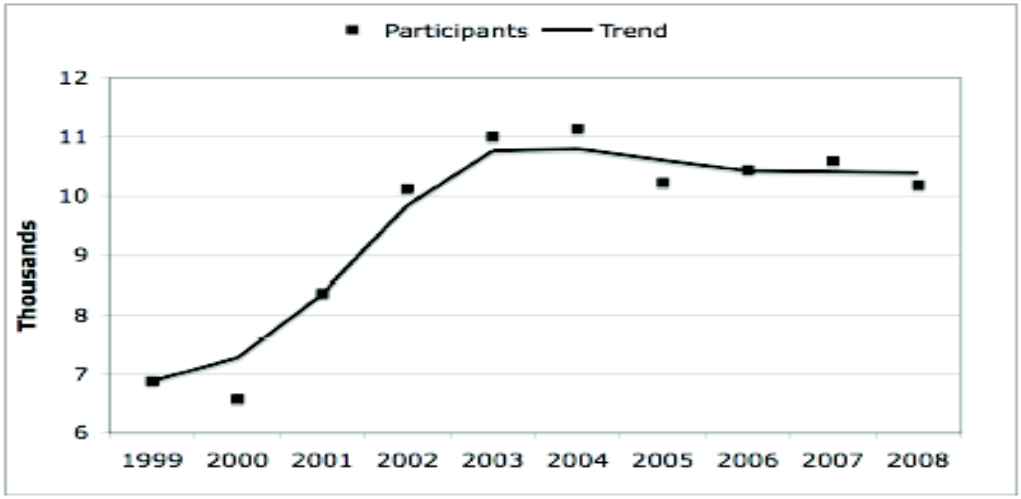

Figure 2 Trend in participant numbers

Throughout most of the period since 2000, the program has operated in each of ACT, NSW, QLD, SA, TAS, VIC, WA. However, no WA schools have participated since 2004. Only two states grew their share of the overall program in this period, NSW & SA. As Figure 3 shows, the NSW share dropped during the period 2001-4 before recovering while the reverse was true for all other states/territories. The change in SA participation is small but suggests a slow rate of growth.

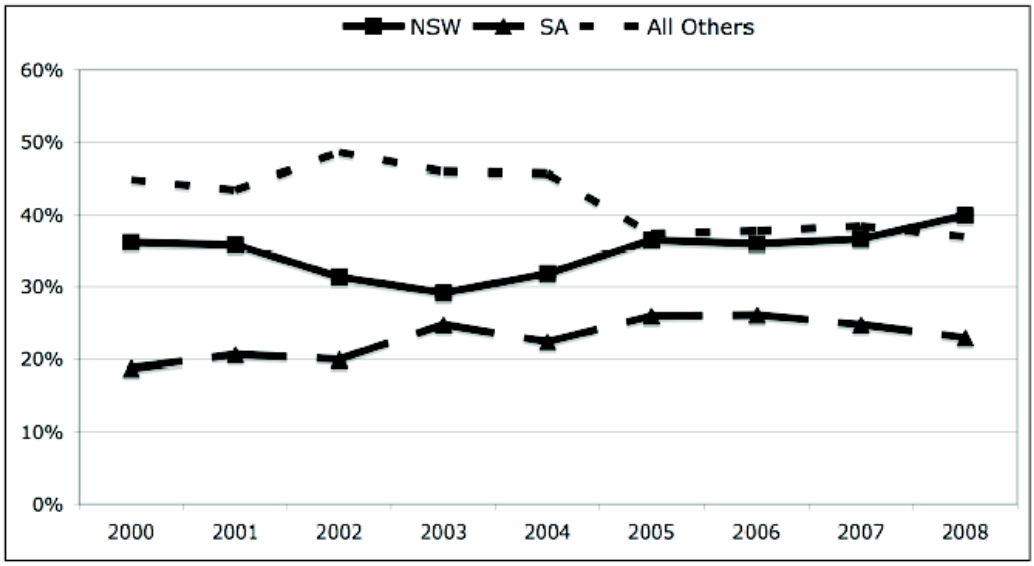

Figure 3 Change in overall share by state/territory

Government schools have been the dominant participant in the program throughout the period but have been declining in favour of non-Catholic independent schools. In the period 2000-08, government schools declined from 64% to 55% of all programs while independent schools grew from 23% to 35%. Catholic systemic schools have remained constant at around 10% over the same time (see Figure 4).

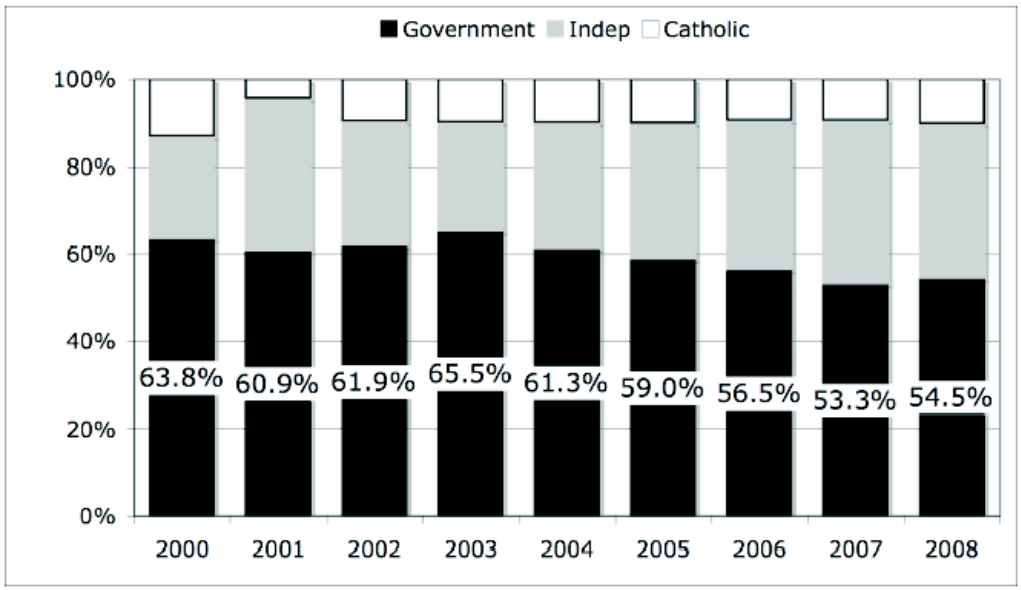

Figure 4 Share of annual program by School System

Similarly, the participation of schools from different geographic areas has also shifted in this period. Initially, schools in capital cities accounted for almost 60% of all participating schools but this had dropped to 39% by 2008 (Figure 5).

The decline in city school participation has mostly been replaced by a growing representation of schools from Australia's regional cities. In 2007 and 2008, the number of schools from these areas exceeded those from capital cities. The participation rate for schools from rural and remote areas is much more variable from year to year but has averaged just over 20% in this nine year period.

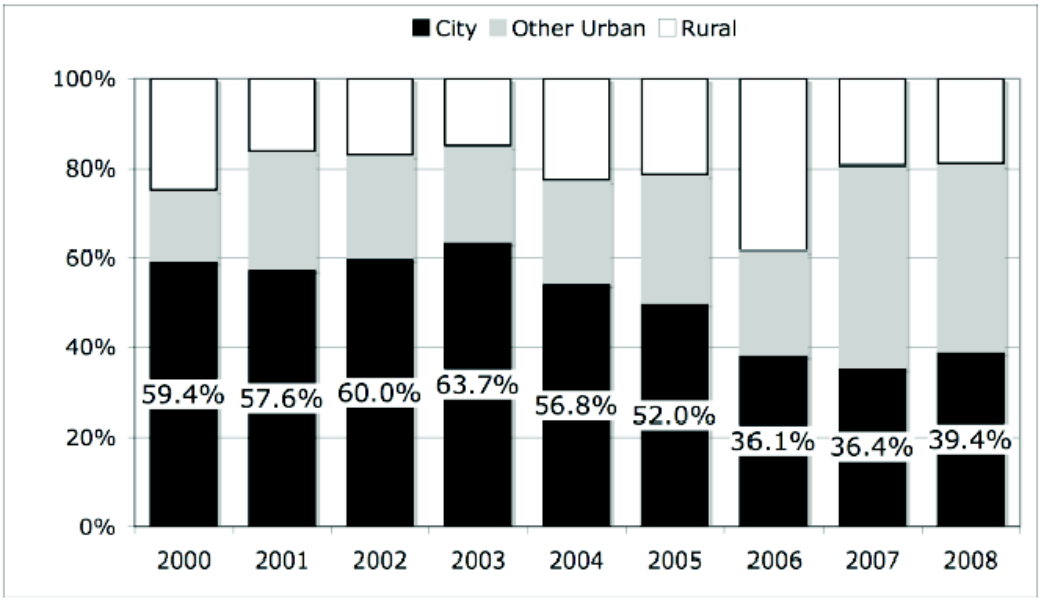

Figure 5 Share of annual program by geographic location

It is worth noting that the changes over time noted above display a good deal of volatility and this will also be observed in many of the analyses that follow. Given that we are dealing with very large sample sizes here, this has important implications that caution against generalising from single year sets of data.

Participant characteristics

In the questionnaires that students complete before they commence the ABW Schools program they are asked a number of questions that define the background they bring to the program. Some of these are the common questions of gender, age and the like, others focus on their experiences of the world of business.
The data in this section is based on the subset of participants attending schools that supplied data. In total, the data represents 35,290 individual participants.
Figure 6 shows that throughout the period, a substantially greater proportion of participants have been female with the proportion fluctuating between 49% and 58%.

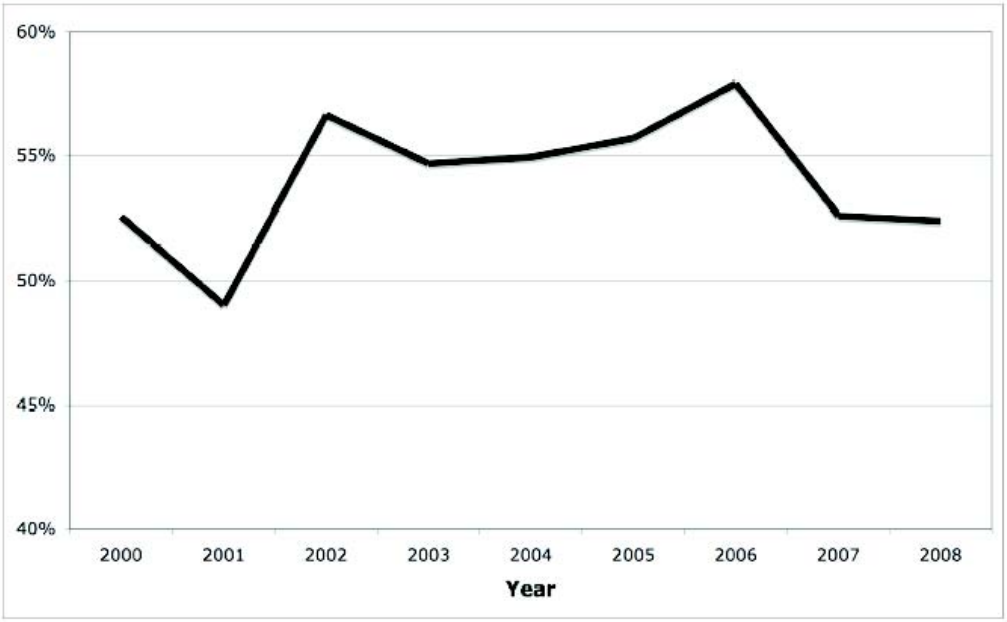

Figure 6 Percentage of participants who are female

The ABW Schools program was originally designed to be used by participants in Year 11 and, during the early years, this was where the program operated. However, increasingly schools have opted to operate the program as part of their Year 10 activities. This trend is evident in Figure 7 where it can be seen that almost two out of three participants in 2008 were currently enrolled in Year 10.

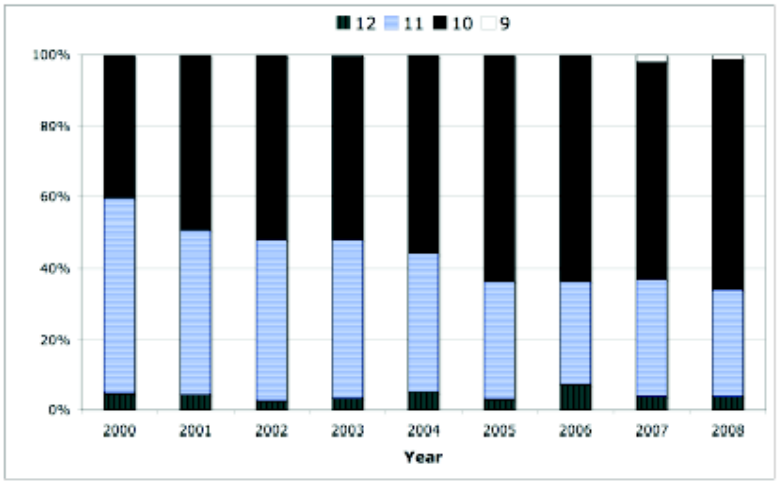

Figure 7 Participation by grade level

Since 2001, participants have been asked about their parental background and throughout the period to 2008, a quite consistent 41-45% have indicated that one or more of their parents was born outside Australia.
Also since 2001, participants have been asked if they identify as Aboriginals or Torres Strait Islanders. The proportion who do so has been consistently small with the greatest proportion being 2.6% in 2002 and then steadily declining to 1.2% in 2008.

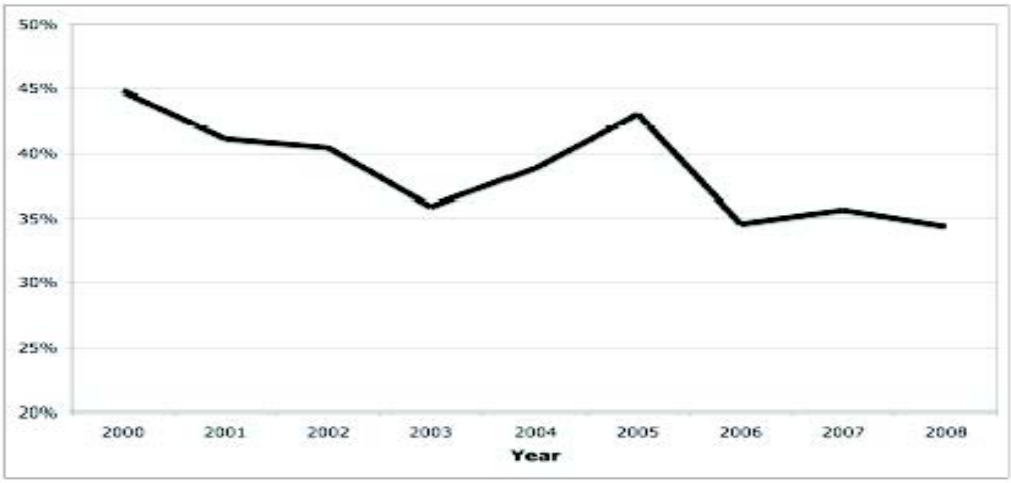

Figure 8 Proportion of participants with a parent born outside Australia

To assess the background of the participants as to what exposure they have had to business related ideas or practices, they are asked firstly if they are concurrently studying subjects relevant to business. Figure 10 shows that around four in ten students are doing so at the time they undertake the program. However, this proportion has declined over the period from a high of around 45% to the 2008 figure of 34%.

A second question asks if the student has family or relatives who own or operate a business. This proportion answering “yes” has remained fairly constant over the period at around 55% (range: 52%-59%).

The third question asked whether or not the participant was in part-time employment. Again this has remained fairly constant over the period with an average of 43% of participants working (range: 40% - 46%).

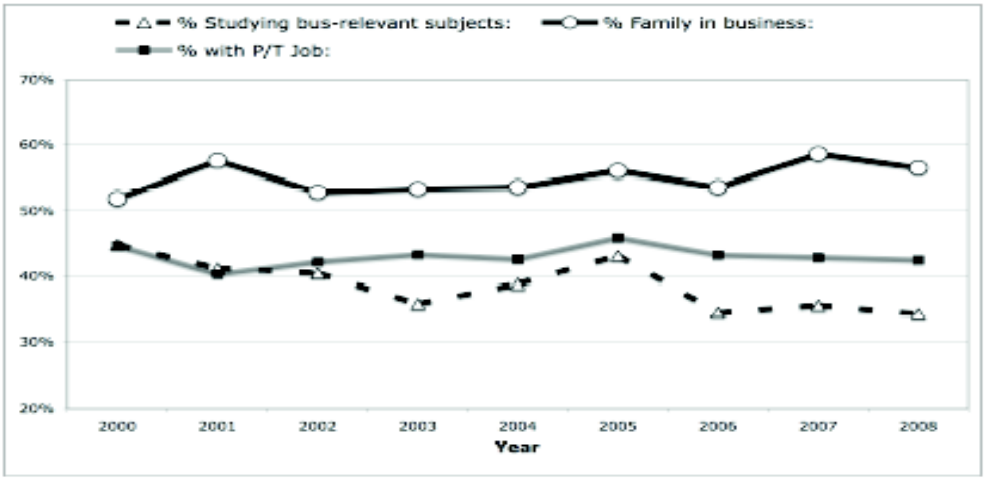

Figure 10 Participant exposure to business practice

Together these indicate that a significant proportion of students have personal experience of business at some level even before they undertake the ABW Schools program. Typically less than one in five participants report that none of these three circumstances apply to them and around 40% report two or more as applicable.

Participant evaluation of the program

After completing the program, participants are asked to rate each of a number of aspects of the program as well as the "program as a whole". Throughout the history of the program's operation, the proportion rating the program as "Good" or "Excellent" has remained consistently high (average 2000-08 = 75%) although it dropped noticeably in 2008 (see Figure 11).

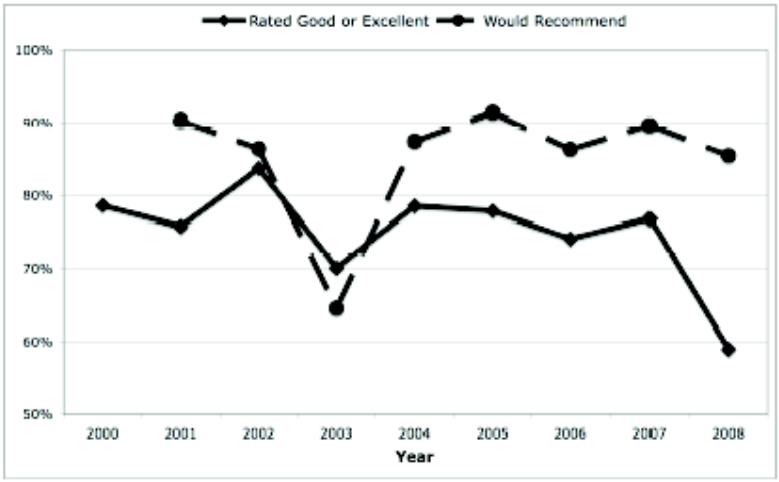

Figure 11 Participant evaluation of the program

Since 2001, students have also been asked to indicate whether or not they would recommend the program to others and this, too, has remained consistently high (average = 85%) (although this was dramatically lower in 2003) and remained high in 2008.

Regional differences [1]

In earlier reports (e.g., Hawke 2003) the impact of school location was identified as a significant one that affects the backgrounds students bring into the program and the experiences of it. In this Hawke 2004, this matter was explored further and extended look at how the patterns of influence were changing over time.
This chapter draws on pre- and post-program data provided by participants over the four years from 2000 to 2003. The total number of students providing data in that period and used in these analyses is 14,220.

The program over time

The mixture of participation of students in the program varies from year to year with students from city schools typically representing about 57% of the total. The greatest variability appears to be with regional participants whose numbers have varied from 18% to 27% over the period.

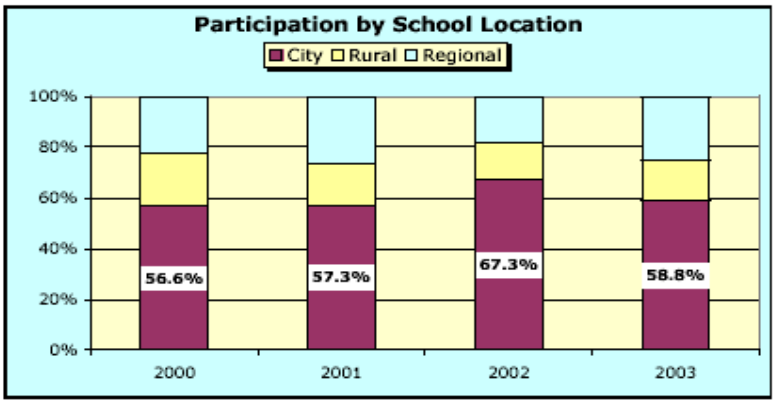

Figure 12 Student participation rates by region

Moreover, the mix of participants varies substantially from state to state with the proportion of city participants varying from a low of 32% in Queensland to a high of 71% in Western Australia. This pattern has remained relatively stable over time.

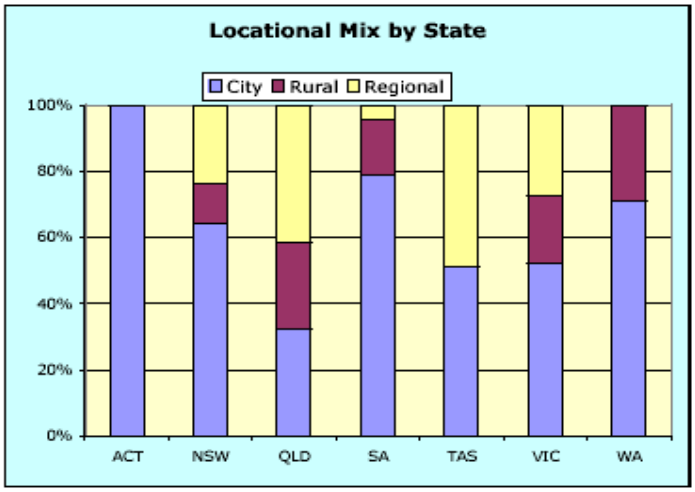

Figure 13 State differences in school location

[1]This chapter is drawn from sections of Hawke, G 2004, Regional differences in the backgrounds of participants, operation of programs and outcomes for students: ABW Enterprise Education 2000-2003, Sydney, OVAL Research, University of Technology, Sydney.

The gender mixture in the program has changed over this period as well with the proportion of females involved increasing. However, interestingly, almost the entire change can be attributed to shifting participation rates among students from city schools.

It is interesting to note, too, the greater volatility of female participation in regional schools. This appears to be linked to the greater overall participation of regional students in each of 2000 and 2002.

There are substantial changes as well in the backgrounds that students bring into the program. Previous reports have shown the linkages between the participant's prior exposure to business practices and their attitudes towards business and the ways in which they see them relating to a future in business. It is important, then, that we gain a clearer understanding of how these factors are operating and how they may be shifting over time.

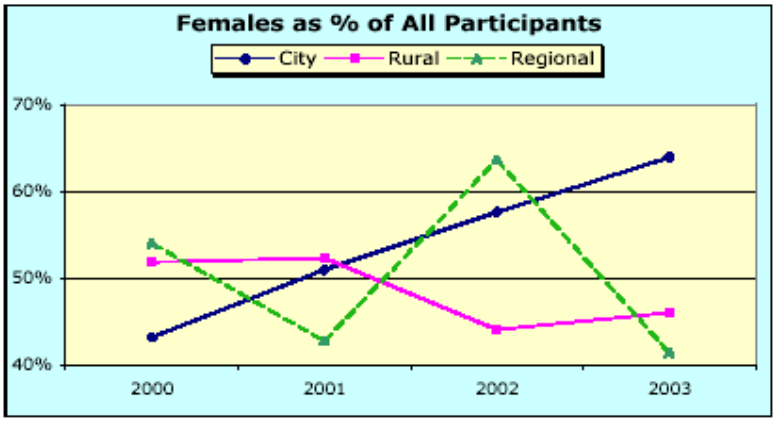

Figure 14 Female participation by region

Participants are asked to indicate if they are concurrently studying business-related subjects and, typically, around 40% indicate that they are. However, as the following figure shows, the proportions doing so vary considerably among students studying in the different locations with regional students substantially more likely to be doing so and city students much less.
Interestingly, however, the very high level of study of business subjects in regional areas found in 2000 has now dropped back to something closer to the norm for non-city students.

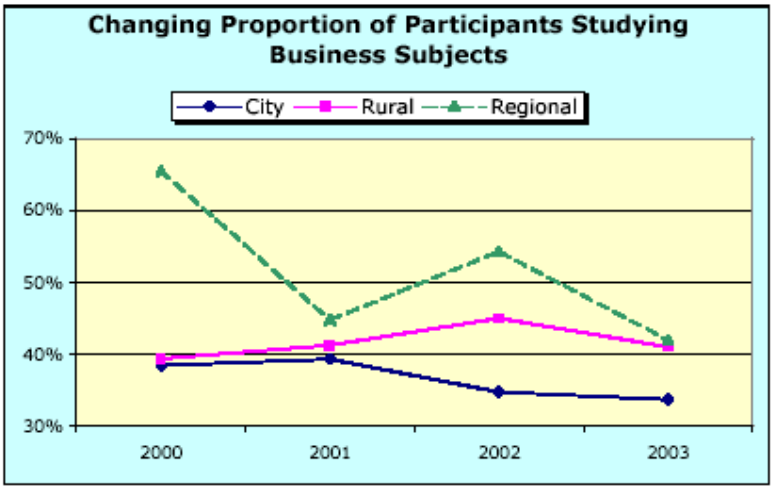

Figure 15 Business study rates by region

In a similar vein, students are asked if any member of their family or close relatives own or operate a business. Just over half of all participants do have a close family member who runs a business but the numbers and the patterns by region have varied over the years.

With the exception of 2000, regional students have consistently been most likely to report having family members in business and city students the least. There is a suggestion that the differences are becoming less pronounced over time but, given the self-selected nature of the sample of participating schools, this cannot be assessed with confidence at this time.

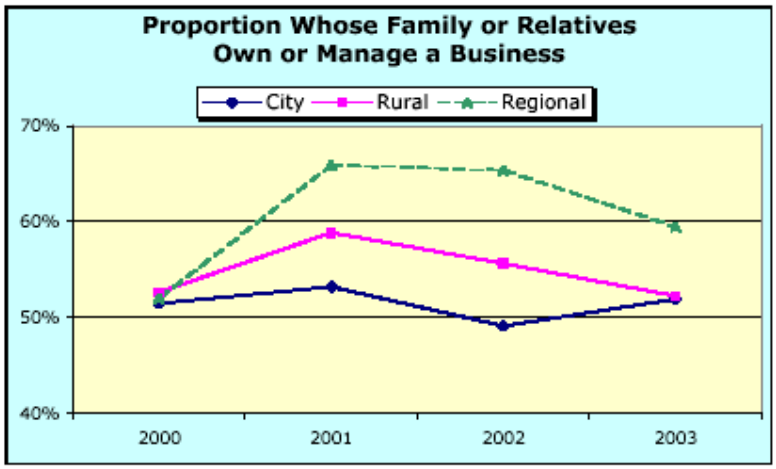

Figure 16 Family business rates by region

Finally, students are asked to indicate if they currently have a part-time job. Overall, 43% do but this varies from 40% among city students to 48% of those in regional areas and this pattern of difference appears to be remaining reasonably constant over time.

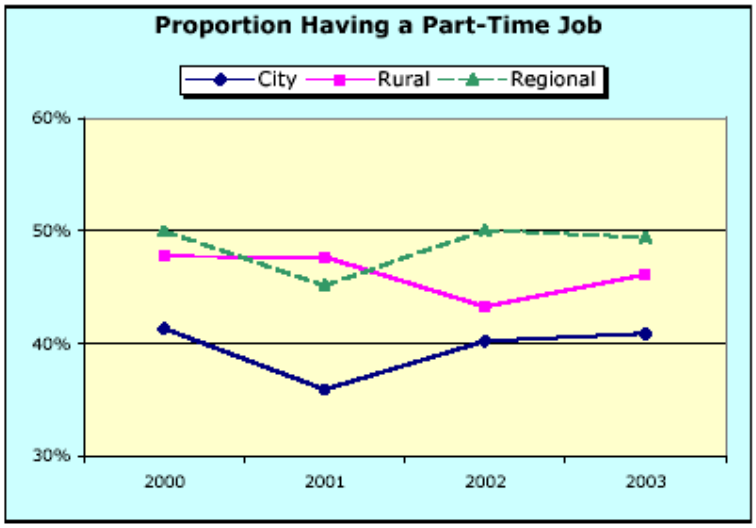

Figure 17 Part-time employment rates by region

Other regional variations

In addition to these shifting patterns, other patterns had remained more stable. For example, the overwhelming majority of city and rural participants are drawn from government schools (68% and 74% respectively) but this is not the case for those from regional areas. With the latter group of students, they are evenly divided between government and independent schools (46% vs 47%). For all three regions, participation by students from catholic systemic schools is low as is clear in Figure 17.

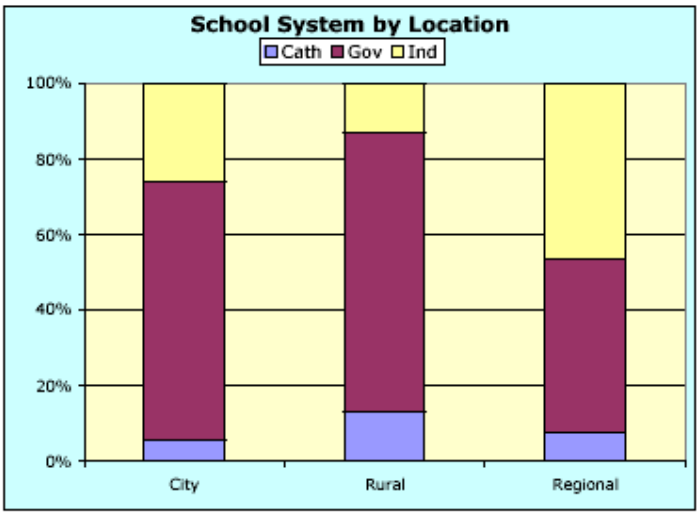

Figure 18 School system by region

Schools in the various regions appear to take up the program at different points within the school year. Rural schools are much more likely to run the program earlier than do regional or city schools. Only about one in five rural participants undertake the program in the last three months of the year as opposed to almost half of all city students (Figure 18).

In addition, there are substantial differences in the grades from which participants are drawn. Over the years, there has been a growth in the proportion of younger students participating as schools are increasingly utilising the program as part of their Year 10 offering rather than for their senior students. However, as Figure 19 shows, schools from different regions are not equally likely to offer the program to Year 10. For city students, the majority (58%) are drawn from Year 10. By contrast, less than one-third of rural and regional participants are enrolled in that grade.

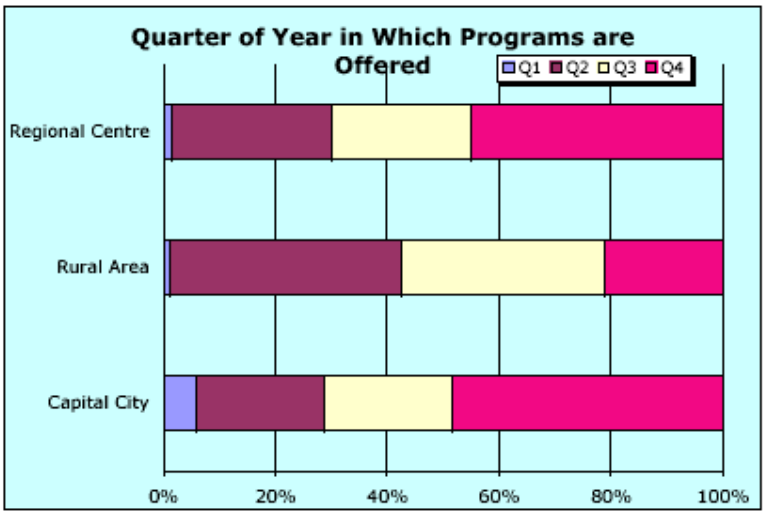

Figure 19 Program timing by region

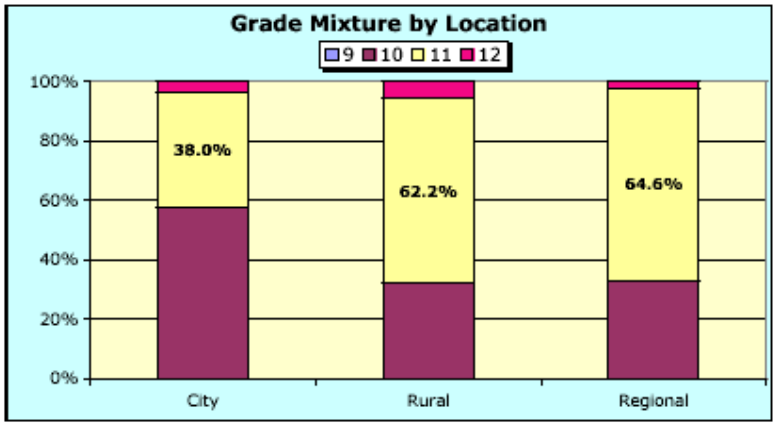

Figure 20 School grade by region

Participant reactions to the ABW experience

An important ongoing aspect of the evaluation program has been assessing the participants' responses to their experience in the program. This considers both their reactions to the program as a whole and to each of the major components of the program.

The program as a whole

The evaluations consistently find that a high proportion of participants (more than 75%) rate the program overall as "Good" or "Excellent" and this does not vary greatly between participants from different regions. However, given the large numbers involved, there is a statistically significant difference (Chi-square = 36.3, $p<0.01$) between the three groups with regional participants more likely to rate the program highly (80%) than rural students (76%) or city participants (75%).
Rural students are the most likely to indicate that they would recommend the program to others (92%) as opposed to 91% of regional students and 89% of students from city schools.

Program components

A similar pattern applies for each of the components. In every case, regional centre students are more likely to rate that component as "Good" or "Excellent" and for most components, city students are least likely to give such a rating. The following table show the differences for each component.

	% Rating "Good" or "Excellent"		
Component	City	Rural	Regional
Computer simulation	61.5%	63.0%	65.2%
Trade Display	70.0%	69.3%	71.6%
Video Advertisements	67.2%	69.9%	70.8%
Written company report	53.6%	53.2%	57.3%
Oral presentation of report	55.5%	53.7%	57.9%
Guest Speakers	54.4%	56.6%	61.8%
Mentors	65.9%	66.9%	74.4%

Attitude change

An important issue that the evaluations have been seeking to address is the impact of the program on the attitudes or future intentions of the participants. To examine this, the participants are asked a number of questions before they commence the program and again after completion and their responses compared.

Understanding business

One of the core questions to which students respond and one that has shown to be a useful indicator in previous evaluations is the question that asks if they believe they have a good understanding of how a business operates.
Past evaluations have shown that the proportion indicating that they do have a good understanding increases following the program and the following figure shows that this applies in each of the three groups of participants. The rate and extent of increase, however, is much greater for non-city students with the proportion giving this question a high rating almost doubling for these students. The change for city students is very much less.

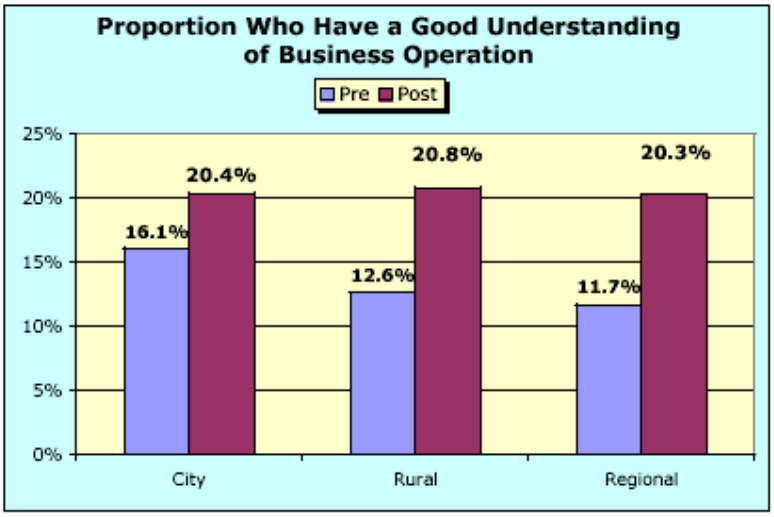

Figure 21 Business understanding by region

Intention to run a business

A second indicator that has shown important changes in previous evaluations is the question that asks the participants whether or not they think they might run a business in the future.

While for some students the prospect of running a business might initially seem attractive, the program provides them with an opportunity to gain a more realistic understanding of what that might involve. Consequently, students are typically less likely to respond positively to this question after completing the program than was the case before hand. There are, however, substantial differences between the groups. Rural students do not see owning or operating a business in the future nearly as likely an option as do their city or regional counterparts and, moreover, are least affected in their view by undertaking the program. By comparison, city students show a much greater shift in expectations after undertaking the program.

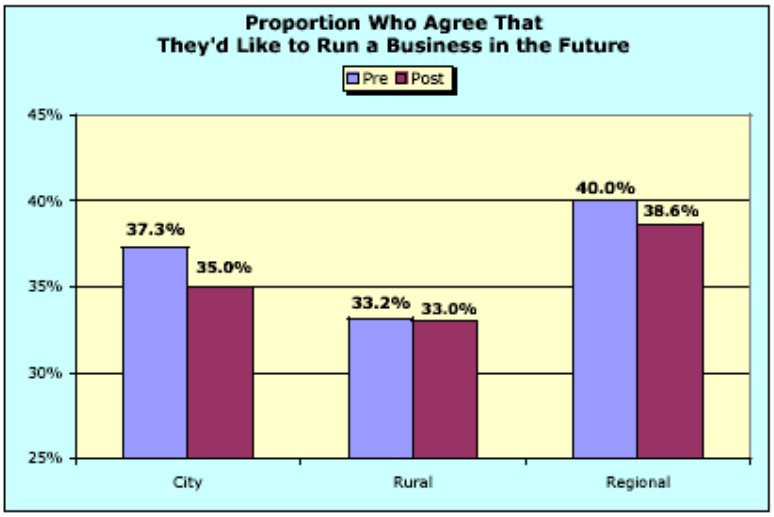

Figure 22 Run a business in future by region

Business abilities & skills

Despite participants indicating a lowering of their expectations regarding operating a business, there is a substantial increase in the proportions reporting that they have skills and abilities that would be useful in business.
Before the program, the proportion agreeing that they hold such skills is extremely low (around 6%). Following the program, this rises dramatically to almost a quarter of students.

The greatest increase occurs for students from schools in regional centres where almost five times as many students believe they have relevant skills following the program as did so before it commenced.

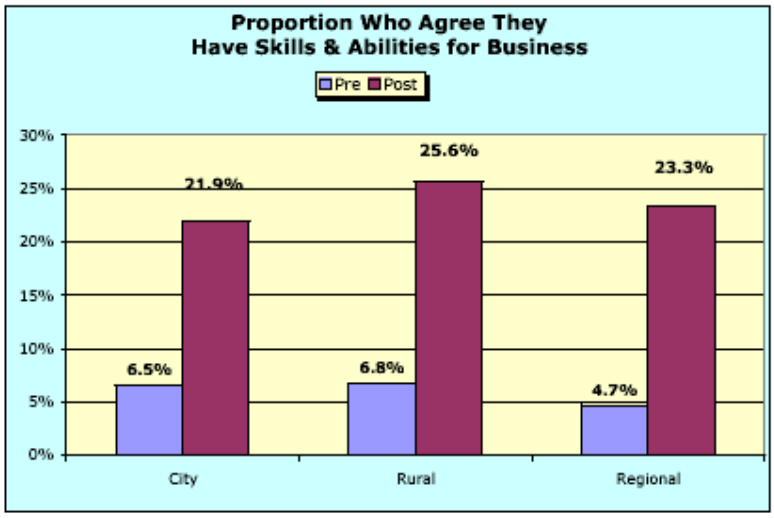

Figure 23 Business skills by region

Attitudes to business

A question that has been added to the surveys in recent years asks the participants to indicate their agreement as to whether working in a business would “be exciting”. Just over half of all participants respond positively with a notably higher proportion of positive respondents amongst students from regional centres. Attendance on the

program does not appear to greatly affect the responses although for each group, the proportion responding positively after the program is greater than before.

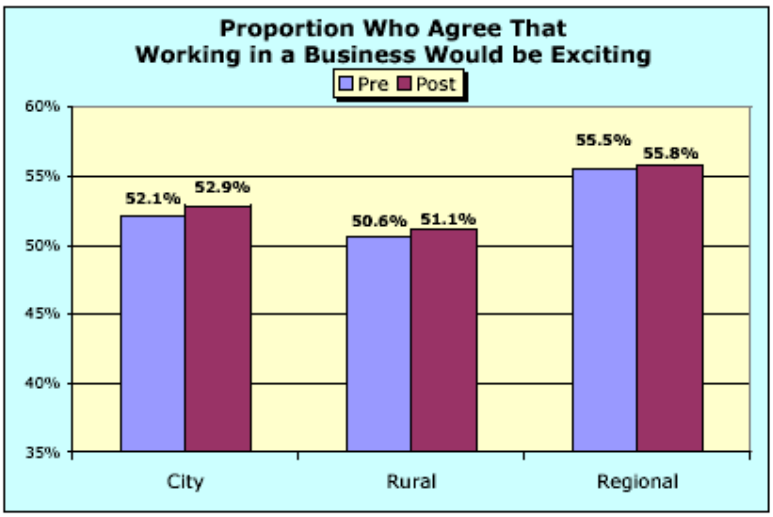

Figure 24 Business is exciting by region

Conclusion

There is a consistent pattern underlying a great deal of what has been reported above. Students from regional centres respond to the program in a consistently more positive way than students from either city schools or rural areas.

Similarly, the regional centres appear to provide the students with more opportunities to have observed and understood business practices before commencing the program. This may suggest that those schools in regional centres that elect to participate are ones whose students are more interested in business or alternatively, that opportunities for business are greater in regional areas.

For most pre-program/post-program comparisons, regional centre students also show the greatest change suggesting that, in some manner, the form of the program is better suited to their needs and interests than it is to other participants.

Conversely, it is most often students from capital city schools who show the least change after the program, who are least likely to rate the program highly and who have the lowest levels of exposure to business before the program.

School System Effects

In the 2001there were notable differences in the gender distribution of participants by state and by school type. In two states, the proportion of males exceeded that of females by over 30% (WA and Vic) while in NSW and Queensland, females were in the majority. However, the effect of school system was especially marked with Catholic schools were overwhelmingly female and independent schools primarily male.

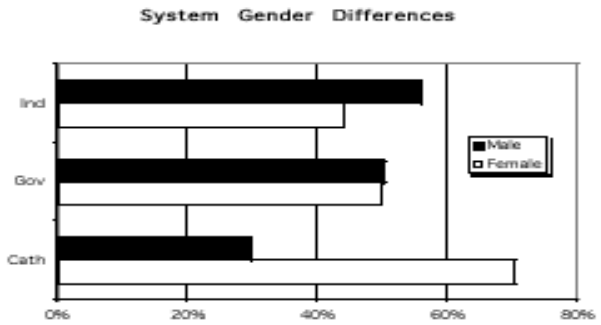

Figure 25 School system and gender

Participants were also asked to indicate the extent to which they were in some way connected to the world of business. This was done by a series of questions that asked them about other subjects they were currently studying, their family involvement in business and their own involvement in work.

Table 1 Participant contact with business by school type

	School Type			
% of Participants who:	Gov	Cath	Indep	Total
Are studying business-related subjects	37.3	48.6	45.4	41.2
Have a relative who owns or manages a business	48.7	61.5	69.7	57.5
Have a P/T job	43.6	39.6	35.6	40.3

Table 1 shows that something less than half of all participants were in some way employed in business and that more than half had a relative who owns or manages a business. These figures were lower than in previous years. However, the Table also shows that the extent of the contact is not equally the case for participants from each of the three school types. In each case, the differences amongst systems are statistically significant ($X_2 = 44.22$, 28.00 and 21.48 respectively).

Similar analyses with the 2004 cohort focused on the effect of school system type on three variables, which in previous analyses, had consistently shown substantial variations amongst participants. These assessed the extent to which students saw themselves as suited to a career in business. System type is shown to have a variety of complex implications for the three outcome variables being studied.

In the case of participant attitudes towards the relevance of their own skills for use in a business context, the system types differ significantly (chi-sq, $p<0.05$) in the proportion of participants indicating that they believe they have the skills needed by business. The difference appears to be substantially accounted for by the difference between Catholic school participants and those from other system types. However, as Table 2 indicates participants from all system types significantly increase the proportion agreeing with this statement at the time of the post-program evaluation (Wild – Seber statistic, $p<0.05$, (Wild & Seber 2000)). This leads to a

situation in which, at the post program point, there are no statistical differences between the systems.

Table 2 Proportion of participants agreeing they have skills needed by business

	Pre	Post	Diff	N	
Cath	61.4%	69.9%	+8.5%	432	*
Gov	53.5%	65.4%	+11.9%	2817	*
Ind	54.1%	66.4%	+12.3%	1497	*

A quite different pattern emerges, however, when we examine the participants' responses to the question assessing their belief that they understand how a business operates. The school systems don't differ significantly on their pre-program responses but all show substantial and statistically significant (Wild-Seber, $p<0.01$) increases in the proportions of students responding positively on this question at the post-program evaluation (see Table 3).

Moreover, at that point, there is a statistically significant variation amongst system types with the relatively higher proportion of Catholic participants who agree appearing to account for this difference.

Table 3 Proportion of participants indicating they understand how a business operates

	Pre	Post	Diff	N	
Cath	38.2%	74.5%	36.4%	432	**
Gov	37.8%	69.1%	31.3%	2817	**
Ind	37.5%	68.3%	30.9%	1497	**

Yet a different pattern emerges for the final outcome variable – participant intention not to run a business in future. For this variable, System Type appears to have no effect at either time point and there is no difference in the changed proportion of participants from pre- to post-program (Table 4).

Table 4 Proportion of participants indicating they DO NOT intend to run a business in future

	Pre	Post	Diff	N	
Cath	45.5%	40.7%	-4.7%	432	ns
Gov	42.0%	40.3%	-1.6%	2817	ns
Ind	44.6%	40.5%	-4.1%	1497	ns

Thus it appears to be the case that, while the system within which a school operates can be related to participants' beliefs about their skills and understanding of business, it does not appear to impact on their career intentions.

Attitudes about business[2]

One of the issues that are of concern to programs such as the ABW Enterprise Education program, is the extent to which they are able to influence participants' views of business and of their own capacity to engage in business as a career.

To address these issues, the evaluation in 2001 introduced two attitude scales into the data collection. The first of these sought to assess the extent to which participants saw themselves as having the attributes and skills necessary to work in a business environment. This scale was used again in this 2002 evaluation. It is made up of seven items each of which addresses a different area of capability. Participants respond to these on a nine-point rating scale where a rating of one indicates that they do have that attribute and a rating of nine indicates that they do not. Thus total scores on the scale can range from 7 to 63 with lower scores indicating higher levels of business-related capability[3].

Pre-Program 2002

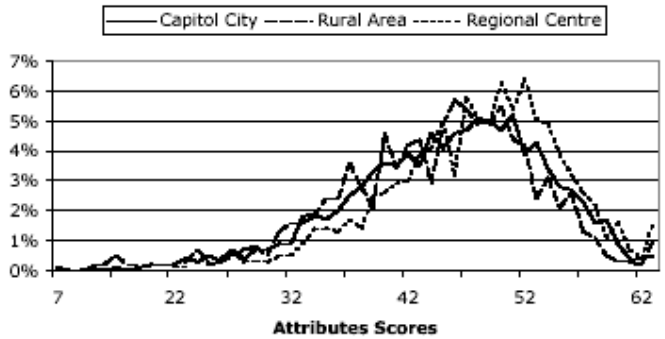

Figure 26 Participant scores on the Business Attributes Scale

The figure above shows the percentage distribution of participants on the total scores on this scale. There are clear similarities in the overall pattern of each of the three participant groups shown. Each of the curves is strongly skewed towards the end of the scale that indicates a perception of having relatively poor business-related skills or abilities. The differences between the three groups, however, while statistically significant ($F= 30.9$, $p<0.01$), are quite small and differences among the groups only account for a small proportion of the overall variance ($\omega^2 = 0.014$).
Nonetheless it is interesting that it is the participants from regional centres whose pattern of response is most notably different from that of the other two groups. Again the differences of regional participants from each of the others are statistically significant but small in practical terms.

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[2] This chapter draws on material published in Hawke, G 2001, *The ABW Enterprise Education Program: A three-year review*, Research Centre for Vocational Education and Training, Sydney. And Hawke, G 2003, *The ABW Enterprise Education Program 2002: A focus on school location*, Sydney, OVAL Research.

[3] In 2001, this scale was found to be quite reliable (alpha = 0.74). In the 2002, sample, a similar result was found (alpha = 0.70).

The second scale aimed to measure the attitudes of the participants toward business in general. Like the first, this scale was mad up of seven items, each scored on a different ninepoint rating scale. Two of the items were expressed in positive terms and five in negative terms. The total scores (after reversing the two positive items) ran from 7 to 63 with low scores indicating a more positive attitude towards business[4].

Pre Program 2002

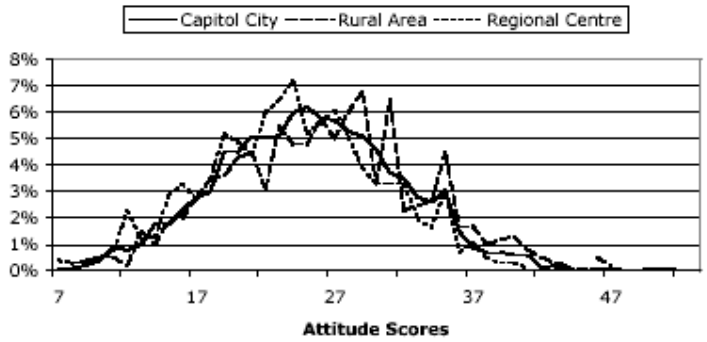

Figure 27 Participant scores on the "Attitudes to Business" scale

As with the earlier scale, the three groups show a similar overall pattern of response. Total scores on this scale for all groups are fairly symmetrically distributed and the differences between the groups are significantly different in statistical terms (F= 19.8). As before, however, theses differences only represent a very small proportion of the overall variance ( ]2 = 0.009).

For each of the scales, participants from regional centres show a small but statistically different pattern from the other two groups. They typically report a more positive assessment of their business-relevant attributes and a more positive attitude towards business. This pattern continues when we consider changes in scores on these scales that occur that occur after completion of the program.

Table 1 Changes in average Business Attributes scale scores

	Pre-Program	Post-Program	Raw Difference	Difference as % of pre-program sdev[5]
Capital City	45.45	49.13	3.68	43%
Rural Area	44.30	47.46	3.16	37%
Regional Centre	47.65	51.70	4.05	53%

[4] This scale also showed a quite reasonable level of reliability: alpha = 0.66

5 sdev = standard deviation, a measure of the amount of variation of the scores around the average.

In both pre- and post-program data, regional participants have the largest average scores indicating a relatively higher assessment of their business-related attributes. Moreover, their gains following the program are also the greatest.
Table 2 shows similar information for the Attitudes to Business scale. Again, there is a distinctly different pattern of response for the participants from regional centres and as before this indicates both an initially more positive attitude and that this becomes even more positive following completion of the program.
It is noteworthy, too, that the gains for rural participants are consistently lower than for either other group.

Table 2 Changes in average Attitudes to Business scale scores

	Pre-Program	Post-Program	Raw Difference	Difference as % of pre-program sdev
Capital City	25.36	24.05	-1.31	19%
Rural Area	26.34	25.09	-1.25	17%
Regional Centre	24.04	22.31	-1.73	26%

All of the differences reported in these two tables are statistically significant at the 1% level. However they also represent substantial improvements in attitudes towards ones more positive to business. It appears that the program is most effective in improving the attitudes of regional participants and that it is able to do this partly by building on a more positive orientation that they bring into the program initially.

THE IMPACT OF PRIOR EXPERIENCE ON ATTITUDES

Earlier research had identified that the extent to which participants had experience of or exposure to ideas about business was related to their attitudes and reactions to the program. In the context of our interest in this evaluation of exploring the effects of school location on participants it was decided to investigate how prior experience and school location might interact in their relationship to the participants' assessment of their business-related attributes and in their attitudes towards business.

The approach used to assess this relationship is a form of hierarchical tree analysis or automatic interaction detector called FIRM (Hawkins & Kass 1982). Essentially the process involves taking the whole group and identifying the factor or variable that can divide the whole group into two or more subgroups that are most different on the relevant criterion (in this case the attitude scales). Each of these sub-groups is then, in turn, subdivided in the same way until no further improvement is possible.

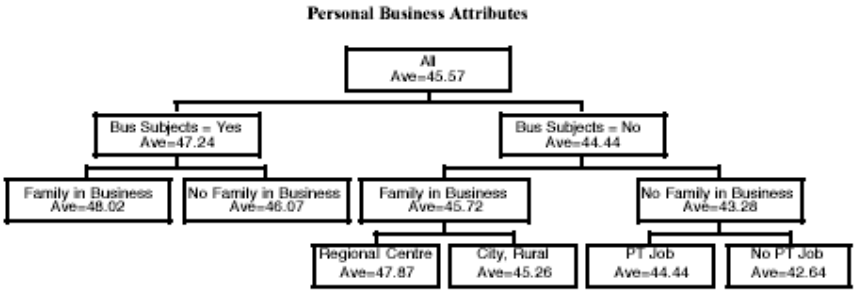

Figure 28 Effect of experience and location on "Business Attributes"

Our first analysis involved the scale measuring the participants' assessment of their business related skills and knowledge. It is clear that school location is not a significant factor in the presence of others that measure experience of business. The two dominant factors that influence average scores on the scale are whether or not the participants have studied other subjects related to business and their family's participation in business. School location only plays a role for the sub-group who have not studied business-related subjects but whose family have experience of business. In this case, regional students score significantly higher[6] on the scale than do participants from the other two areas. While this is consistent with the sort of pattern we've seen earlier, it also suggests that the differences between areas we've been observing may be accounted for by the differing exposure such participants have to business ideas and concepts. It would be useful to seek to explore the direction of causation more completely than is possible with sorts of data collected here.

Attitudes to Business

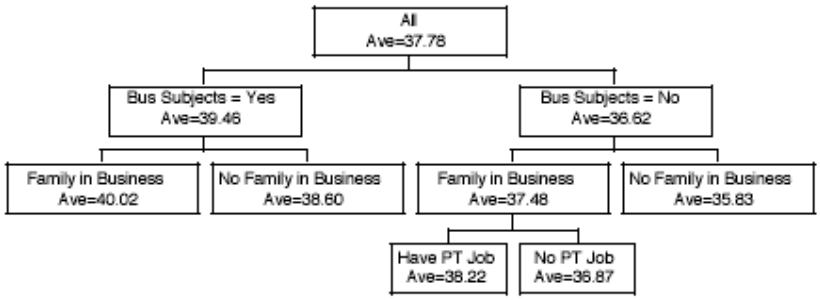

Figure 29 Effect of experience and school location on "Attitude to Business"

To make the interpretation of the analysis more intuitive, we have reversed the scoring on the attitude scale for the second analysis so that higher scores reflect a more positive attitude towards business.

In the case of the attitude scale, very similar factors operate to that we found for business attributes. However, in this case, school location plays no part at all, its effect having been entirely removed as a result of the effects of prior business experience.

[6] All differences shown are statistically significant at the 1% level.

Exploring the post-program changes in student responses

Previous analyses have typically shown that reliable and consistent changes occur in the responses students give to a number of questions between their pre-program answers and what they report after the program has been completed.
In this chapter, we use the 2004 data to explore some of these differences and seek to understand how they relate to other variables that we know are influential. To provide a further basis of analysis, schools have been classified by dominant characteristics that are descriptive of the cohort of participants from that school. For example in a school in which the overwhelming majority of participants are in Years 9 and/or 10, the school program is classified as “Junior”, where most are in Years 11 or 12, “Senior” and where there are significant numbers from both, as “Mixed”. Similar categorisations are used to characterise school programs as “Boys”, “Girls” and “Co-educational”.

Access Business career information

As part of the pre-and post-program surveys, students were asked to indicate the extent to which they agreed with the statement “I know how to find out about a career in business if I want to”. For the purpose of these analyses the nine-point rating was dichotomised and the following tables report the difference in the percentage of students who responded positively to this question before and after the program. A positive figure indicates that more students gave one of the three most positive ratings after completing the program than had been the case before.

Overall the many possible sub-groups, 10.4% of students change their rating from a neutral or negative assessment to a positive one.

School location & System type

Type \ Location	City	Rural	Urban	Total
Cath	12.9%	N/A	5.8%	10.6%
Gov	12.5%	6.6%	13.2%	11.3%
Ind	8.2%	13.3%	8.2%	8.6%
Total	11.2%	7.4%	10.2%	

Note: N/A indicates that there were no students in this cell

Four of the eight observed cells show substantially above average improvements while the remaining four are substantially lower.
Using the Weighted Net Percentage Difference technique (Spady 1970) allows for the assessment of the effect of one variable, while holding others constant. Thus, controlling for School location, the effect of the different school systems alone is:

System	Effect
Cath	0.0%
Gov	2.2%
Ind	-2.5%

Thus, around 2% more Government school students typically shift from a non-positive response to this question to a positive one while 2.5% fewer than average students from independent schools do so.

Controlling for School system type, the effects of various school locations are:

Location	Effect
City	2.2%
Rural	-2.0%
Regional	0.6%

City and, to a lesser degree Regional, students are more likely than average to show improvements post-program. Students from Rural schools are less likely to adopt a more positive stance after undertaking the program.

The mixture of grades and genders in the program

Grades \ Gender	Boys	Co-Ed	Girls	Total
Jun	N/A	11.0%	17.0%	11.5%
Mix	N/A	14.7%	N/A	14.7%
Sen	7.6%	8.8%	7.6%	8.4%
Total	7.6%	10.3%	11.6%	10.4%

Note: N/A indicates that there were no students in this cell

Two groups show significantly greater levels of change while the level of change is consistently below average for groups comprised of senior school students.
When the effect of gender is equalised, the remaining effect of the mixture of grades in the program are:

Grade mix	Effect
Junior	2.4%
Mixture	3.9%
Senior	-3.0%

The Grade effect is quite great. A program involving both Junior and Senior students is substantially more likely to result in a positive change while a program involving only Senior students is likely to see substantially fewer students changing their response in a positive direction.

In a similar fashion, when the effect of the mixture of grades is removed, the effect of different gender mixtures in a program is found to be:

Gender mix	Effect
Boys	-0.4%
Co-Ed	-2.1%
Girls	2.8%

The greatest change is likely to occur in girls only programs while Co-Ed programs appear to be associated with below average percentages of change.

The simulation undertaken in the program

To examine the effect associated specifically with the simulation model used in the program, the joint effect of simulation and School system type is tabulated. This suggests that the original (Manufacturing) simulation does not lead to as great a change as is the case with the newer versions.

Simulation \ Type	Cath	Gov	Ind	Total
Hospitality	13.3%	11.8%	14.3%	12.7%
IT	N/A	9.7%	19.7%	16.4%
Manufacturing	6.3%	11.2%	4.2%	8.6%
Total	10.6%	11.3%	8.6%	10.4%

Note: N/A indicates that there were no students in this cell

To provide a more rigorous test, the effect of the School system is equalised and the resulting simulation effect is found to be:

Grade mix	Effect
Hospitality	3.6%
IT	2.9%
Manufacturing	-4.5%

This confirms the position of Manufacturing but reverses the relative standing of the IT and Hospitality simulations. This adjustment is most likely a consequence of the small number of students in 2004 who undertook the IT simulation (the most recently introduced).

Understand Business Operations

All participating students were asked to indicate the extent to which they agreed to the statement “I have a good understanding of how a business operates”. As before, students recorded their responses on a nine-point scale and, subsequently, this has been dichotomised into two categories — positive and not positive. The difference in the percentage responding positively before and after the program is analysed in the following tables.

This question shows one of the highest levels of difference of any of those asked. As the tables show, almost a third of students change from a negative or neutral response to a positive one. Moreover, this appears to be a fairly uniform change regardless of the various subgroups considered.

School location & System type

Type \ Location	City	Rural	Urban	T
Cath	39.2%	N/A	31.4%	
Gov	31.3%	31.3%	31.6%	
Ind	30.7%	34.7%	30.3%	
Total	32.0%	31.2%		

Note: N/A indicates that there were no students in this cell

Controlling for School location, the effect of the different school systems alone is:

System	Effect
Cath	5.1%
Gov	-1.3%
Ind	-0.9%

Thus, around 5% more Catholic school students typically shift from a non-positive response to this question to a positive one while around 1% fewer than average students from government and independent schools do so.

Controlling for School system type, the effects of various school locations are:

Location	Effect
City	0.5%
Rural	1.3%
Regional	-0.8%

The effects of region are much smaller. Students from Rural schools are slightly more likely to adopt a more positive stance after undertaking the program and Regional students slightly Location Effect

The mixture of grades and gender in the program

Grades \ Gender	Boys	Co-Ed	Girls	Total
Jun	N/A	34.6%	35.3%	34.7%
Mix	N/A	23.9%	N/A	23.9%
Sen	34.3%	28.1%	28.4%	28.7%
Total	34.3%	31.6%	31.3%	31.6%

Note: N/A indicates that there were no students in this cell

The raw marginal percentages don't vary a great deal, so it is important to consider the effects after other variables are controlled. Firstly controlling for the effect of gender, the remaining effect of the mixture of grades in the program are:

Grade mix	Effect
Junior	6.8%
Mixture	-6.9%
Senior	-4.3%

The Grade effect is quite great. A program involving Junior students only is substantially more likely to result in a positive change while a program involving only Senior students or a mixture of grades is likely to see substantially fewer students changing their response in a positive direction.

In a similar fashion, when the effect of the mixture of grades is removed, the effect of different gender mixtures in a program is found to be:

Gender mix	Effect
Boys	2.6%
Co-Ed	-0.2%
Girls	0.2%

The greatest change is likely to occur in boys only programs while Co-Ed or Girls only programs don't appear to be associated with percentages of change very different from the average.

The simulation undertaken

As before this is cross-tabulated with School system type to provide a less biased estimate of the effects of the simulation itself.

Simulation \ Type	Cath	Gov	Ind	Total
Hospitality	38.9%	35.9%	36.2%	36.5%
IT	N/A	8.3%	41.5%	30.4%
Manufacturing	31.1%	30.1%	26.8%	29.0%
Total	36.4%	31.3%	30.9%	31.6%

Note: N/A indicates that there were no students in this cell

When the effect of the School system is equalised, the resulting simulation effect is found to be:

Grade mix	Effect
Hospitality	7.0%
IT	-10.3%
Manufacturing	-6.3%

In this case, the Hospitality simulation is associated with the greatest positive change and, again, Manufacturing is found to be associated with a lower than expected improvement. Here, however, IT also has a negative outcome.

Have skills and abilities for business

The students also rate the statement "I have skills and abilities that would be useful in business" on both occasions. As before the following analyses are based on the changes that occur in the dichotomised version of this variable.

School location & System type

Type \ Location	City	Rural	Urban	Total
Cath	9.6%	N/A	5.8%	8.5%
Gov	12.0%	12.3%	11.0%	11.9%
Ind	14.2%	18.4%	7.6%	12.3%
Total	12.4%	12.3%	8.9%	

Note: N/A indicates that there were no students in this cell

Holding the effect of School location constant, the residual effect of the School system is shown.

System	Effect
Catholic	-2.7%
Government	-0.7%
Independent	1.9%

This shows that Independent school students are somewhat more likely than average to respond positively to this question following the program while students in Catholic schools show a lower than average change.

Similarly, when System is held constant, the effect of location is found to be:

Location	Effect
Capital City	2.0%
Rural	2.4%
Regional	-3.2%

Here Regional students stand in contrast to their city and rural counterparts and are rather less likely than them to change their response to a more positive one following the experience of the program.

Gender and Grade mixtures

Grades \ Gender	Boys	Co-Ed	Girls	Total
Jun	N/A	13.4%	12.4%	13.3%
Mix	N/A	2.3%	N/A	2.3%
Sen	5.2%	11.0%	11.0%	10.5%
Total	5.2%	11.9%	11.6%	11.6%

Note: N/A indicates that there were no students in this cell

Because the raw marginal percentages are influenced greatly by the presence of empty cells, it is important to consider the effects after other variables are controlled. Firstly controlling for the effect of gender, the remaining effect of the mixture of grades in the program are:

Grade mix	Effect
Junior	6.8%
Mixture	-6.9%
Senior	-4.3%

The Grade effect is quite great. A program involving Junior students only is substantially more likely to result in a positive change while a program involving only Senior students or a mixture of grades is likely to see substantially fewer students changing their response in a positive direction.

In a similar fashion, when the effect of the mixture of grades is removed, the effect of different gender mixtures in a program is found to be:

Gender mix	Effect
Boys	2.6%
Co-Ed	-0.2%
Girls	0.2%

The greatest change is likely to occur in boys only programs while Co-Ed or Girls only programs don't appear to be associated with percentages of change very different from the average.

The simulation used

Simulation \ Type	Cath	Gov	Ind	
Hospitality	7.9%	14.7%	16.4%	
IT	N/A	-1.4%	13.4%	
Manufacturing	11.6%	11.1%	10.2%	
Total				

Note: N/A indicates that there were no students in this cell

When the effect of the School system is equalised, the resulting simulation effect is found to be:

Grade mix	Effect
Hospitality	3.8%
IT	-7.7%
Manufacturing	-2.7%

Again, the Hospitality simulation is associated with the greatest positive change and, both the Manufacturing and IT simulations are found to be associated with a lower than expected improvement.

Skills Relevant to Business

Students were asked to respond to the question "I have skills and abilities that would be useful in business" on a nine-point rating scale. The following analyses report the change in the percentage of all students whose ratings were in the top three categories indicating agreement. The changes are reported as the percentage who agreed with the statement after completing the program minus the percentage who indicated agreement before the program was commenced.

Each of the following tables reports a particular pair of background variables that were measured at the same time.

School location & System type

Type \ Location	City	Rural	Urban	Total
Cath	5.8%	N/A	5.0%	5.0%
Gov	9.6%	9.1%	11.4%	9.8%
Ind	8.0%	16.3%	2.7%	6.8%
Total	8.7%	9.5%	6.8%	8.4%

Note: N/A indicates that there were no students in this cell

The largest percentage change here is that for students from rural, independent schools. Following the program, 16% more of this group rated their skills and abilities as suited to business than had done so before the program began.

Controlling for School location, the effect of the different school systems alone is:

System	Effect
Cath	-2.5%
Gov	2.1%
Ind	-1.2%

Thus, on average, 2% more students in Government schools showed an improvement in their rating than did students in other systems. By contrast, 2.5% fewer Catholic school students did so when compared to all other students in the program

Controlling for School System, the effect of the different school locations is:

Location	Effect
Capital City	0.7%
Rural	2.7%
Regional	-0.9%

It can be seen that, compared to students from other areas, almost 3% more students from rural schools improve their ratings following the program. Students in cities and regional areas don't greatly differ from the average in the extent of change on this variable

The mixture of grades and gender in the program

Grades \ Gender	Boys	Co-Ed	Girls	Total
Jun	N/A	8.5%	4.6%	8.2%
Mix	N/A	4.6%	N/A	4.6%
Sen	-7.6%	10.9%	9.5%	9.0%
Total	-7.6%	9.2%	7.4%	8.4%

Note: N/A indicates that there were no students in this cell

Co-educational programs typically result in a higher proportion of students whose ratings of their abilities improve following the program than do single-sex schools. The table also suggests that there is less change in programs comprised of a mixture of senior and junior students. However, the empty cells in this table suggest we need to be cautious in these interpretations and the following analyses will help to clarify any effects.

When the data for the different school grades that comprise the students in a program is examined while controlling for the gender mix, the following effects are found:

Grade Mix	Effect
Junior	-1.9%
Mixture	-4.1%
Senior	2.6%

Programs that involve a mixture of Junior and Senior students result in around 4% fewer students changing their rating on this question post-program than more homogeneous program groups. Moreover, programs involving predominantly senior students show around 3% greater change than do others.

Controlling for the grade composition, the effects of the gender mixture are found to be:

Gender Mix	Effect
Boys	-7.6%
Co-Ed	5.4%
Girls	-1.9%

The gender effects are rather larger than others we've observed so far. Boys High Schools show a substantially smaller proportion of their students changing their rating than do other school types. Mixed schools, on the other hand, show a substantially above average number of students changing their responses.

The simulation undertaken in the program

Simulation \ Type	Cath	Gov	Ind	Total
Hospitality	4.4%	12.7%	10.0%	10.4%
IT	N/A	-1.4%	6.3%	3.7%
Manufacturing	7.6%	8.9%	5.4%	7.6%
Total	5.0%	9.8%	6.8%	8.4%

In the above table we've examined the effect of the simulation chosen for the program when considered in conjunction with what we know is an influential variable, School system type. It appears to be the case that the Hospitality simulation leads to quite different outcomes than do the others.

Simulation	Effect
Hospitality	3.6%
IT	-7.0%
Manufacturing	-2.5%

Controlling for the System type effect, we find:
There is a strong pattern of difference with students who have done the Hospitality simulation more likely to positively change their ratings after doing the program. With the IT simulation, however, the likelihood of post-program change is substantially less — 7% fewer show a positive change than do those who undergo either of the other simulations.

References

Hawke, G 1999, *The Australian Business Week Schools Program: an evaluation*, Commissioned research report, Sydney, Research Centre for Vocational Education and Training.

Hawke, G 2000, *The Australian Business Week Schools Program: 1999 evaluation*, Research Centre for Vocational Education and Training, Sydney.

Hawke, G 2001, *The ABW Enterprise Education Program: A three-year review*, Research Centre for Vocational Education and Training, Sydney.

Hawke, G 2002, *The ABW Enterprise Education program: 2001 performance*. Research Report, Sydney, OVAL Research.

Hawke, G 2003, *The ABW Enterprise Education Program 2002: A focus on school location*, Sydney, OVAL Research.

Hawke, G 2004, *Regional differences in the backgrounds of participants, operation of programs and outcomes for students: ABW Enterprise Education 2000-2003*,Sydney, OVAL Research, University of Technology, Sydney.

Hawkins, D M and Kass, G V 1982, ' Automatic Interaction Detection', in ed Hawkins, D. M., *Applied Multivariate Analysis*, Cambridge University Press, Cambridge, UK.

Spady, W G 1970, ' Simple techniques for multi-variate analysis', *Interchange,* vol.1, pp.3-20.

Wild, C J and Seber, G A F 2000, *Chance Encounters: A First Course in Data Analysis and Inference*, Wiley, New York:.