One-to-one laptop program: Effect on boys' education

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CHAPTER 7. Findings: Possible Impacts on Literacy and Numeracy

7.1 Introduction

Chapters Four, Five and Six focused on the views of teachers, students and parents regarding the 1:1 laptop program. This chapter discusses the student learning which could be attributed to the 1:1 implementation and the possible effects on learner engagement and motivation particularly in regards to literacy and numeracy outcomes. The chapter looks at the performance of Cohort A and B in the 2010 to 2012 National Assessment Program for Literacy and Numeracy (NAPLAN) compared to a previous cohort prior the 1:1 laptop program between 2008 to 2010.

The emphasis for Chapter Seven is to examine critically the data in relation to research question three, “What educational impact(s) if any, is there on student literacy and numeracy learning outcomes?” Bebell and O’Dwyer’s (2010) comprehensive literature review identified a lack of empirical evidence to prove laptops positively impact learning. This study attempts to add to the research literature by providing insights into how male students used laptops for learning, specifically in relation to literacy and numeracy outcomes. The study also considered related educational impacts such as learner engagement. Additionally, research question four, “What differences can be identified between junior and middle school implementations in regard to research questions 1, 2 and 3?” helps to focus the chapter on similarities and differences between the Junior and Middle School cohorts.

7.2 Changes to Learning

As a precursor to discussing student performance in relation to literacy and numeracy outcomes, this section presents the findings in relation to learner engagement and motivation and provides some broad insights into student and teacher perceptions of learning through the 1:1 laptop program.
This section presents the results of an analysis of the quantitative and qualitative data concerning teacher and student perceptions of the impact of laptop use on learning, engagement and motivation. Teacher and student participants from Cohort A and Cohort B were asked to respond to four items in the annual questionnaires to determine whether there were any changes in learning, engagement and motivation. A Likert-type scale of: 1 (Low) to 5 (High) was used to indicate the perceived level of change in learning and the level of engagement and motivation prior and since the introduction of the 1:1 laptop program. This Likert-type scale was applied to the questionnaire items for both student and teacher participants as shown in Table 7.1.

### Table 7.1
*Change in Learning, Engagement and Motivation Annual Questionnaire Items*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Questionnaire item (Student and teacher questionnaire)</th>
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<tbody>
<tr>
<td>Student</td>
<td>(10) Have there been any changes in your learning because of your use of the laptop?</td>
</tr>
<tr>
<td>Teacher</td>
<td>(21) Have there been any changes in your students’ learning since the introduction of the laptop program?</td>
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<tr>
<td>Student</td>
<td>(11) Do you feel more or less engaged towards learning since you received your laptop?</td>
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<tr>
<td>Teacher</td>
<td>(22) Do you feel students are more or less engaged towards learning since the introduction of the laptop program?</td>
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<tr>
<td>Student</td>
<td>(12) What was your motivation, prior to the introduction, of the laptop program?</td>
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<tr>
<td>Teacher</td>
<td>(23) What was the student motivation, prior to the introduction, of the laptop program?</td>
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<tr>
<td>Student</td>
<td>(13) What is your level of motivation since the introduction of the laptop program?</td>
</tr>
<tr>
<td>Teacher</td>
<td>(24) What was the level of student motivation since the introduction of the laptop program?</td>
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Figure 7.1 shows the comparative mean scores between student and teacher participants in response to Items 10 (student) and 21 (teacher): “Have there been any changes in your learning because of your use of the laptop?” at the end of the first year, second year and third year of the study.
Figure 7.1. Student and teacher participants’ mean scores for change in learning since the introduction of the 1:1 laptop program.

Thirty student participants interviewed annually were asked (Question 20): “Have there been any changes in your learning since you have had a laptop?” Student participants responded by giving examples of these changes in learning which mainly emanated from the structure of lessons.

Using NVivo, 10 sub-nodes within a main node of “Changes in learning” resulted from student responses during annual interviews between the first year and third year of the study. Data was then aggregated over three years, from the three sets of interviews. Figure 7.2 displays a radar graph of the 10 coded areas both Cohort A and B recognised as changes in learning from the interview data.
Figure 7.2. Student perceptions about changes in learning since the introduction of the 1:1 laptop program for Cohort A and Cohort B.

Increased learning for both cohorts was the highest recorded change in learning within the node of “Changes in learning.” Seven student participants from Cohort A and nine from Cohort B indicated the reasons why they considered learning had increased was due to: having unlimited access to ICT, which increased productivity, greater interest in learning, and lessons were more interesting, exciting and motivating:

I feel more, like, I can answer more questions with using the laptops because now I’m understanding more of the concept. (A092010)

I think the teachers find it easy to get their point across. They use YouTube and that kind of thing, showing us how to actually do it, like, putting it into practice, and it makes it easier to understand. (B212011)

Probably I know a lot more about each subject, like, it was probably limited to what you could find out with a subject before laptops. So when you had to do an assignment on something they might not be ... the task might not be that hard and because they know you can’t find the information as much. But now you can find a lot more information and so they make the task harder, and kids know more, kids are learning more and putting more into their work, so they’re getting better marks. (B122012)

The teachers were also asked (Question 14): “Have there been any changes in your students’ learning since the introduction of the laptop program?” Figure 7.3 shows eight types of coded responses.
When teachers were asked to elaborate on changes in learning the excerpts from teacher participants 35 and 60 address the areas of supporting learners and access to information:

I think there are a lot of kids that one particular learning style does not fit. I think with the laptops they are able to learn at their own rate, they are able to learn and be specific to who they are, rather than to be specific to 31 kids. They can go and learn at their own rate, so I think that’s absolutely vital since the laptop program’s been implemented, and I can see that is a huge plus for introducing the program. (C352010)

I certainly believe now that most definitely there has been a change in terms of their access to information and whereas prior to that the teacher and the textbook needed to be the gurus in terms of knowing everything about everything. Now they have it at their fingertips, and I think that has to be an improvement, because there is so much information out there. Access to information and I think now, what happens now is, you know, you look at our role and I think that does subtly start to change because now it becomes much more a question of okay, how do we facilitate them to be able to discern between what’s truth and what’s fiction, what’s relevant, what’s not relevant. (C602011)

Nine teacher participants believed that the use of ICT had improved with the use of a laptop, in particular the technical expertise with ICT. There was also a view held by teachers the students were becoming increasingly responsible with their use of laptops:
Well, I will give you an example of the sort of website situation. You could only build a very basic, say if they were a year nine level, you know, if you went back five years ago. It was just tables, text, background, very basic because we just didn't have that, you know, I guess information or ability to direct that but as we have got skilled ourselves, boys are increasingly skilled. If they are right into it, they will explore that JavaScript or Java query, and now you start getting boys that are year nine level doing stuff that year 12s would do. (C502012)

Four teacher participants shared concerns of the overreliance of using laptops. Teacher Participant 60 expressed a view of the ‘dangers’ with students using laptops for learning:

I think there are dangers in terms of becoming, where the kids are totally preoccupied with the use of computer. Because I think, education’s a lot more complex. There are a lot of other things that make it what it should be as far as, you know, there needs to be interaction and discussion and debate and all those sorts of things, but the computer obviously fulfills a good role there. (C602011)

There was a relatively low number of teachers who held a view that the 1:1 laptop program had a negative impact on writing with only three coded responses as seen in Figure 7.3. The following excerpts provide an example of this perception:

I am concerned with the amount our Year Seven’s are writing, their ability to write is an issue. And obviously the amount of times that they are putting pen to paper has been reduced with the onset and reliance of laptops. In saying that though, their ability to generate ideas is very good. (C522010)

I think negatively and the one that still worries me and causes me sleepless nights is the pen-in-hand writing. You only have to watch our examinations and see the examination halls that one, boys struggle with the physical demands of writing for sustained time; I find they do not produce anywhere near enough as what other colleges are. And two, it is probably a picky one is the legibility of the writing is becoming an issue. We have a lot more students, I find, that it is actually difficult to decipher what they are writing because they are not doing handwriting and concentrating on making it neat. So they are two of the negatives, I think. But, I think that is probably a long-term thing. (C552012)

Only four teacher participants reported having difficulty in determining if there were any changes in student learning. These teachers were not conclusive in attributing laptops for a change in learning:

It would be hard to say, I mean, over the three years I have not noticed anything massively different but it would be tricky to say, it is quite a short time. (C652012)

Question 18 of the annual interviews asked teacher participants: “Do you have any concerns about the laptop program?” Teacher participants responded with five types of concerns as shown in Figure 7.4.
Figure 7.4. Teacher participants’ coded responses for concerns about the laptop program between the first year and third year of the study.

The response registering the greatest number of comments was distractions. Fourteen teachers reported concerns about how the laptops were a distraction or at times had impacted on student focus.

Yes, it is a distraction, and we are looking at a generation now. I sound like an old man, get off the lawn sort of here, it just worries me, but you go out now and you see people around you endlessly that cannot put their mobiles away, that they are continually touching them, and I see this with the boys in the class. It worries me when we take it off them, they are almost, and some of them seem to be suffering from some sort of withdrawal symptoms. (C552012)

I still have a bit of an issue with the kids in terms of their focus and the personality types who are easily distracted and what to do about those kids. (C602012)

A range of operational issues detracted from the smooth implementation of the 1:1 program. Eleven teachers shared concerns about issues of power supply, bandwidth monitoring, mobility, and the use of loan laptops. The following excerpts provide an example of these concerns:

I have a number of concerns: firstly power is a huge concern. We need to rewire the room so that you get dangling cords coming down, or you have got the little fold up things at the bottom so that kids can plug in. The power issue is huge. At the end of the day, it’s not unusual to have four, five, six kids, and the thing is, leave your power cord at home, you know, they do not, thank God, because I can plug them into the side, and they can keep working. So that is a huge issue that needs to be addressed. Issues of bandwidth need to be addressed, I think particularly when it comes to things like assessment. If you are going to have six simultaneous classes doing assessment
from the same website, issues of bandwidth need to be addressed. Monitoring, I think, needs to be continued. Sanctions need to be public, and they need to be strong, so that students in Year Nine, for instance, and I guess predominantly we’re talking about Year Nine who get caught going to dodgy sites. The consequences of that need to be known and they need to be very strong. (C542012)

My only issue is a few things. It’s heavy and the boys carry it around, it’s cumbersome. I would like to see in future the iPad for the kids, something which is lighter and is more portable, I know the laptops are supposed to be portable, but for little kids it’s heavy. And that’s what I think is one detraction from it. (C322010)

Certainly one of the things we’ve raised in our learning area is having better wireless access outside of the classroom. (C392010)

Only probably issues is when boys hand in a laptop and get rented laptops or loan laptops that don’t have the software, they may not have their work backed up, they don’t know the procedure for doing that sort of stuff. (C502012)

There were some discrepancies between data collected from questionnaires and data collected at interviews. For example, three teachers shared their concerns about plagiarism. This was not mentioned at interview, which may indicate plagiarism is not a key issue as seen in Figure 7.4. Similarly in the questionnaire, five teachers expressed their concern about other staff being reluctant when using ICT. This is at odds with the teachers interviewed who were predominately positive about using ICT:

I think we are probably heading in the right direction. Concerns, yes, probably just ... my concerns are more about the acceptance by staff. I think you find that there’s going to be naturally some resistance to it. That’s not to say that people are not going to use it but are they going to fully embrace it and take it to where it could be? (C602011)

Teachers reported a clear set of concerns providing valuable insights into future foci for implementing change. Again, the theme of distraction was a prominent and common view shared by the teachers as previously discussed in section 4.8.2 of Chapter Four.

### 7.2.1 Engagement levels with laptops

Item 11 of the student questionnaire required the students to indicate their level of engagement towards learning since receiving their laptop. Similarly, Item 22 of the teacher questionnaire required teachers to indicate student engagement towards learning since the introduction of the laptop program using a Likert-type scale of 1
(Low) to 5 (High). Figure 7.5 shows the mean scores for the study over three years for both students and teachers.

![Graph showing mean scores for students and teachers over three years.]

**Figure 7.5.** Student and teacher participants’ three year mean scores for perceptions of student engagement levels since the introduction of the 1:1 laptop program.

The mean score for Cohort A increased (0.5) from 3.6 ± 0.4 to 4.1 ± 0.2 and Cohort B increased (0.3) from 3.5 ± 0.2 to 3.8 ± 0.1. Both of these instances were statistically significant (One-Way ANOVA, p < 0.05). Students from both cohorts who were interviewed annually and asked Question 21: “Do you feel more or less engaged towards learning since you received your laptop?”

The laptop gives learning a more fun experience, and you get to learn a lot more on a laptop because you concentrate on it. (A032011)

I think I feel more engaged purely for the fact that I'm finding out the information by myself as opposed to the teacher kind of reading it from a book and taking notes from it. So yeah, I feel more engaged. (B162012)

Teachers did not record the same level of enthusiasm for student engagement as student participants. Teachers recorded the lowest mean score in the third year of the three groups. Teachers, interviewed annually, were asked (Question 15): “Do you feel students are more or less engaged towards learning since the introduction of the laptop program?” Responses were coded into three types of categories: less engaged, no change and more engaged. Out of 29 teachers, two teachers believed students were less engaged, and four believed there was no change in student engagement:
They are more engaged, and they are less engaged at the same time, it is paradoxical really. They are more engaged because they have a greater array of programs to access which kids without laptops would not even know exist. I think they can present their information in a much more efficient and aesthetically pleasing way. So I think they are more engaged in that sense. They are less engaged due to the distractions. (C572012)

However, the overwhelming sentiment expressed by teachers at the interviews was that the laptops helped improve student engagement. A total of 23 teachers believed laptops improved the rate of engagement towards learning since the implementation of the 1:1 laptop program. This view remained consistent throughout the study as shown in the following annual excerpts:

It is certainly more engaging. Because they are involved in it more. It’s their currency, it’s what they use outside of school, so it only makes sense to use it inside of school. (C412010)

I believe there is value. The engagement factor, especially with boys, is a significant improvement from what I’ve seen in previous years with teaching without a laptop. (C682011)

The students are more engaged. Because ICT is so prevalent in everything they do, they now can use it as part of their learning. They are naturally involved in ICT at all levels, whether it’s phone, at home with computer games, things like that. Now they get to use it in a different part of their life, and especially those boys who probably have more ability they can use their intuition a bit more. If they have got particular skills in programming they can use that more; if they like the arts they can still be arty and creative, it’s just on a different platform. So I think in terms of those different style of learning, it can get each boy. (C622012)

Again, data from the annual questionnaires compared to the annual interviews appeared to be contrasting for the teachers. The mean scores from the questionnaire revealed a perception of lower level of engagement for learning compared to that of the students. Teachers may be seen to be more guarded or perhaps even cynical on the issue and, this might have accounted for lower means. However, the annual teacher interviews provided a different view of laptops in terms of student engagement, as clearly there was a difference between the quantitative and qualitative findings. This difference may have been because teachers articulated a more positive perception when probed at interview. Teachers believed there was a greater impact on student engagement since the introduction of the 1:1 laptop program. This stated belief was similar to the view of the students, who were also of the view laptops helped improve engagement in learning.
7.2.2 Motivation towards learning since the implementation

Learner engagement is defined as continual interaction and practice, where teaching and feedback are important in ensuring students develop good habits and improve their learning. The ability to improve can lead to motivation to participate and further engage students in learning (Irvin, Meltzer, & Dukes, 2007). Therefore, motivation is defined as the level of student effort utilised to improve or achieve a set goal (Seifert, 2004).

Item 13 and Item 24 of the student and teacher questionnaires respectively asked participants to gauge the level of motivation towards learning since the introduction of the 1:1 laptop program using a Likert-type scale of 1 (Low) to 5 (High). Figure 7.6 shows the annual mean scores.

Figure 7.6. Student and teacher mean score responses to perceptions of student motivation since the implementation of the 1:1 laptop program.

The following excerpt from an interview with Student Participant 02 (a student from the high band of achievement) from Cohort A is an example of the observed change in motivation in response to the two questions from the annual interview: (22) “What was your motivation, prior to the introduction, of the laptop program?” and (23) “What is your level of motivation since the introduction of the laptop program?”
[Interviewer] On a scale of one to five, one being low and five being high, what was your level of motivation before the introduction of the laptop program?

[Participant] Probably about a four.

[Interviewer] Explain?

[Participant] Because I was interested in the work that we were doing but not one hundred per cent, like, desperate to get going and start on whatever work we’d been given.

[Interviewer] On a scale of one to five, 1 being low and 5 being high, what is your current level of motivation since the introduction of the laptop program?


[Interviewer] Why five?

[Participant] Because now I am very excited to get going because the assignments are more interesting, creating movies with special effects and using spreadsheet applications to create budgets. (A022012)

This narrative was typical of many Cohort A students who reported an increase in their level of motivation. As can be seen, the 1:1 laptop program was felt to play a role. The following excerpt from Student Participant 14 (a student from a high band of achievement) from Cohort B also demonstrates an example of an increase in motivation:

[Interviewer] On a scale of 1 to 5, 1 being low and 5 being high, what was your level of motivation before the introduction of the laptop program?

[Participant] Probably about a three.

[Interviewer] Why’s that?

[Participant] I was still interested in learning, but it just wasn’t that fun and as interesting as it was with the laptops.

[Interviewer] On a scale of 1 to 5, 1 being low and 5 being high, what is your current level of motivation since the introduction of the laptop program?

[Participant] About four.

[Interviewer] Why is that?

[Participant] Well, with the laptops you can bring back your work with you, bring back everything you’ve done, you’ve got all your documents in one place. Like, I remember I always used to forget books when I didn't have the laptop but now I just bring back my laptop and I’ve got everything with me.

The following excerpt is from an interview with Teacher Participant 34 in an interview in the third year of the study:
[Interviewer] On a scale of 1 to 5, 1 being low and 5 being high, what were the levels of motivation prior to the laptop program to where we are right now? How would you summarise that?

[Participant] In 2010, I thought it was high but when I reflect on it now I think ... as far as motivation I would like to have thought my kids were always motivated when I was teaching them before the laptops, but I think for the low ability students, the motivation has improved. I think for the high ability students it was there anyway, so that’s probably quite stable for them. But low abilities have definitely improved because they can get automatic feedback, you can differentiate the tasks more so than we could before. I think because there’s that visual aspect of the laptop, that information technology thing, they are more engaged. They’re certainly a lot more organised because everything is all there, they do not have to carry a hundred different books and pencils, everything can be put in the laptop case. But I think that’s definitely improved. (C322012)

The qualitative data suggests that the motivation levels for lower achieving students had increased because laptops may have opened up opportunities for them to activate a different learning style. For higher achieving students, laptops may have slightly increased motivation because they may have activated their self-directed capacities.

7.2.3 Student participants focus on learning

Annually, the 30 student participants from Cohort A and Cohort B were asked (Question 13): “Do you think you are more focused as a student with your own laptop?” This question was specifically aimed at determining if the laptops had an impact on student focus on learning. This focus is interpreted as student concentration levels, priority of learning and ability to reflect on the learning process. A total of 131 references for the topic of focus on learning were coded from the four interview stages (first year inception, first year, second year and third year). Students consistently responded with three types of responses, categorised into the following: distraction, no improvement and improvement. Figure 7.7 and Figure 7.8 show the number of coded responses for both Cohort A and Cohort B.
Students from Cohort A generally believed laptops had helped to improve their focus towards learning. The belief was consistently reported at each of the four intervals of the study as shown in Figure 7.7. There were four references of no improvement and two instances of distractions being said to have an impact on the focus for learning. However, it was evident from the number of responses that Cohort A was supportive of the opportunities to learn in different ways and the access to information that 1:1 laptops provided.

I think I am more focused because I can do things that I wouldn't be able to do on, like, paper, I would be able to do it on a laptop and enjoy what I'm doing. (A082011)

I think I am more focused because it’s just I’ve got all the information right in front of me; I don’t need to be asking a lot more questions, I know what I have to do and it’s all there on the laptop. (A092012)

Cohort B also reported improvements in terms of being more focused due to the use of laptops; however, this fluctuated as seen in Figure 7.8. By the third year, 17 student participants believed they were more focused on learning since the introduction of the 1:1 laptop program.
Figure 7.8. Cohort B (N = 20) student responses for focus on learning with the use of a laptop.

The self-directed capacities of 1:1 laptops appear to have been attractive to students from Cohort B. The following excerpts show examples of this:

I think I was a little bit more focussed because when I didn’t have my own laptop it was easy to talk to friends or just turn around and someone’s sitting next to you but whereas when there’s a laptop you’re sort of engrossed in what you’re doing. So, yeah, you’re really focussing on what you're doing. (B162010)

I feel more focussed with the laptop. With the laptop, in school I can ... I know what to do and I complete it. I don’t really want to do anything else; I just want to get it done. (B132012)

In summary, both Cohort A and Cohort B reported learning with a laptop had increased their focus on their learning. It is significant that in the third year 26, of the 30 interviewed students still responded that with the use of a laptop they were more focused towards learning.

7.3 Literacy and Numeracy: NAPLAN

As discussed in Chapter Two, NAPLAN is a test of literacy and numeracy skills over time through school curriculum. NAPLAN is made up of tests in the four areas (as referred to in this study) of reading, writing, language conventions (spelling, grammar and punctuation) and numeracy. Annually, NAPLAN testing
occurs in Years Three, Five, Seven and Nine across all schools in Australia (ACARA, 2014).

### 7.3.1 Overview of NAPLAN for Analysis

Both cohorts completed NAPLAN in the first year (2010) and third year (2012), which provided an opportunity to consider results in the four areas over this time. In the first year of the research, NAPLAN was undertaken three months after the deployment, making it more or less a pre-test in terms of this research. Lei and Zhao (2008) report that other research studies have sought to gauge the impact of using ICT pre and post testing in one or more subject areas (Gulek & Demirtas, 2005; Rockman et al., 2000; Shapley et al., 2009; Silvernail & Gritter, 2005).

Analysing the NAPLAN results for both cohorts for three years pre and post the 1:1 laptop implementation helped in gauging the impact of the 1:1 laptop program in the learning areas of literacy and numeracy. NAPLAN data also provided an opportunity for the study to compare the two cohorts to previous years where students did not have laptops. There was no control group due to the scale of the 1:1 implementation at the School. As a method of comparison, previous year levels (Years Five, Seven and Nine) were used to compare pre-laptop NAPLAN results to NAPLAN results where student used laptops for learning. The Year Five to Seven and Year Seven to Nine students from the School, in 2008 to 2010 are used as a comparative measure. As discussed earlier this was the only other cohort used for comparison as NAPLAN was introduced in 2008 (first year of the study commenced in 2010). The area of Writing had not been included in the three year analysis due to the changes in the Writing section of NAPLAN from 2011. A move from narrative writing to persuasive writing was approved by Australian State Ministers in 2010 following extensive piloting (Turvey, 2012).

When describing NAPLAN results, there are five scales, one for each of the learning areas of Reading, Writing, Numeracy and two for Language Conventions (Grammar and Punctuation, and Spelling). The five scales span all year levels from Year Three to Year Nine and describe the development of student achievement according to ten-bands on the scale. The scales are designed so that any given score by any student in Australia, can be interpreted the same way over time and represents
the same level of achievement. For example, a score of 700 in Numeracy will have
the same meaning in 2012 as in 2010, enabling improvements to be gauged over
time. Each learning area is divided into 10 bands on the scale to cover the full range
of student achievement in the test. The bands are used for reporting student
performance at each year level. The Year Three report shows bands one to six, Year
Five bands three to eight, Year Seven bands four to nine, and the Year Nine shows
bands five to ten (ACARA, 2014) (further information about NAPLAN is available

Sections 7.3.3 and 7.3.4 provide a summary of NAPLAN results for the period
2008 to 2012, for grade levels Year Five, Year Seven and Year Nine, for: (a)
students at the School; and (b) males nationally. Section 7.3.5 presents several sets of
NAPLAN score data, for years 2008, 2010 and 2012, for Year Five. Section 7.3.6
provides the same treatment for Year Seven NAPLAN score data, for years 2008,
2010 and 2012. Similarly Section 7.3.7 provides the same treatment for Year Nine
NAPLAN score data, for years 2008, 2010 and 2012.

Ideally when comparing schools it is useful to select ‘like schools’ based on the
Index of Community Socio-Educational Advantage (ICSEA). However, as there
were a limited number of male-only schools that were similar in ICSEA to the
School, the School was compared with males nationally. Data for the students at the
School is presented systematically alongside corresponding data for males nationally.
For every mean NAPLAN test score, a corresponding ‘Uncertainty of the Mean’ is
provided (in terms of a 95% Confidence Interval (CI)). This enables the researcher
to use a statistical test: ‘One-Way ANOVA (Analysis of Variance) for Summary
Data’ to determine when a difference between a mean for the students at the School
and the corresponding mean for males nationally is statistically significant at either
the p < 0.01 or the p < 0.05 level.

Section 7.3.8 turns the focus away from NAPLAN test scores and towards
NAPLAN test cohort gain data. The following cohort gain scenarios are considered,
for both the students at the School and males nationally:

- Year Five to Year Seven, 2008 to 2010;
- Year Five to Year Seven, 2010 to 2012 (Cohort A);
• Year Seven to Year Nine, 2008 to 2010; and
• Year Seven to Year Nine, 2010 to 2012 (Cohort B).

Differences between the students at the School and males nationally are again tested for statistical significance using the One-Way ANOVA process. Finally, Sections 7.3.9 to 7.3.11 move away from comparisons of the students at the School with males nationally, and seeks to make comparisons of cohort gain between different groups of males at the School. The following comparisons are made:

• Year Five to Year Seven, 2008 to 2010 with Year Five to Year Seven, 2010 to 2012; and
• Year Seven to Year Nine, 2008 to 2010 with Year Seven to Year Nine, 2010 to 2012.

Again, a One-Way ANOVA is used for Summary Data test. Further to this, rather than undertaking the cohort gain comparisons resolved according to the four individual NAPLAN areas (excluding Persuasive writing), an approach of pooling the NAPLAN test scores from the four individual areas into a ‘Four area Combined’ score is undertaken. This enables the research to make the cohort gain comparisons for the cohort as a whole, rather than only for the individual constituent areas (see Figure 7.9).
Figure 7.9. NAPLAN analysis overview for the research.

7.3.2 Summary of NAPLAN data 2008 to 2012: Comparing Cohort A and males nationally in Year Five

Figure 7.10 provides a summary of NAPLAN test results for Year Five students for the years 2008 to 2012; for the School and all males nationally. Each bar in the figure represents the mean score for a particular year for the NAPLAN area indicated. Represented in green is the School, and in blue is the national male mean. Cohort A is shown as Year Five students in 2010 (first year of the study).
Figure 7.10. Year Five NAPLAN test results 2008 to 2012: The School and males nationally.

The key features to note from Figure 7.10 are now stated. Over the five-year period, 2008 to 2012 (inclusive), the mean score achieved by the School was roughly +20 marks higher than that achieved by Year Five males nationally for Reading, Spelling, and Grammar and Punctuation. For Numeracy the margin was larger, at about +40 marks in 2008, 2009 and 2011. For Persuasive Writing, a roughly +20 mark gap was observed in 2011 and 2012.

In 2010 (Cohort A) the Year Five Cohort scores for Spelling, Grammar and Punctuation, and Numeracy, were approximately 10 marks above the mean achieved nationally by males. The Year Five School results are consistent across the period of 2008 to 2012, with 2010 being the only year that recorded lower scores compared to the other years. The extent to which the difference between the School Year Five cohorts and the Year Five national averages are statistically significant will be discussed in section 7.3.5.
7.3.3 Summary of NAPLAN 2008 to 2012: Comparing Cohort A and Cohort B and males nationally in Year Seven

Figure 7.11 displays the School mean score compared to the national mean score for males in Year Seven. Cohort B are shown as Year Seven students in 2010 (first year of study) and Cohort A are seen as Year Seven students in 2012 (third year of study).

Figure 7.11. Year Seven NAPLAN test results 2008 to 2012: The School and males nationally.

The key features to note from Figure 7.11 are now stated. Over the five-year period, 2008 to 2012 (inclusive), the mean score achieved by the school was roughly +30 marks higher than that achieved by Year Seven males nationally, (in the four areas excluding Persuasive Writing). For Persuasive Writing, a roughly +30 mark gap was observed in 2011 and 2012. The above margins in relative terms represents a difference of about +5.5%, across the board (i.e. for all areas).

The 2009 Year Seven cohort at the School scored particularly well in the four areas. In this year the margin between the School and Year Seven males Nationally was on average about +9.5% in relative terms. Since the outstanding results of 2009, the School’s results have tended in subsequent years to return to a position closer to, but still well above, the Year Seven male national results. The extent to which the
differences between the School Year Seven cohorts and the Year Seven national average are statistically significant will be discussed in section 7.3.6.

7.3.4 Summary of NAPLAN data 2008 to 2012: Comparing Cohort B and males nationally in Year Nine

Figure 7.12 displays the School mean score compared to the national mean score for males in Year Nine. Cohort B is shown as Year Nine students in 2012 (third year of the study).

**Figure 7.12.** Year Nine NAPLAN test results 2008 to 2012: The School and males nationally.

The key features to note from Figure 7.12 are now stated. Over the five-year period, 2008 to 2012 (inclusive), the mean score achieved by the School was roughly +30 marks higher than that produced by males nationally in Reading, Spelling and Grammar and Punctuation. For Numeracy, the margin was even larger, at about +50 marks. For Persuasive Writing, a +40 mark gap is seen in 2011 and 2012.

The above margins of +30, +40 and +50 marks in relative terms represent differences of about +5%, 7.5% and 8.5%, respectively. The Year Nine School results are more or less consistent across the period 2008 to 2012, with no one year being outstandingly strong or outstandingly weak. The extent to which the
differences between the School Year Nine cohorts and the Year Nine national average are statistically significant is now discussed in section 7.3.7.

7.3.5 NAPLAN data for Year Five, 2008, 2010 and 2012: Comparing the School and males nationally

Table 7.2 details Year Five NAPLAN test results for 2008, 2010 and 2012 (Cohort A – first year); for students at the School and males nationally. Data includes N (number of students tested), the mean test result, the standard deviation of the test results, and the 95% Confidence Interval (CI) of the mean result.

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>School</th>
<th>National (males)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>Reading</td>
<td>53</td>
<td>516.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>53</td>
<td>497.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>53</td>
<td>519.8</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>Numeracy</td>
<td>53</td>
<td>521.8</td>
</tr>
<tr>
<td>Year 5</td>
<td></td>
<td>Reading</td>
<td>52</td>
<td>503.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>54</td>
<td>485.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>55</td>
<td>501.1</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>Numeracy</td>
<td>54</td>
<td>510.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reading</td>
<td>73</td>
<td>502.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Persuasive writing</td>
<td>73</td>
<td>467.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>73</td>
<td>508.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>73</td>
<td>503.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>73</td>
<td>510.2</td>
</tr>
</tbody>
</table>

Note. Std. Dev.=Standard Deviation. 95% CI = ±2 × Std.Dev./√(N)^3

Figure 7.13 (see below) plots the 2008 NAPLAN Year Five results as seen in Table 7.2. The Schools results are in green and national males results are in blue. The red uncertainty bars represent the 95% CI. Note that in the national results, due to N being large (>250,000) the 95% CI is very small, no thicker than the line at the top of the blue columns.
Figure 7.13. NAPLAN mean test results Year Five 2008 (School and national).

In Reading, Grammar and Punctuation, and Numeracy, the difference between the Year Five School result and males nationally is significant at the p < 0.01 level. For Spelling, the difference is significant at the p < 0.05 level. See Table 7.3 for these significance results tabulated.

Table 7.3
One-Way ANOVA for Summary Data Test Results for Year Five 2008, Comparing the School and Males Nationally

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>The School</th>
<th>National (males)</th>
<th>ANOVA Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>95% CI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 5 2008</td>
<td></td>
<td>Reading</td>
<td>53</td>
<td>516.2</td>
<td>77.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>53</td>
<td>497.7</td>
<td>75.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>53</td>
<td>519.8</td>
<td>81.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>53</td>
<td>521.8</td>
<td>70.5</td>
</tr>
</tbody>
</table>

Note. A “One-Way ANOVA (Analysis of Variance) for summary data” process was used to test whether the observed differences between the Year Five school students and national males NAPLAN mean scores were statistically significant. The input to the ANOVA process was N, mean, and Std. Dev. (as tabulated in columns 4-6 and columns 7-9). Column 10, ΔThe School – national shows the difference between the School and national mean scores, and column 11 shows the 95% CI of that difference. Columns 12 and 13, respectively, list the F-statistic of the ANOVA test, and its Significance. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

Figure 7.14 plots the 2010 NAPLAN Year Five results as shown in Table 7.2. In Reading, the difference between the School and the males nationally is significant at the p < 0.05 level.
Figure 7.14. NAPLAN mean test results Year Five (Cohort A) 2010 (School and national).

For the other areas, the differences were not significant (at the p < 0.05 level). See Table 7.4 for these significance results tabulated.

Table 7.4
One-Way ANOVA for Summary Data Test Results for Year Five 2010 (Cohort A)
NAPLAN Data, Comparing the School and Males Nationally

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>The School</th>
<th>National (males)</th>
<th>ANOVA Results</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>N</td>
</tr>
<tr>
<td>Year 5</td>
<td>2010</td>
<td>Reading</td>
<td>52</td>
<td>503.8</td>
<td>77.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>54</td>
<td>485.3</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>55</td>
<td>501.1</td>
<td>80.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>54</td>
<td>510.4</td>
<td>72.1</td>
</tr>
</tbody>
</table>

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

Figure 7.15 (see below) plots the 2012 NAPLAN Year Five results as shown in Table 7.2. For the three areas of Spelling, Grammar and Punctuation, and Numeracy, the difference between the School and the males nationally is significant at the p < 0.05 level.
Figure 7.15. NAPLAN mean test results Year Five 2012 (School and national).

For the two remaining areas of Reading and Persuasive writing, the differences in mean scores were not significant. See Table 7.5 for these significance results tabulated.

Table 7.5

One-Way ANOVA for Summary Data Test Results for Year Five 2012 NAPLAN Data, Comparing the School and Males Nationally

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Δ [School - National]</th>
<th>95% C.I.</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Reading</td>
<td>73</td>
<td>502.7</td>
<td>79.2</td>
<td>245,203</td>
<td>486.1</td>
<td>79.2</td>
<td>16.6</td>
<td>13.2</td>
<td>3.07</td>
<td>0.080</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Persuasive writing</td>
<td>73</td>
<td>476.5</td>
<td>69.5</td>
<td>245,096</td>
<td>462.6</td>
<td>69.6</td>
<td>13.9</td>
<td>11.6</td>
<td>2.79</td>
<td>0.095</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>73</td>
<td>508.7</td>
<td>76.7</td>
<td>245,660</td>
<td>485.6</td>
<td>76.7</td>
<td>23.1</td>
<td>12.8</td>
<td>6.33</td>
<td>0.012*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>73</td>
<td>503.9</td>
<td>84.3</td>
<td>245,660</td>
<td>480.3</td>
<td>84.3</td>
<td>23.6</td>
<td>14.0</td>
<td>5.47</td>
<td>0.019*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>73</td>
<td>510.2</td>
<td>73.1</td>
<td>244,363</td>
<td>492.1</td>
<td>73.1</td>
<td>18.1</td>
<td>12.2</td>
<td>4.28</td>
<td>0.039*</td>
</tr>
</tbody>
</table>

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

In 2008, the Year Five students from the School scored roughly +35 marks higher than Year Five males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +7.5%. In 2008, the margins of the Year Five students from the School results over the Year Five males nationally were significant at the p < 0.01 level for the three areas Reading,
Grammar and Punctuation, and Numeracy. For Spelling, the margin was significant only at the p < 0.05 level.

In 2010, the Year Five students from the School scored roughly +15 marks higher than Year Five males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +3.0%. In 2010, the margin of the Year Five students from the School results over the Year Five males nationally was statistically significant at the p < 0.05 level for Reading.

In 2012, the Year Five students from the school scored roughly between +23 marks higher than Year Five males nationally (in three areas excluding Reading and Persuasive writing). In relative terms, this was equivalent to a margin of about +4.0%. In 2012, the margin of the Year Five students from the School results over the Year Five males nationally was statistically significant at the p < 0.05 level for Spelling, Grammar and Punctuation, and Numeracy.

7.3.6 NAPLAN data for Year Seven, 2008, 2010 and 2012: Comparing the school and males nationally

Table 7.6 details Year Seven NAPLAN test results for the School and males nationally for 2008, 2010 (Cohort B – first year of study) and 2012 (Cohort A – third year of study). Data includes N (number of students tested), the mean test result, the standard deviation of the test results, and the 95% CI of the mean result.

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>The School</th>
<th>National (males)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>M</td>
<td>Std. Dev</td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td>Reading</td>
<td>134</td>
<td>563.9</td>
<td>69.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>134</td>
<td>547.0</td>
<td>74.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>134</td>
<td>529.6</td>
<td>73.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>134</td>
<td>600.0</td>
<td>75.8</td>
</tr>
<tr>
<td>2010 Cohort B</td>
<td></td>
<td>Reading</td>
<td>135</td>
<td>580.7</td>
<td>69.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>134</td>
<td>563.5</td>
<td>73.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>134</td>
<td>558.6</td>
<td>74.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>135</td>
<td>604.7</td>
<td>75.0</td>
</tr>
<tr>
<td>2012 Cohort A</td>
<td></td>
<td>Reading</td>
<td>138</td>
<td>560.0</td>
<td>69.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Persuasive Writing</td>
<td>136</td>
<td>543.7</td>
<td>74.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>140</td>
<td>557.2</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>140</td>
<td>557.6</td>
<td>68.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>137</td>
<td>572.6</td>
<td>76.9</td>
</tr>
</tbody>
</table>

Note. Nat’l N = National number. 95% CI = ±2 × Std.Dev./N√}

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Figure 7.16 presents the plot of 2008 NAPLAN Year Seven results as shown in Table 7.6.

**Figure 7.16. NAPLAN mean test results Year Seven 2008 (School and national).**

In Reading, Spelling and Numeracy the difference between the School and males nationally is significant at the p < 0.01 level. See Table 7.7 for these significance results tabulated.

### Table 7.7

**One-way ANOVA for Summary Data Test Results for Year Seven 2008 NAPLAN Data, Comparing the School and Males Nationally**

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Δ [School - National]</th>
<th>95% C.I.</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Reading</td>
<td>134</td>
<td>563.9</td>
<td>69.9</td>
<td>265,627</td>
<td>531.9</td>
<td>69.9</td>
<td>32.1</td>
<td>8.7</td>
<td>26.1</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>134</td>
<td>547.0</td>
<td>74.1</td>
<td>266,083</td>
<td>528.8</td>
<td>74.1</td>
<td>18.2</td>
<td>9.2</td>
<td>7.46</td>
<td>0.006**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>134</td>
<td>529.6</td>
<td>73.8</td>
<td>266,083</td>
<td>517.3</td>
<td>73.8</td>
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<td>0.056</td>
</tr>
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<td></td>
<td></td>
<td>Numeracy</td>
<td>134</td>
<td>600.0</td>
<td>75.8</td>
<td>265,275</td>
<td>552.3</td>
<td>75.8</td>
<td>47.7</td>
<td>9.4</td>
<td>49.0</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

*Note: ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.*

Figure 7.17 displays the plot of 2010 NAPLAN Year Seven (Cohort B) results as shown in Table 7.6.
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In all four areas the differences between the Year Seven (Cohort B) students at the School and the males nationally were significant at the p < 0.01 level. See Table 7.8 for these significance results tabulated.

### Table 7.8

*One-way ANOVA for Summary Data Test Results for Year Seven (Cohort B) 2010 NAPLAN Data, Comparing the School and Males Nationally*

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Δ [School - National]</th>
<th>95% C.I</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 7</td>
<td>2010</td>
<td>Reading</td>
<td>135</td>
<td>580.7</td>
<td>69.7</td>
<td>264,682</td>
<td>540.9</td>
<td>69.7</td>
<td>40.1</td>
<td>8.6</td>
<td>41.2</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>134</td>
<td>563.5</td>
<td>73.6</td>
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<td>534.1</td>
<td>73.6</td>
<td>28.9</td>
<td>9.1</td>
<td>19.1</td>
<td>0.000**</td>
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<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>134</td>
<td>558.6</td>
<td>74.9</td>
<td>265,414</td>
<td>524.1</td>
<td>74.9</td>
<td>34.9</td>
<td>9.3</td>
<td>26.8</td>
<td>0.000**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>135</td>
<td>604.7</td>
<td>75.0</td>
<td>263,808</td>
<td>552.7</td>
<td>75.0</td>
<td>52.3</td>
<td>9.2</td>
<td>60.5</td>
<td>0.000**</td>
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</table>

*Note.* ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

Figure 7.18 displays the plot of 2012 NAPAN Year Seven (Cohort A) results as shown in Table 7.6.
In all five areas, (now including Persuasive Writing), the differences between the Year Seven students (Cohort A) from the School and the males nationally results were significant at the p < 0.01 level. See Table 7.9, for these significance results tabulated.

Table 7.9

One-way ANOVA for Summary Data Test Results for Year Seven (Cohort A) 2012
NAPLAN Data, Comparing the School and Males Nationally

<table>
<thead>
<tr>
<th>Grade</th>
<th>Year</th>
<th>Area</th>
<th>The School</th>
<th>National (males)</th>
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<td></td>
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<td>N</td>
<td>Mean</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reading</td>
<td>138</td>
<td>560.0</td>
<td>69.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Persuasive Writing</td>
<td>136</td>
<td>543.7</td>
<td>74.9</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>Spelling</td>
<td>140</td>
<td>557.2</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>140</td>
<td>557.5</td>
<td>68.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>137</td>
<td>572.6</td>
<td>76.9</td>
</tr>
</tbody>
</table>

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

In 2008, the margin of the School’s Year Seven results over the males national Year Seven results were significant at the p < 0.01 level for the three areas Reading, Spelling and Numeracy. For Grammar and Punctuation, the margin was significant only at the p < 0.05 level.
In 2010, the Year Seven (Cohort B) students at the School scored roughly +40 marks (ranging from +29 to +52) higher than Year Seven males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +7.0%. In 2010, the margin of the School’s Year Seven (Cohort B) results over the males national Year Seven results were significant at the p < 0.01 level for all four NAPLAN areas (excluding Persuasive Writing).

In 2012, the Year Seven (Cohort A) students at the School scored roughly +25 marks (ranging from +22 to +29) higher than Year Seven males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +4.5%. In 2012, the margin of the School’s Year Seven (Cohort A) results over Year Seven males national results were significant at the p < 0.01 level for all four NAPLAN areas (excluding Persuasive Writing). Additionally in 2012, for the recently introduced (in 2011) area of Persuasive Writing, the Year Seven (Cohort A) students at the School scored +43 marks higher than Year Seven males nationally; equivalent to a relative margin of +8.5%. This margin, like those for the other four areas, was significant at the p < 0.01 level.

### 7.3.7 NAPLAN data for Year Nine 2008, 2010 and 2012 (Cohort B): Comparing the School and males nationally

Table 7.10 details Year Nine NAPLAN test results for 2008, 2010 and 2012 (Cohort B); for the School and males nationally.
Figure 7.19 presents the plot of 2008 NAPLAN Year Nine results as seen in Table 7.10. The area of writing is not included as persuasive writing was only included in second year of the study.

Figure 7.19. NAPLAN mean test results Year Nine 2008 (School and national).

In all four areas, the differences between the Year Nine students at the School and males nationally were significant at the p < 0.01 level. See Table 7.11 for these significance results tabulated.

Table 7.11
One-Way ANOVA for Summary Data Test Results for Year Nine 2008 NAPLAN Data, Comparing the School and Males Nationally.

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Area</th>
<th>Year</th>
<th>The School</th>
<th>National (Males)</th>
<th>ANOVA Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Year 9 2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>180</td>
<td>610.5</td>
<td>67.0</td>
<td>262,549</td>
<td>575.0</td>
</tr>
<tr>
<td>Spelling</td>
<td>180</td>
<td>595.3</td>
<td>72.9</td>
<td>263,297</td>
<td>566.5</td>
</tr>
<tr>
<td>Grammar &amp; Punctuation</td>
<td>180</td>
<td>596.2</td>
<td>70.4</td>
<td>263,297</td>
<td>558.9</td>
</tr>
<tr>
<td>Numeracy</td>
<td>180</td>
<td>638.2</td>
<td>70.2</td>
<td>262,122</td>
<td>586.5</td>
</tr>
</tbody>
</table>

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

Figure 7.20 presents the plot of 2010 NAPLAN Year Nine results as seen in Table 7.10. The area of writing is not included in 2010 as persuasive writing was only included in the second year of the study.
Figure 7.20. NAPLAN mean test results Year Nine 2010 (School and national).

In all four areas, the difference between the Year Nine students at the School and males nationally results were significant at the $p < 0.01$ level. See Table 7.12 for these significance results tabulated.

Table 7.12
One-Way ANOVA for Summary Data Test Results for Year Nine 2010 NAPLAN Data, Comparing the School and Males Nationally

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>The School</th>
<th>National (Males)</th>
<th>ANOVA Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Std. Dev.</td>
<td>N</td>
</tr>
<tr>
<td>Year 9 2010</td>
<td></td>
<td>173</td>
<td>599.1</td>
<td>67.1</td>
<td>260,046</td>
</tr>
<tr>
<td></td>
<td></td>
<td>173</td>
<td>592.7</td>
<td>75.6</td>
<td>261,408</td>
</tr>
<tr>
<td></td>
<td></td>
<td>173</td>
<td>591.4</td>
<td>71.0</td>
<td>261,408</td>
</tr>
<tr>
<td></td>
<td></td>
<td>173</td>
<td>633.0</td>
<td>72.7</td>
<td>258,827</td>
</tr>
</tbody>
</table>

Note. ** Indicates significance at the $p < 0.01$ level, and * Indicates significance at the $p < 0.05$ level.

Figure 7.21 displays the plot of 2012 NAPAN Year Nine (Cohort B) results as seen in Table 7.10.
In all four areas, the difference between the Year Nine students at the School and the males nationally result is significant at the p < 0.01 level. See Table 7.13, below for these significance results tabulated.

Table 7.13
One-Way ANOVA for Summary Data Test Results for Year Nine 2012 NAPLAN Data, Comparing the School and Males Nationally

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Year</th>
<th>Area</th>
<th>The School</th>
<th>National (Males)</th>
<th>ANOVA Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>Mean</td>
<td>Std. Dev.</td>
</tr>
<tr>
<td>Year 9 2012</td>
<td></td>
<td>Reading</td>
<td>176</td>
<td>605.4</td>
<td>67.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Persuasive Writing</td>
<td>173</td>
<td>568.1</td>
<td>86.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spelling</td>
<td>176</td>
<td>598.0</td>
<td>73.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grammar &amp; Punctuation</td>
<td>176</td>
<td>594.1</td>
<td>70.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Numeracy</td>
<td>176</td>
<td>640.2</td>
<td>74.7</td>
</tr>
</tbody>
</table>

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

In 2008, the School’s Year Nine students scored roughly +39 marks (ranging from +29 to +52) higher than Year Nine males nationally (in all four areas excluding persuasive writing). In relative terms, this was equivalent to a margin of about +6.5%. In 2008, the margin of the School’s Year Nine results over the Year Nine males national results were significant at the p < 0.01 level for all four areas (excluding Persuasive Writing).
In 2010, the School’s Year Nine students scored roughly +31 marks higher (ranging from +25 to +42 marks) than Year Nine males nationally (in the four subjects excluding Persuasive Writing). In relative terms this was equivalent to a margin of about +5.5%. In 2010, the margin of the School’s Year Nine results over the Year Nine males national results were significant at the p < 0.01 level for all four areas (excluding Persuasive Writing).

In 2012, the School’s Year Nine students (Cohort B) scored roughly +37 marks (ranging from +31 to +50) higher than Year Nine males nationally (in the four areas excluding Persuasive Writing). In relative terms, this was equivalent to a margin of about +6.5%. In 2012, the margin of the School’s Year Nine results over the Year Nine national males results were significant at the p < 0.01 level for all four NAPLAN areas (excluding Persuasive Writing). Additionally in 2012, for the recently introduced (in 2011) area, Persuasive Writing, the School’s Year Nine students scored +34 marks higher than Year Nine males nationally; equivalent to a relative margin of about +6.5%. This margin, like those for the other four areas, was significant at the p < 0.01 level. In both 2010 and 2012, the Numeracy results for Year Nine at the School were particularly outstanding in comparison to males nationally. In relative terms, this was equivalent to +7.0% and 8.5%, respectively in 2010 and 2012.

7.3.8 NAPLAN cohort gain data: Comparing the School and males nationally

The research is interested at looking at changes to literacy and numeracy over time, and therefore tracks cohort mean scores in all of the literacy and numeracy skills. Figure 7.22 shows the gains from Year Five to Year Seven in all learning areas for the School and national males.
7.3.8.1 Summary of NAPLAN cohort gain data: Comparing the School and males nationally (2008 to 2010 and 2010 to 2012)

i) Cohort Gain, the students at the School and males nationally: From Year Five to Year Seven (2008-10)

For the four areas (excluding Persuasive Writing), the difference in cohort gain between the School and males nationally is about one per cent (relative). None of these differences (between the males at the School and males nationally) in cohort gain are statistically significant, since the 95% CI for the males at the School is approximately ±3.3% (relative).

ii) Cohort gain, the School and males nationally: From Year Five to Year Seven (2010 to 2012). Figure 7.23 shows the percentage change from Year Five to Year Seven (Cohort A) between 2010 and 2012.
Figure 7.23. Relative percentage cohort gain (Cohort A) from Year Five to Year Seven between 2010 and 2012.

For the NAPLAN area of Reading, the difference in cohort gain between the students at the School and males nationally is negligible, less than 0.5%. Certainly this margin is not statistically significant since the 95% CI for the School is approximately ±3.3%. For the areas of Spelling, Grammar and Punctuation, and Numeracy, the difference in cohort gain between the School and males nationally is slightly larger than for Reading, at about +2.5%. However, since the 95% CI for the School is approximately ±3.3%, these cohort gain differences are still not statistically significant at the $p < 0.05$ level.

iii) Cohort Gain, the School and males nationally: From Year Seven to Year Nine (2008 to 2010 – non-laptop cohort). Figure 7.24 shows the relative percentage change from Year Seven to Year Nine between 2008 and 2010.
Figure 7.24. Relative percentage cohort gain from Year Seven to Year Nine between 2008 to 2010.

For the area of Reading, the difference in cohort gain between the School and males nationally is negligible, at less than +0.5%. This is not statistically significant since the 95% CI for the School is approximately ±2.0%. For the areas of Spelling and Grammar and Punctuation, the difference in cohort gain were not statistically significant at the p < 0.05 level.

For the area of Numeracy, the result is unusual in that the cohort gain achieved by males nationally was greater than that achieved by the School. In absolute terms this gain represents six marks; and relative terms, 1.5%. Compared to the 95% CI for the School cohort gain, ±12 marks (absolute) and ±2.0% (relative), the cohort gain margin is not statistically significant at the p < 0.05 level.

iv) Cohort gain, the School and males nationally: From Year Seven to Year Nine (Cohort B) 2010 to 2012. Figure 7.25 shows the relative percentage change from Year Seven to Year Nine between 2010 and 2012.
For three of the four areas, Reading, Grammar and Punctuation, and Numeracy, the cohort gain for males nationally exceeded those of the School. For these three areas, the national cohort gain exceeded the School cohort gain by about 1.0%. For the other area, Spelling, the School cohort gain exceeded that of males nationally by 0.1%. Because the 95% CI for the School cohort gain results is approximately ±2.0%, none of these differences in cohort gain is large enough to be statistically significant at the $p < 0.05$ level.

v) Overall

In all cases, the differences in cohort gains between the School and males nationally were not statistically significant. Section 7.3.9 will compare the School and males nationally using a pooled data approach.

7.3.9 NAPLAN cohort gain data: Comparing the School and males nationally using pooled data

Pooling the data pertaining to the four individual areas into aggregated (four-areas) cohort gains generates larger numbers from the Schools perspective, and therefore opens up avenues for further statistical analysis. More meaningful comparisons are possible between pre-1:1 laptop cohorts with post 1:1 laptop
cohorts. Figures 7.26 to 7.29 present this approach for the following years and cohorts:

- Years Five to Year Seven (2008 to 2010);
- Year Five to Year Seven (2010 to 2012 – Cohort A);
- Year Seven to Year Nine (2008 to 2010); and
- Year Seven to Year Nine (2010 to 2012 – Cohort B).

*Figure 7.26. Relative percentage cohort gain from Year Five to Year Seven (2008 to 2010).*
Figure 7.27. Relative percentage cohort gain from Year Five to Year Seven (Cohort A) 2010 to 2012.

Figure 7.28. Relative percentage cohort gain from Years Seven to Years Nine (2008 to 2010).
Figure 7.29. Relative percentage cohort gain from Years Seven to Years Nine (Cohort B) 2010 to 2012.

7.3.9.1 Summary of the pooled NAPLAN data: Cohort gain, the School and males nationally

i) Pooled Data - Cohort gain, the School and males nationally: From Year Five to Year Seven (2008 to 2010).

The area-by-area analysis of cohort gain showed no statistically significant differences between the students at the School and males nationally for these cohorts. Neither did the overall analysis of cohort gain, after pooling the data for the four separate areas.

ii) Cohort gain, the School and males nationally: Year Five to Year Seven (Cohort A) 2010 to 2012.

The area-by-area analysis of cohort gain showed no statistically significant differences between the students at the School and males nationally for these cohorts. However, after pooling the data for the four separate areas, the overall analysis of cohort gain revealed that the students at the School cohort gain was greater than that of males nationally, to a statistically significant extent (p < 0.05).

iii) Cohort gain, the School and males nationally: From Year Seven to Year Nine (2008 to 2010).
The area-by-area analysis of cohort gain showed no statistically significant differences between the students at the School and males nationally for these cohorts. However, after pooling the data for the four separate areas, the overall analysis of cohort gain revealed that the School, cohort gain was greater than that of males nationally, to a statistically significant extent (p < 0.05).

iv) Cohort gain, the School and males nationally: Year Seven to Year Nine (Cohort B) 2010 to 2012.

The area-by-area analysis of cohort gain showed no statistically significant differences between the students at the School and males nationally for these cohorts. Neither did the overall analysis of cohort gain, after pooling the data for the four separate areas.

v) Overall conclusion

The area-by-area analysis of cohort gain undertaken did not provide any definitive indication that the School outperformed national data in terms of cohort gain. However, when all of the four learning areas were pooled, the uncertainty bars (representing 95% CI) were reduced by approximately a factor of two. This procedure increases the likelihood of discerning statistically significant differences between the students at the School and males nationally, satisfying the criterion of p < 0.05. This component of the analysis, therefore has exploited a statistical ‘trade-off’ between resolution and uncertainty in order to elicit quantitative evidence that in two cases out of four, the difference was indeed significant. In two cases (i.e., Year Five to Year Seven, 2008 to 2010; and Year Seven to Year Nine, 2010 to 2012), the overall difference between the students at the School and males nationally is not statistically significant. In the other two cases, (i.e., Year Five to Year Seven, 2010 to 2012; and Year Seven to Year Nine, 2008 to 2010), the students at the School have outperformed males nationally to a statistically significant extent.

7.3.10 NAPLAN cohort gain data: Comparing the students at the School over 2008 to 2010 and over 2010 to 2012

The following section considers the cohort gains in relative terms. Figure 7.30 plots the cohort gain data as a percentage for the 2008 to 2010 cohort (without
laptops) compared to the 2010 to 2012 (Cohort A) as part of the 1:1 laptop implementation. None of the differences in cohort gain between the two separate groups of students from the School is significant (at the p < 0.05 level).

Figure 7.30. The Schools relative percentage cohort gain from Year Five to Year Seven: Comparison of 2008 to 2010 with 2010 to 2012 (Cohort A).

The following section also considers the cohort gains in relative terms. Figure 7.31 plots the cohort gain data as a percentage for the 2008 to 2010 cohort (without laptops) compared to the 2010 to 2012 cohort as part of the 1:1 laptop implementation.
The cohort gain in difference for Grammar and Punctuation is significant at the p < 0.01 level and is shown in Table 7.14. For the other three subjects the differences are not significant (at the p < 0.05 level).

### Table 7.14

**One-Way ANOVA for Summary Data Test Results for Year Seven to Year Nine Cohort Gain Data Comparing the 2008 to 2010 Period with the 2010 to 2012 Period**

<table>
<thead>
<tr>
<th>Cohort Gain (Year 7 to Year 9)</th>
<th>Area</th>
<th>School 2008-10</th>
<th>School 2010-12</th>
<th>ANOVA Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>ΔMean (%)</td>
<td>Std. Dev. (%)</td>
<td>N</td>
</tr>
<tr>
<td>Reading</td>
<td>134</td>
<td>6.2</td>
<td>11.8</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>134</td>
<td>8.4</td>
<td>13.1</td>
<td>134</td>
</tr>
<tr>
<td>Spelling</td>
<td>134</td>
<td>11.5</td>
<td>12.9</td>
<td>134</td>
</tr>
<tr>
<td>Grammar &amp; Punctuation</td>
<td>134</td>
<td>5.5</td>
<td>12.0</td>
<td>135</td>
</tr>
</tbody>
</table>

Note. ** Indicates significance at the p < 0.01 level, and * Indicates significance at the p < 0.05 level.

(i) The students at the School, Year Five to Year Seven, cohort gain: Comparing 2008 to 2010 with 2010 to 2012.

For the two areas Reading and Numeracy, the 2008 to 2010 gain was marginally greater than the 2010 to 2012 gain. For the other two areas, Spelling, and Grammar and Punctuation, the 2010 to 2012 gain was greater than the 2008 to 2010 gain. But none of these differences were statistically significant.
For the two areas Grammar and Punctuation, and Numeracy, the difference in gains was slightly larger, at 18 to 20 marks (absolute) and about 3.7% (relative). Nevertheless, since the 95% CI for both the 2008 to 2010 and the 2010 to 2012 School results was about ±17 marks (absolute) and ±3.4% (relative), none of the differences are statistically significant at the p < 0.05 level.

This combination of results for Year Five to Year Seven Cohort Gains, i.e. 2008 to 2010 have the best results for two areas, and 2010 to 2012 have the best results for the other two areas. Two of the gains differences are small in size (Reading and Spelling). Of these, one shows the 2008 to 2010 cohort to have greater growth (Reading) and one (Spelling) shows the 2010 to 2012 cohort to have greater growth. This same pattern is observed with Grammar and Punctuation, and Numeracy which display larger gaps. Overall, there is a real mix of results, with nothing systematic even suggested.

Underlying reasons for cohort gains can be complex, involving factors such as teacher knowledge and skills, and student capabilities. It is not possible at this time to untangle the impact of the 1:1 laptop program within the context of this complexity. It should be noted that the NAPLAN program is used to identify regions and schools that have greatest need for additional resources rather than relatively small scale improvement initiatives.

ii) The students at the School, Year Seven to Year Nine, cohort gain: Comparing 2008 to 2010 with 2010 to 2012

For the three areas Reading, Spelling and, Grammar and Punctuation, the 2008 to 2010 gain was greater than the 2010 to 2012 gain. For the remaining area, Numeracy, the 2010 to 2012 gain was greater than the 2008 to 2010 gain by a 0.3%. However, the only statistical significant difference was for Grammar and Punctuation area. For the two areas Reading and Spelling, the difference in the gains was 11 marks (absolute) and about 2% (relative). Since the 95% CI for both the 2008 to 2010 and the 2010 to 2012 School results was about ±12 marks (absolute) and ±2.1% (relative), the difference in gains is not statistically significant at the p < 0.05 level. For the area Grammar and Punctuation, the difference in gains was 26 marks (absolute) and 5.2% (relative). In this case, a One-Way ANOVA for
Summary Data test (as seen in Table 7.14) confirmed that this margin between the 2008 to 2010 cohort gain and the 2010 to 2012 cohort gain was statistically significant at the p < 0.01 level.

For the Year Five to Year Seven cohort gains, the overall results were mixed, with no qualitative support of a systematic difference in performance between the two groups of male students from the School. This contrasted with the Year Seven to Year Nine overall cohort gain results. For three of the four areas, the 2010 to 2012 cohort gain is smaller than for 2008 to 2010; and for the fourth area (Numeracy) there was essentially no difference. For one of the areas (Grammar and Punctuation), the difference was significant.

The underlying reasons for this statistically significant decline in gains in Grammar and Punctuation can be difficult to pinpoint. Considerations such as whether students in this cohort were taught literacy in a particular approach, or may have previously ‘missed out’ on key literacy fundamentals at an early age, may have had an impact on literacy, or in this instance, grammar and punctuation. The approach of pooling the data pertaining to the four individual areas, into an aggregated (four-area) cohort gain is now applied.

### 7.3.10.1 Pooled data cohort gain at the School: Comparing Year Five to Year Seven (2008 to 2010) with Year Five to Year Seven (Cohort A) 2010 to 2012

The four area combined analysis of cohort gain (see Table 7.15) revealed no statistically significant differences between the two groups at the School.

<table>
<thead>
<tr>
<th>Cohort Gain</th>
<th>Area</th>
<th>School 2008-10</th>
<th>School 2010-12</th>
<th>ANOVA Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N  ΔMean</td>
<td>Std. Dev.</td>
<td>N  ΔMean</td>
</tr>
<tr>
<td>Δ (Yr 5 to Yr 7) 4 Areas Combined</td>
<td>212</td>
<td>63.0</td>
<td>74.7</td>
<td>215</td>
</tr>
</tbody>
</table>

Note. Yr 5=Year Five, Yr 7=Year Seven. ‘One-way ANOVA for summary data’ test results for pooled cohort gain data, the School Year Five to Year Seven, 2008 to 2010 and for 2010 to 2012.
Figure 7.32 shows the relative percentage gain from Year Five to Year Seven. The difference in cohort gain is not significant at the p < 0.05 level.

\[ \text{Figure 7.32. School relative percentage cohort gain from Year Five to Year Seven: Comparing 2008 to 2010 with 2010 to 2012 (Cohort A).} \]

### 7.3.10.2 Pooled data cohort gain at the School: Comparing Year Seven to Year Nine (2008 to 2010) with Year Seven to Year Nine (Cohort B) 2010 to 2012

The four area combined analysis of cohort gain (see Table 7.16) showed a statistically significant difference between the two groups.

#### Table 7.16

**Pooled School cohort data Year Seven to Year Nine 2008 to 2010 and for 2010 to 2012**

<table>
<thead>
<tr>
<th>Cohort Gain</th>
<th>Areas</th>
<th>School 2008-10</th>
<th>School 2010-12</th>
<th>ANOVA Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>ΔMean</td>
<td>Std. Dev.</td>
<td>N</td>
</tr>
<tr>
<td>Δ (Yr 7 to Yr 9)</td>
<td>4 Areas combined</td>
<td>536</td>
<td>43.8</td>
<td>72.5</td>
</tr>
</tbody>
</table>

*Note: Yr 5=Year Five, Yr 7=Year Seven. ‘One-Way ANOVA for Summary Data’ test results for pooled Cohort Gain Data, the School Year Seven to Year Nine, 2008 to 2010 and for 2010 to 2012. ** Indicates significance at the p < 0.01 level, and * indicates significance at the p < 0.05 level.*

Figure 7.33 shows the relative percentage gain from Year Seven to Year Nine. The difference in cohort gain is significant at the p < 0.01 level.
Figure 7.33. School relative percentage cohort gain from Year Seven to Year Nine: Comparing 2008 to 2010 with 2010 to 2012 (Cohort B).

7.3.10.3 Summary of the pooled data analysis

What the analysis has shown is that there was some diminution in some areas of NAPLAN performance between the 2008 to 2010 cohort passing from Year Seven to Year Nine, to the 2010 to 2012 cohort passing from Year Seven to Year Nine. The diminution was seen to be statistically significant at the p < 0.01 level for both (a) Grammar and Punctuation, and (b) also for the overall pooled results of all four areas (excluding Persuasive Writing).

7.4 Conclusion

This chapter has sought to provide insights into the extent to which the 1:1 laptop initiative has (a) improved literacy and numeracy outcomes, and (b) enhanced learner motivation and engagement. Ultimately, the chapter has addressed research question three, namely: What educational impact is there on student learning outcomes? Focusing on two cohorts, the chapter has facilitated a comparison between junior and middle school experiences of the 1:1 initiative with respect to outcomes and engagement.

Analysis of literacy and numeracy outcomes for cohorts A and B was multi-faceted and considered how each cohort performed over time:
• pre- and post- 1:1 laptop implementation;
• in comparison to other cohorts at the School; and
• in comparison to national benchmarks.

These comparisons involved disaggregated data (for each of the five learning areas) and aggregated data (pooled). The comparisons also included two approaches in which to gauge the overall performance of the cohort mean scores over time.

The gains achieved by Cohort B were significantly less than those achieved by the 2008-2010 (Year Seven to Year Nine) School cohort, in the learning area of Grammar and Punctuation (ANOVA, p < 0.01). In contrast, Cohort A achieved noteworthy gains between 2010 and 2012 (Year Five to Year Seven) in all learning areas except for Reading.

Self-reported views revealed perceived increases in engagement and motivation towards learning in both cohorts as a result of the 1:1 laptop initiative. These perceptions were reported consistently across the three years of the study. In attempting to better understand why students were consistently positive towards the 1:1 laptop initiative, qualitative data suggested that laptops may have given students increased opportunities to be self-directed and/or employ learning styles which were more suited to them (e.g., ‘independent’ preferences commonly found in the literature on gender differences). Although increased student engagement and motivation towards learning do not necessarily translate into deeper and richer learning outcomes, the results are heartening, particularly as teachers also acknowledged the positive impacts that laptops could have on engaging and motivating students. It should be noted that perceived levels of student engagement and motivation towards learning were consistently greater for Cohort A than for Cohort B.

This data should be treated with some caution, as there were variations in the extent to which each learning area embraced the 1:1 laptop initiative. In addition, classroom observations indicated inconsistencies in how individual teachers promoted and managed the use of laptops in their classroom. Consideration of related educational outcomes, for example, digital literacy, communication skills and
problem solving, would also be useful in future research. However, with these caveats, the analysis can make a contribution to the literature.

Correlating the implementation of 1:1 laptops at the School with improvements in learning is problematic. Whilst Cohort A slightly improved in terms of its overall NAPLAN performance in comparison to national benchmarks, Cohort B weakened in comparison to national benchmarks and remained stable in relation to previous and subsequent year levels. In saying this, Cohort A, a weaker cohort in comparison to other NAPLAN years, seems to have had a more positive experience with the 1:1 laptop initiative than Cohort B both in terms of their perceptions of levels of engagement and motivation, and their performance in standardised literacy and numeracy examinations. There may have been a number of reasons for these differences, not least the reality that Cohort B commenced the 1:1 initiative at precisely the time that they were making the transition from primary to middle school. There may be lessons to be learnt in the timing of implementations for mobile devices in schools. This issue will be addressed in the following chapter.

Comparison between the School and national standards revealed that the School performed favourably in both cohorts in all five learning areas. This indicates that good teaching and supports are in place. Whether these preconditions are necessary for the implementation of mobile learning initiatives may be a worthy question for future research. The next chapter will discuss the implications of these findings in the context of the study’s research questions.