Sample Primary School

South Australia

Data Analysis Report, October 2020

Prepared by Kennedy Press Pty Ltd

Report prepared on 2015 to 2019 school data

Data include PAT M results and NAPLAN results supplied by Sample Primary School

Contents

Sample Primary School Background Information

The analysis contained within this report is referenced specifically to the Sample Primary School context with the understanding that comparisons are relative and need to be nuanced to individual school circumstances. Data are drawn from the My School website 2019 version (www.myschool.edu.au) and NAPLAN and PAT Maths data supplied by the school.

- Sample Primary School has an enrolment of approximately 700 students from Reception to Year 7
- In 2019 50% of students were male and 50% were female, 1% of students identified as Indigenous and 30% of students have a language background other than English
- With an Index of Community Socio-Educational Advantage (ICSEA) of 1123, Sample Primary School is well above the national average of 1000. 55% of students are from the top quarter of socio-economic advantage, with only 3% from the bottom quarter.
  ICSEA provides an indication of the socio-educational background of student; it has nothing to do with the staff, school facilities or teaching programs at the school. (ACARA)
- Attendance rate for all students ranges from 99%. These rates have remained fairly consistent over the last four years.

NAPLAN Analysis

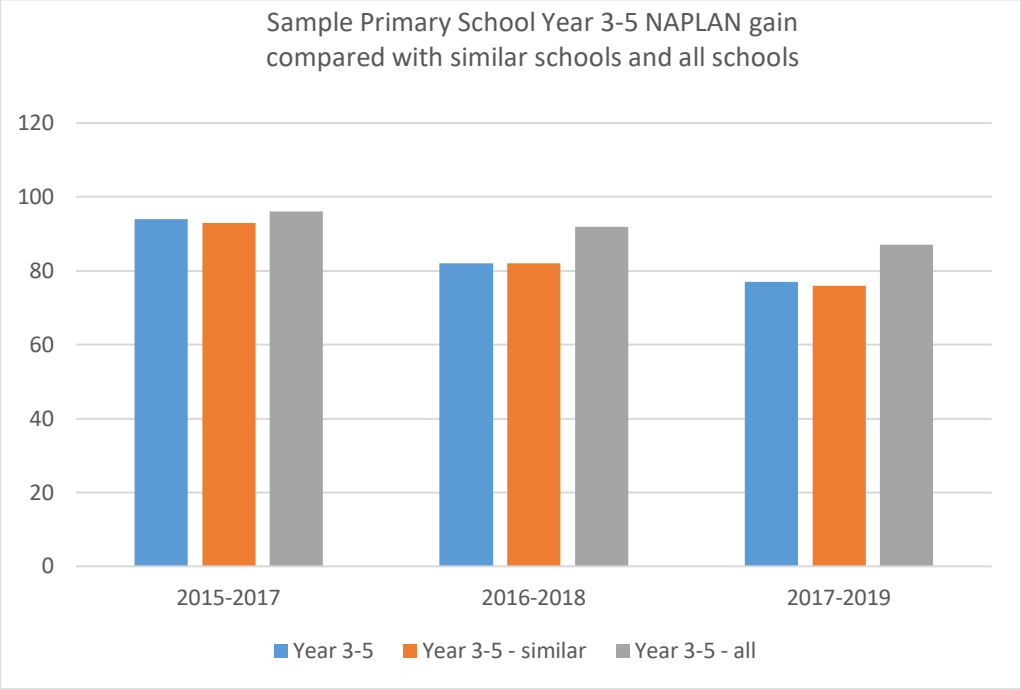
The NAPLAN graphs in this report were prepared using publicly available data from the My School website and results provided by the school. When examining NAPLAN growth, this analysis has considered both cohort gain and trends over time. The analysis uses average student achievement in the numeracy assessment for Years 3, 5 and 7 for Sample Primary School compared with the performance of schools with similar students (as defined by My School) and also with all Australian students.

Cohort Gain

Cohort gain is a measure of the growth made by each cohort of students over the period between two NAPLAN assessments. For example, Year 3 students who sat the test in 2017 will be compared with the Year 5 students who sat the test in 2019. This growth is calculated by subtracting the Year 3 mean scale score from the Year 5 mean scale score, then comparing the gain with similar schools and all schools.

> *Student gain is a way to measure the impact the school has had on student progress. That is, when the background of students is similar across schools, it is more likely that any differences in gain made by schools are related to the teaching and learning capabilities of the school.* (My School)

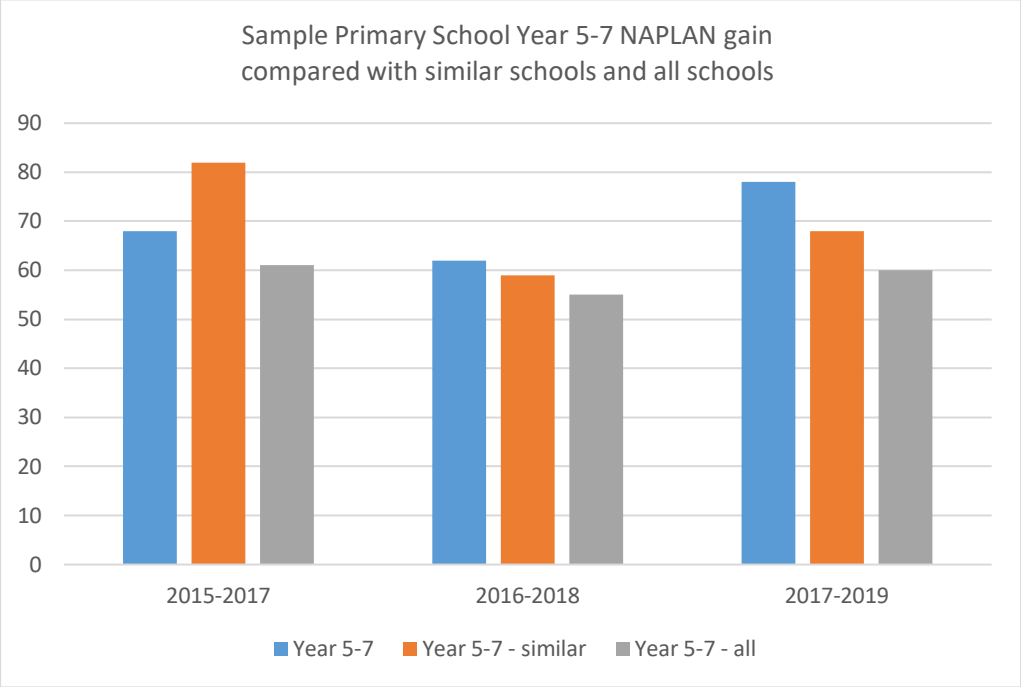
Year 3-5 NAPLAN Cohort Gain 2018 and 2019



The data displayed above indicate that Sample Primary School achieved a student gain from Year 3-5 in 2015-2017 of 94 points, compared to 93 points for schools with similar students and 96 for all schools. The 2016-2018 cohort gained 82 points, identical to similar schools and 92 points for all schools. In 2017-2019, Sample Primary School achieved a student gain from Year 3-5 of 77 points in contrast to an all schools gain of 76 points.

The graphs show that average gain for students attending Sample Primary School has been very similar to that of schools with similar students for the past few years.

Year 5-7 NAPLAN Cohort Gain 2018 and 2019



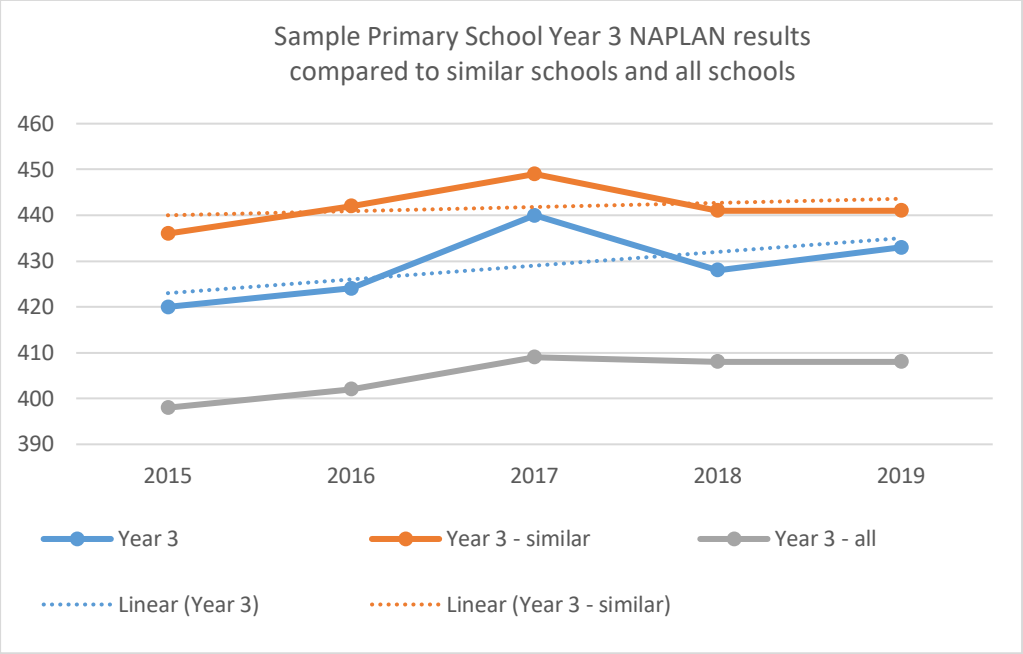
Sample Primary School achieved a student gain from Year 5-7 that was well below that of the comparison groups in 2015-2017. Gain for these students of 68 points, compared to 82points for schools with similar students. The 2016-2018 cohort gained was consistent with schools with similar students and increased again for the 2017-2019 cohort to 78 points in contrast to 68 points for similar schools and 60 points for all schools.

Average gain for students attending Sample Primary School has improved significantly with reference to comparison groups over the past three years.

Trends over time

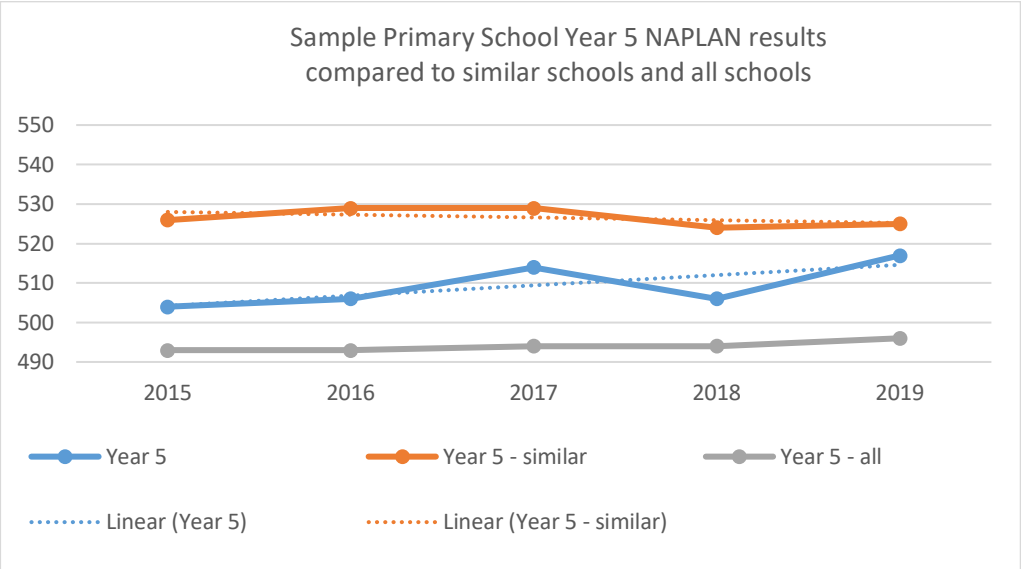
A second factor to consider in an analysis of NAPLAN data is the trends shown in the performance for each year level over time. The line graphs below show five years of mean scale scores for Sample Primary School compared with the same data for similar schools and all Australian schools.

Year 3 trend data



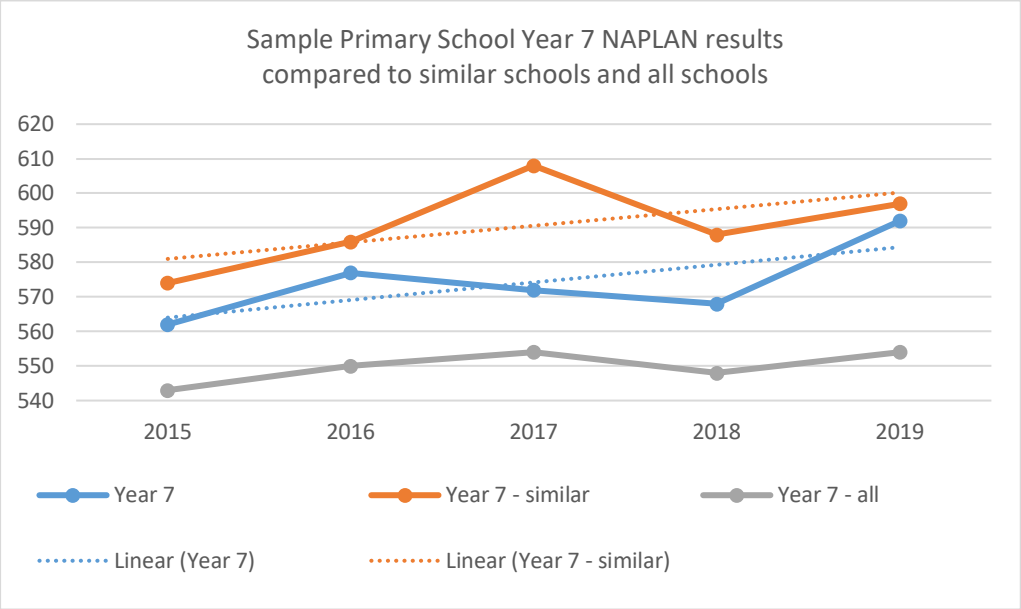
The line graph above indicates that mean scores for Sample Primary School students in Year 3 generally have grown fairly consistently since 2015. The gap to similar schools has halved in that time, from 16 points to 8 points.

Year 5 trend data



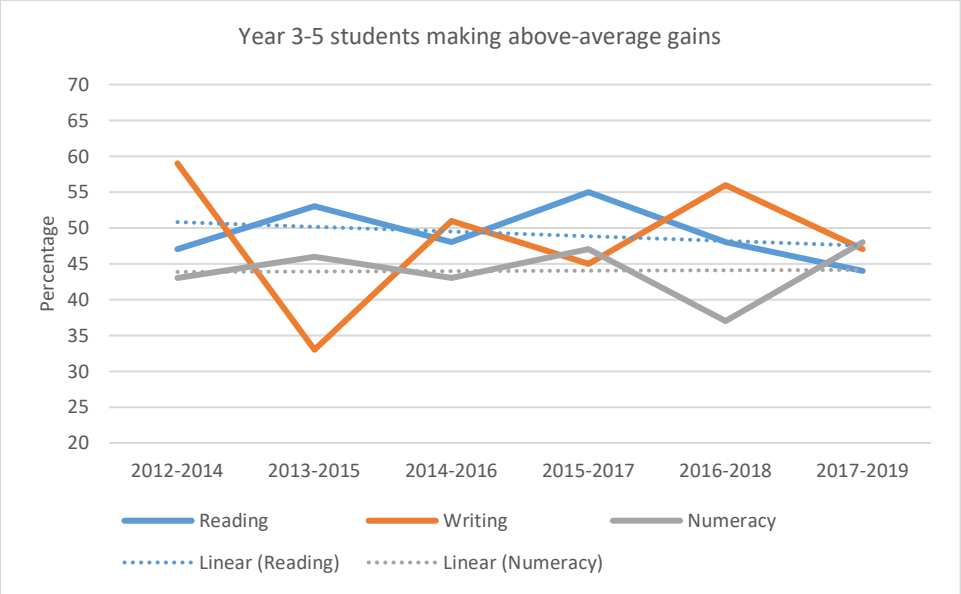
The mean Year 5 score for similar schools has remained fairly constant at around 525 points. Sample students' scores also remained stable for 2015-2018, with a sharp increase in 2019. The data in 2019 showed a gap of just 8 points compared with 22 points in 2105.

Year 7 trend data

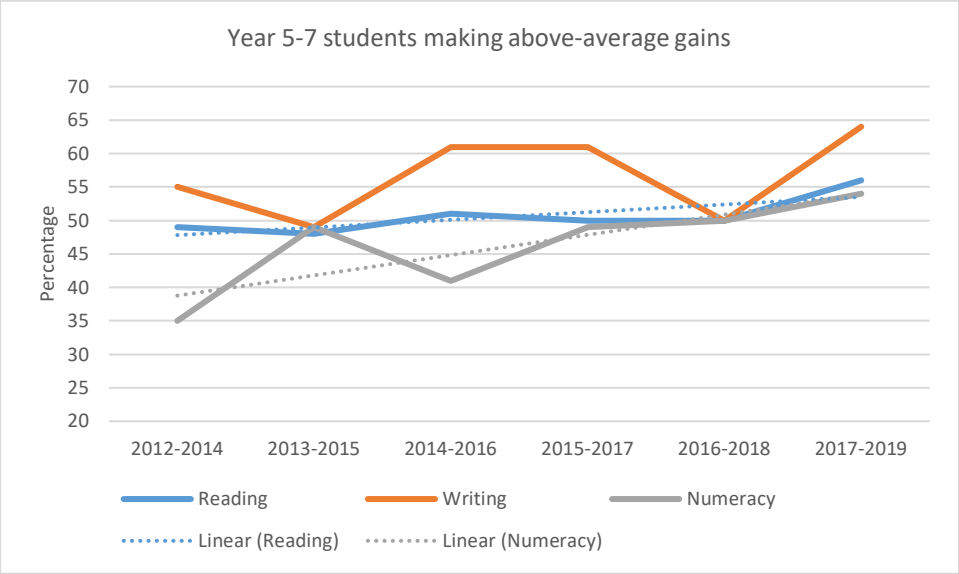


Year 7 mean scores for Sample Primary School students did not change significantly between 2015 and 2018, however 2019 saw a sharp increase. The trend lines for both similar schools and Sample show that the growth over the five years has been fairly similar.

Comparative gains in literacy and numeracy



Across years 3-5, a higher percentage of students has made above-average gains in literacy than in numeracy. This has been consistent since 2012, and is true for both reading and writing when compared with numeracy.

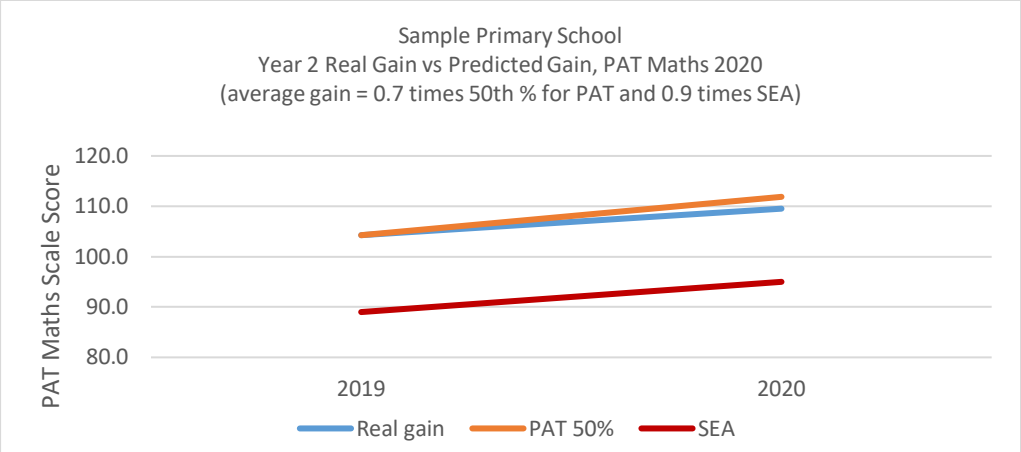


Across years 5-7, a higher percentage of students has made above-average gains in literacy than in numeracy. The gap between reading and numeracy has been closing recently, however the gap to writing has remained fairly consistent.

PAT M Growth Data, 2019 cohort

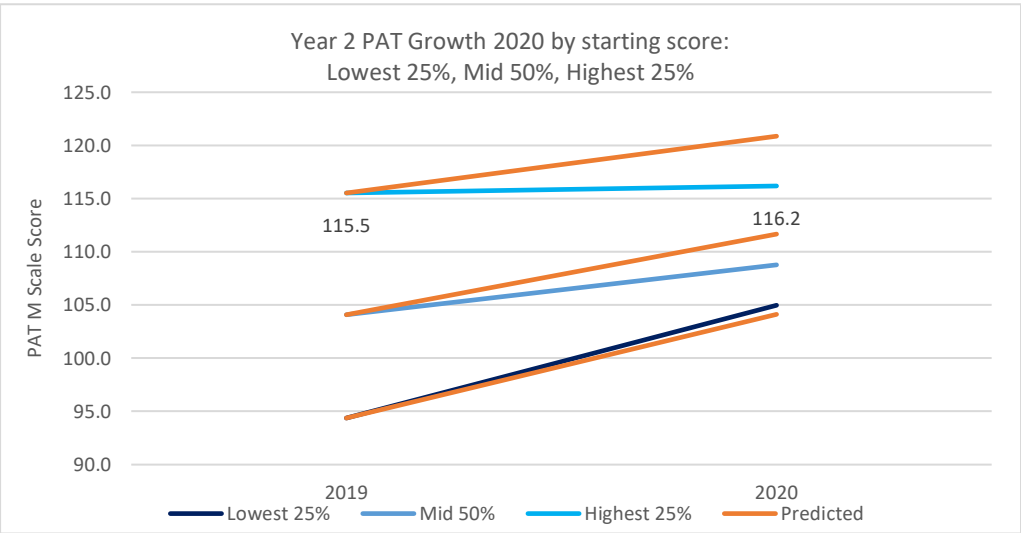
PAT-M data was compared using Tierney Kennedy's model for predicting 12 months of gain for all students using the 50th percentile figures from ACER. A summary of the results is included below. The graphs compare the average scale score for students in each year level for both pre- and post-tests with the average predicted growth for a period of one year.

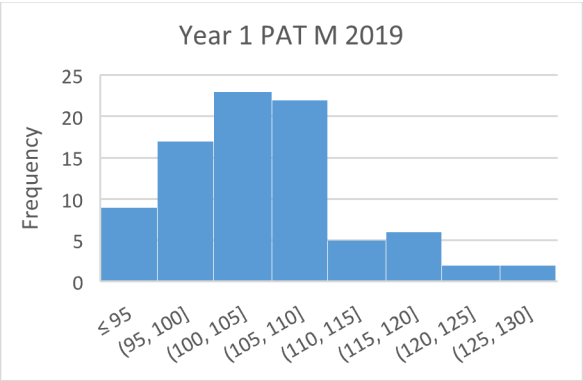
Year 2 PAT Maths

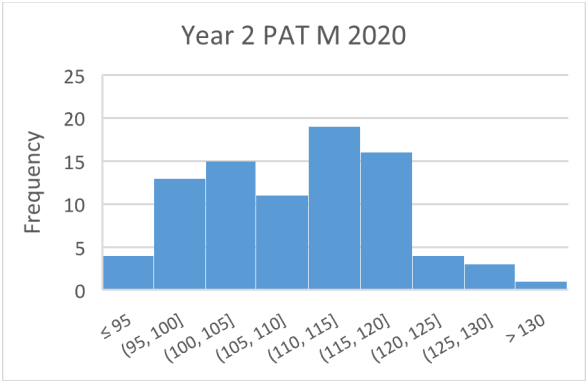


The 86 Year 2 students who sat both the Year 1 and Year 2 PAT M tests achieved an average growth of 0.7 years. They grew at a slower rate than both the 50th percentile and SEA.

The graph below shows the growth by starting score (highest 25%, mid 50% and lowest 25%). While growth for the lowest 25% of students by starting score is slightly higher than a year, the middle and high performing students have not made significant gains. The numbers on the graph state the 2019 and 2020 scores for the highest 25% of students, showing that almost no progress was made.

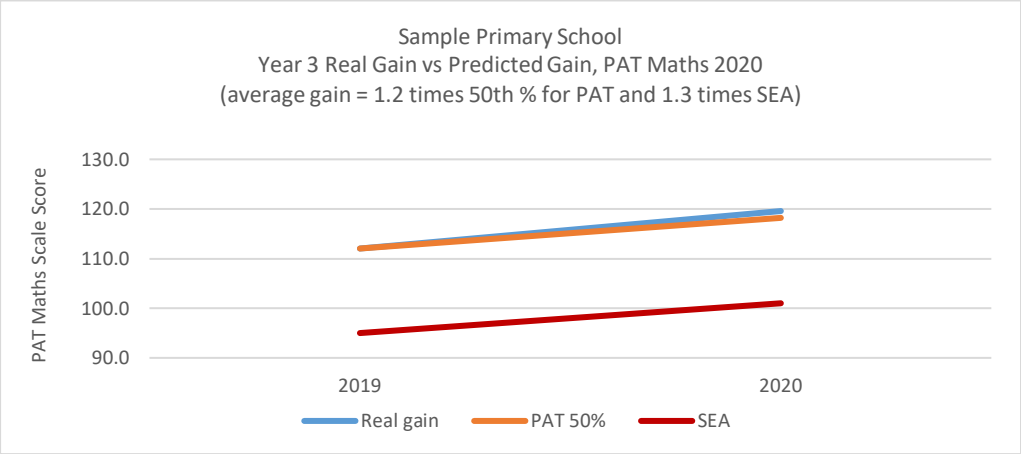




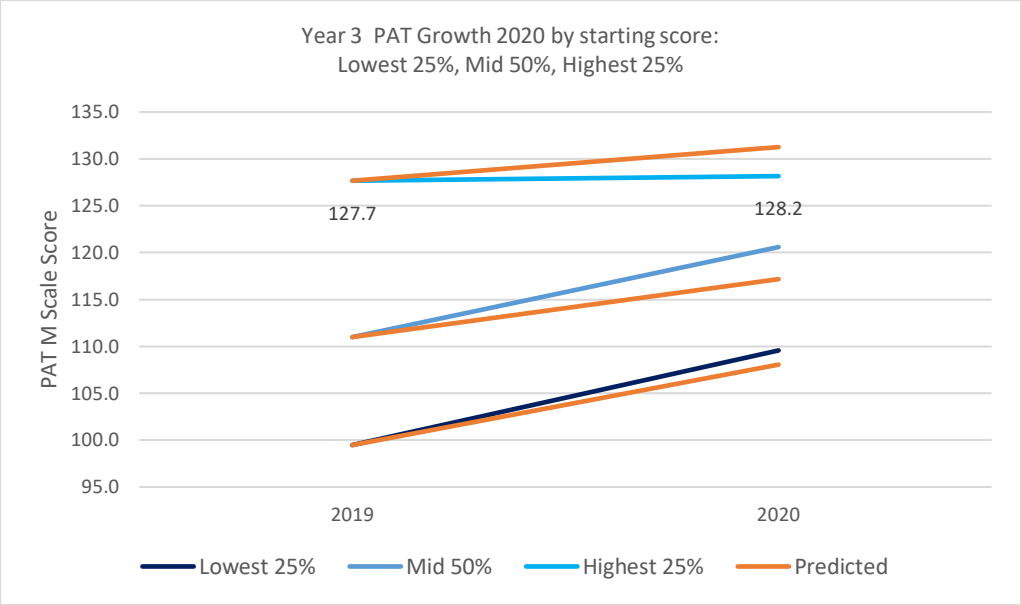


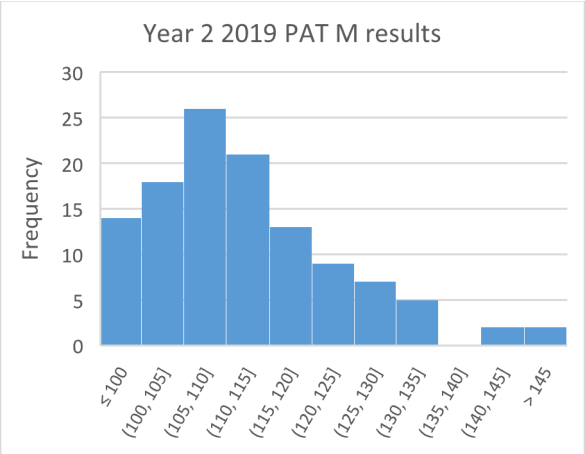
The side-by-side histograms above compare the distribution of students across the test in Year 1 and Year 2. From this graph we can see that there has been a general movement from the lower bins into the mid-range bins, but very little change at all in the three highest bins.

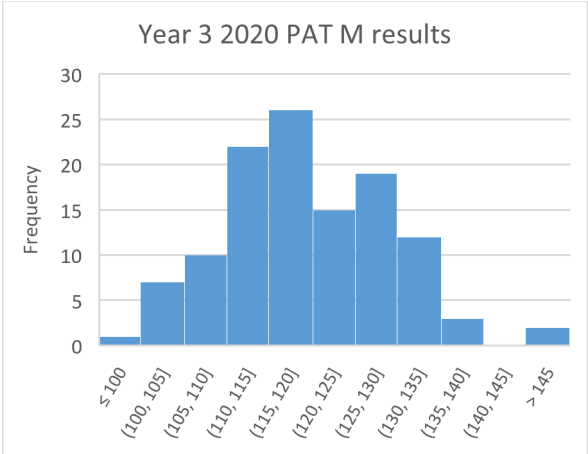
Year 3 PAT Maths



The 117 Year 3 students who sat both the pre and post PAT M tests achieved an average growth of 1.2 years. They grew at a slightly faster rate than both the 50th percentile and SEA. The graph below shows the growth by starting score (highest 25%, mid 50% and lowest 25%).
While growth for the lowest 25% and middle 50% of students by starting score is higher than a year, high performing students have not made significant gains. The numbers on the graph state the 2019 and 2020 scores for the highest 25% of students, showing that little progress was made.

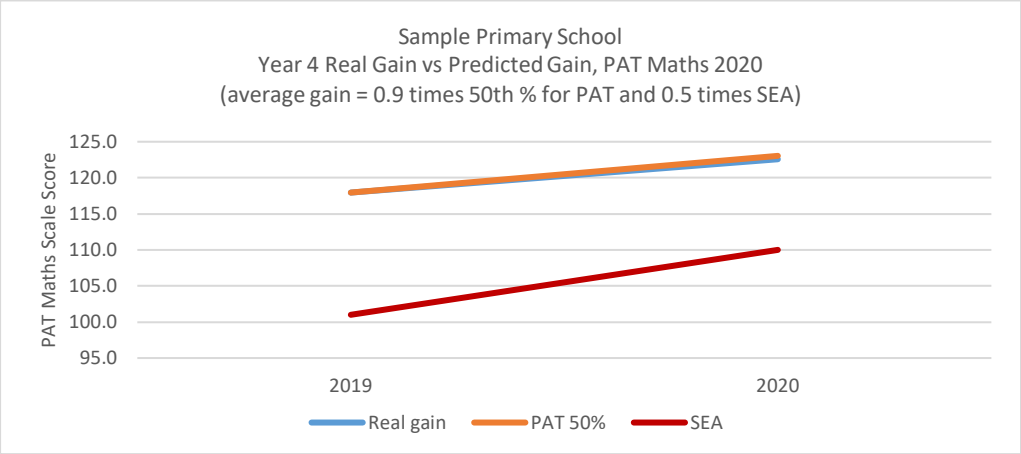




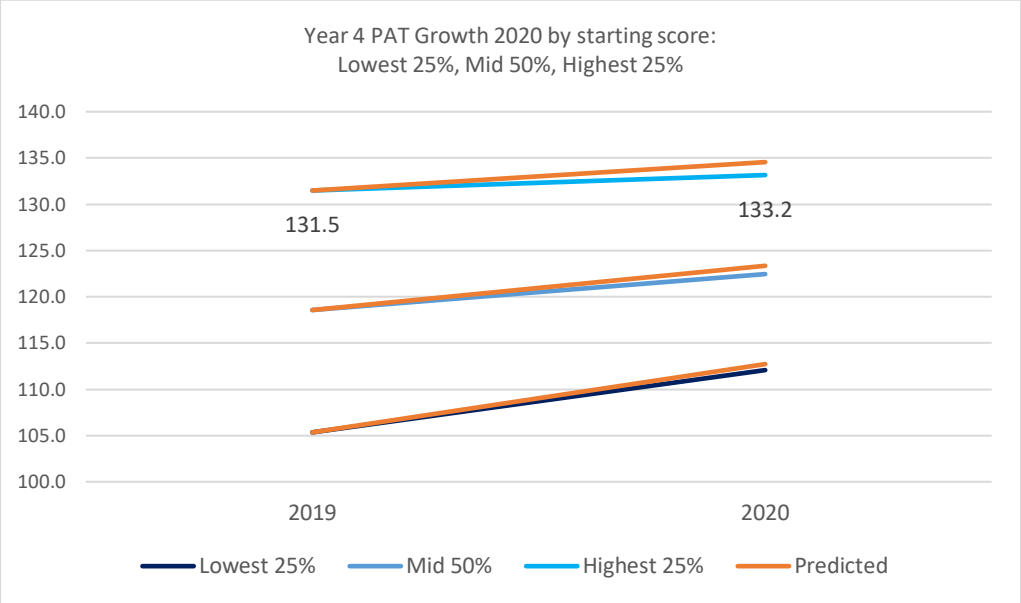


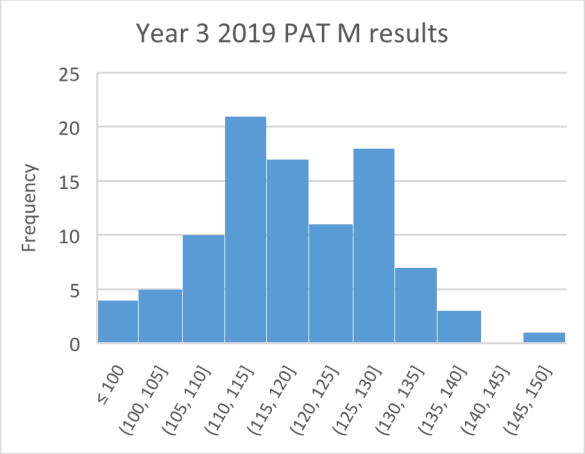
The Year 3 data shows a similar pattern of growth to the Year 2 data: students have shifted out of the bottom bins into the middle bins, but not into the top bins.

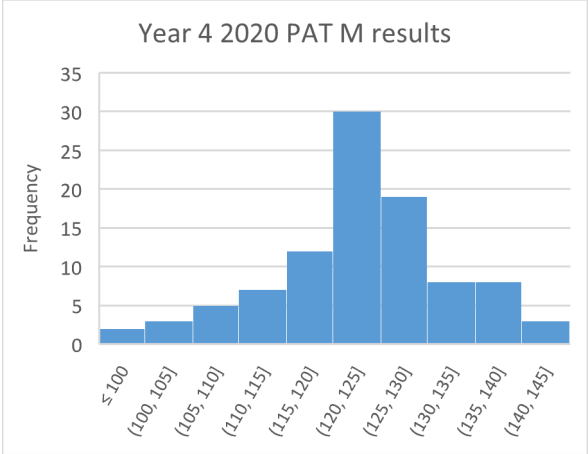
Year 4 PAT Maths



The 97 Year 4 students who sat both the pre and post PAT M tests achieved an average growth of 0.9 years. The graph below shows the growth by starting score (highest 25%, mid 50% and lowest 25%). Low-performing and mid-range students grew by very close to a year, however growth for the highest 25% of students was only around half as high as it should have been.

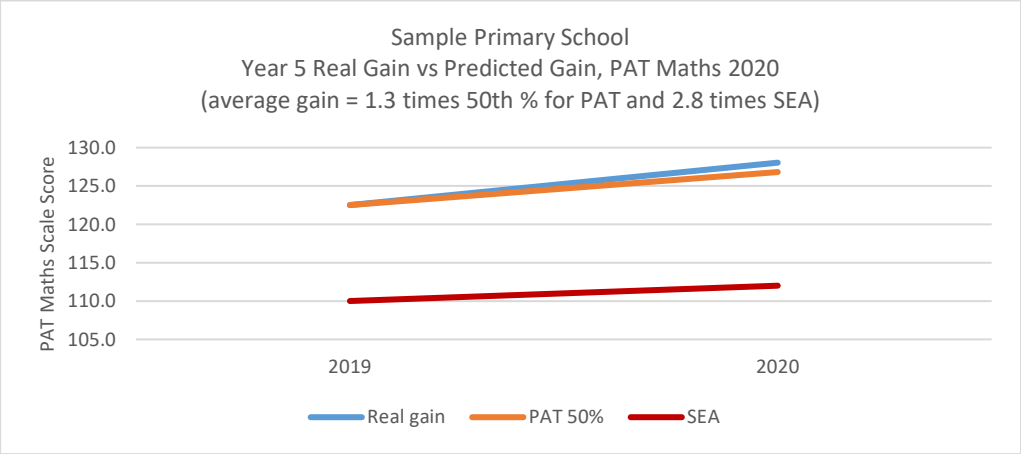




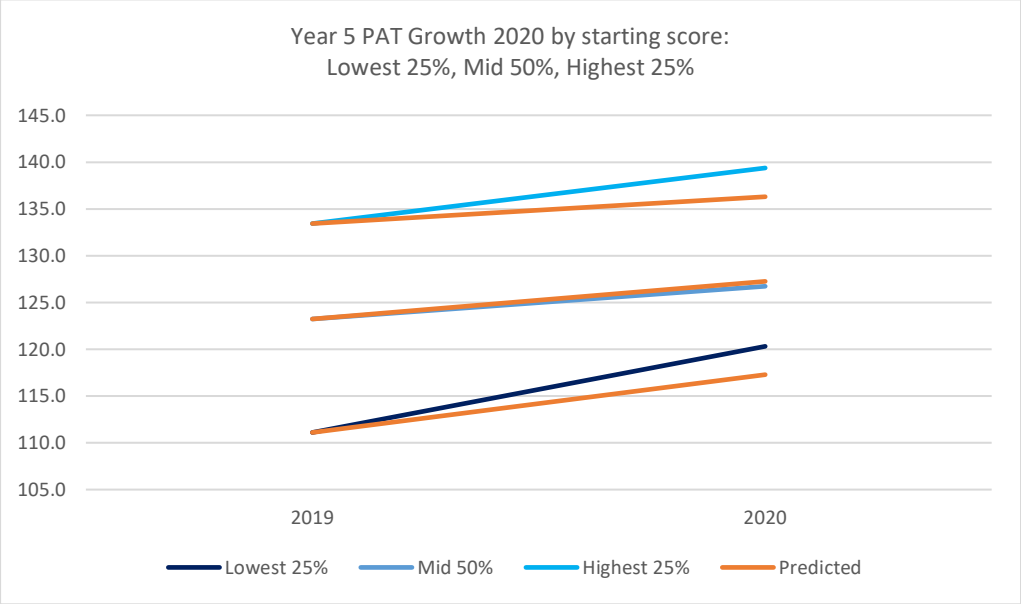


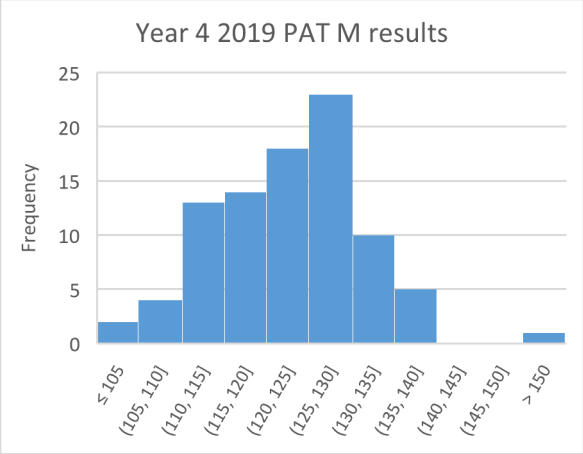
Year 4 results show a movement out of the lower bins and into the middle and higher bins. This indicates that some growth was made by all cohorts.

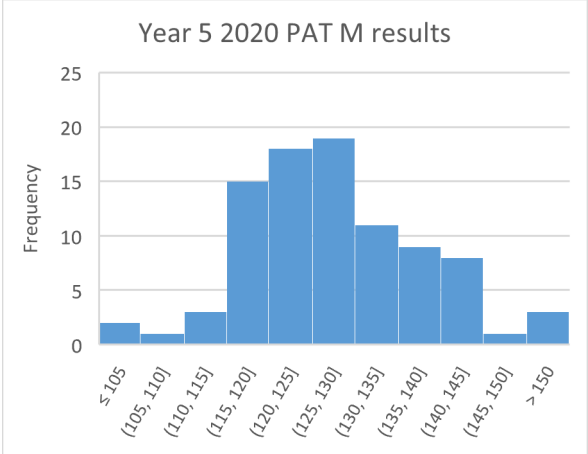
Year 5 PAT Maths



The 90 Year 5 students who sat both the pre and post PAT M tests achieved an average growth of 1.3 years. Their growth rate was significantly higher than both the 50th percentile and SEA figures would predict. The graph below shows the growth by starting score (highest 25%, mid 50% and lowest 25%). Growth was particularly high for low-performing and high-performing students by starting score, with more modest growth for mid-range students.

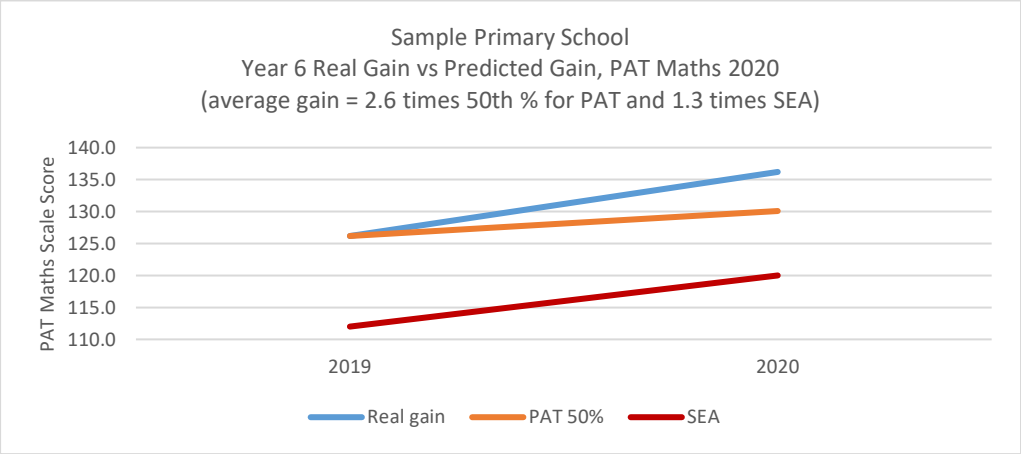




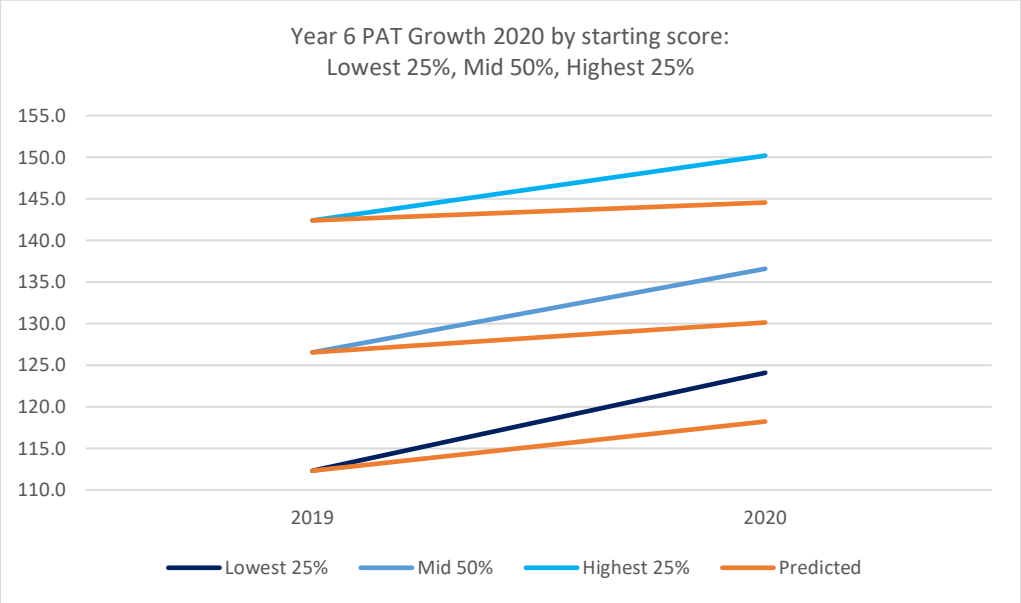


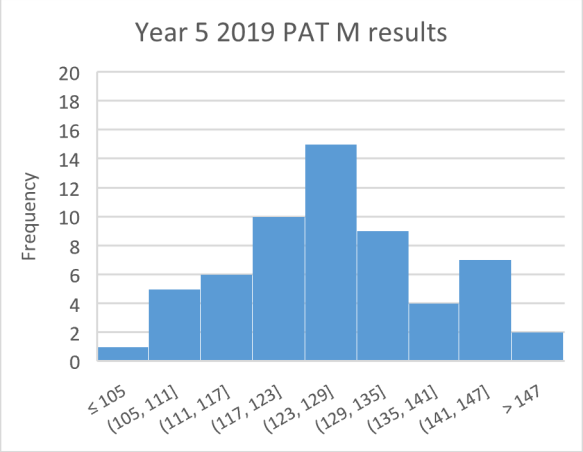
Year 5 results show a significant growth into the upper bins from the middle and lower bins. This indicates good growth across the cohort.

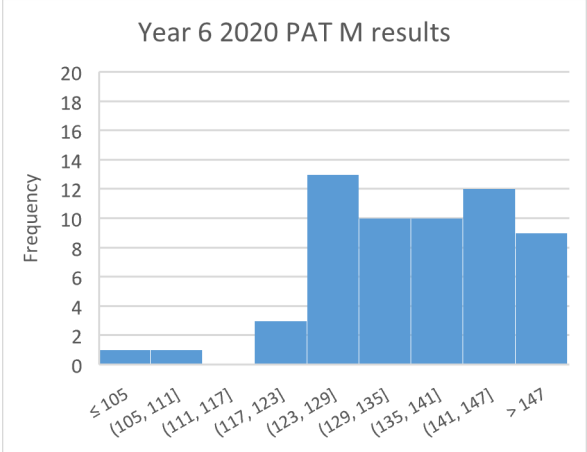
Year 6 PAT Maths



The 59 Year 6 students who sat both the pre and post PAT M tests achieved an average growth of 2.6 years. Their growth rate was significantly higher than both the 50th percentile and SEA figures would predict. The graph below shows the growth by starting score (highest 25%, mid 50% and lowest 25%). Growth was high across all sub-sections of the data.

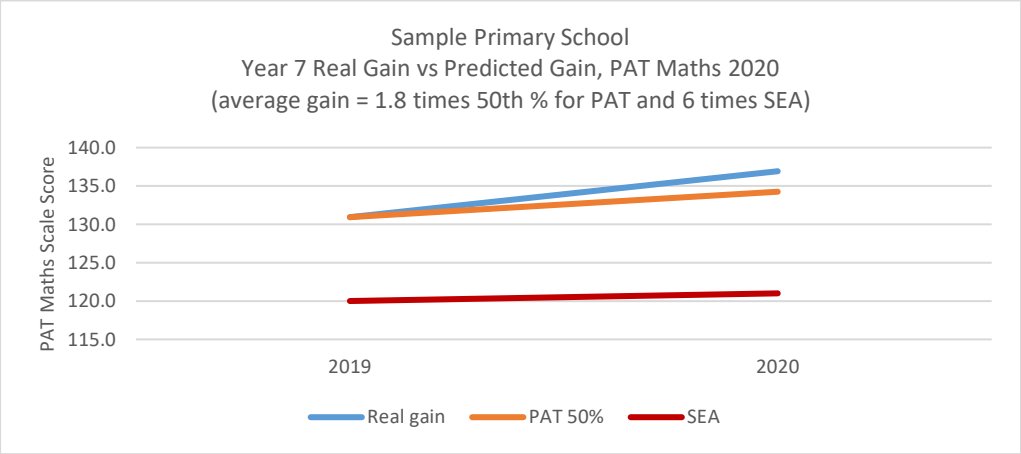




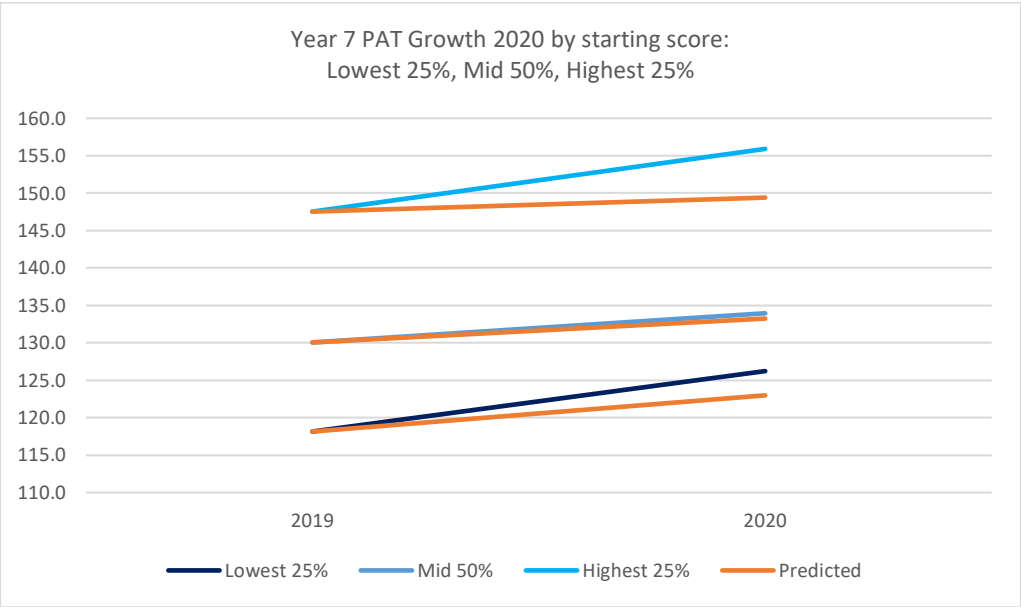


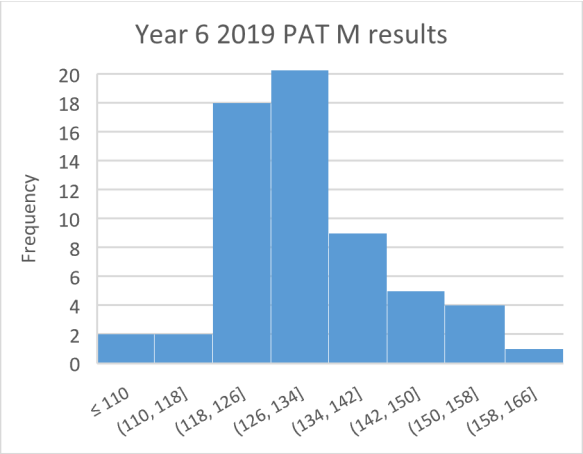
Year 6 results show large movements across all sections of the data. The upper bin grew from 2 students in 2019 to 9 students in 2020.

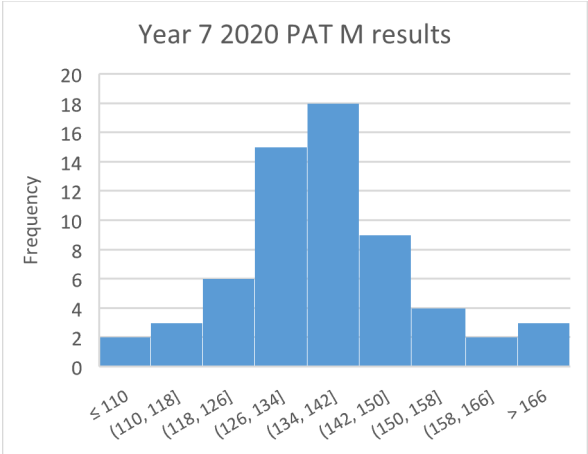
Year 7 PAT Maths



The 62 Year 5 students who sat both the pre and post PAT M tests achieved an average growth of 1.8 years. Their growth rate was significantly higher than both the 50th percentile and SEA figures would predict. The graph below shows the growth by starting score (highest 25%, mid 50% and lowest 25%). Growth was particularly high for low-performing and high-performing students by starting score, with more modest growth for mid-range students, with a similar pattern to Year 5.







Year 7 results show an overall shift from the middle bins into the upper bins, with little change in the lowest bins.

Summary of findings

- *NAPLAN scores remain consistently below the similar schools' average for all year levels.*
- *Years 3 and 5 scores are slowly catching up to that of similar schools. Results improved significantly in 2019 at years 5 and 7, resulting in closing the gap to similar schools markedly.*
- *Cohort gain from Year 3-5 is consistent with similar schools. Cohort gain from Years 5-7 has grown significantly in comparison with similar schools.*
- *Comparative gain graphs show a consistently higher proportion of students make above-average gains in literacy compared with numeracy. This may indicate that teachers are relatively stronger teachers in literacy than numeracy. As year 3 students tend to also score higher in literacy than in numeracy, this tendency is also likely to be consistent among the Junior primary teachers.*
- *2019-2020 PAT Maths analysis of average scores showed more than a year of growth for both Years 5-7, similar to a year of growth at years 3-4 and less than a year of growth for Year 2.*
- *PAT Maths analysis shows that high-achieving students in years 2-4 made little growth during 2020, while those same students in years 5-7 grew more quickly. Students with the lowest starting scores across all year levels grew by the expected amount.*

Discussion

Junior and Middle Primary to Year 4

Average NAPLAN scores for Year 3 have improved slightly over the past few years, however they remain consistently lower than scores for similar schools. Compared with National and similar schools results, year 3 students tend to consistently perform better in reading than in numeracy, indicating that Junior primary teachers have a strength in teaching reading. Growth between years 3 and 5 is also consistently higher in literacy than in numeracy.

For PAT Maths, overall low growth rates in year 2, and low growth rates for high-achieving students in years 2-4 indicate that focus needs to be placed on increasing the level of challenge for students. PAT Maths bin data also indicates that lower-achieving students have moved into the mid-range bins, but that mid-range and high-achieving students have not grown significantly.

Many NAPLAN questions focus on students' understanding and problem-solving ability. Unfamiliar and challenging questions require students to connect, adapt and transfer concepts and therefore improve student reasoning and understanding. All students need regular experience with these types of questions as they learn new mathematical concepts and deepen their understanding. Importantly, students must have opportunities to struggle with challenging problems, seek their own solutions and find connections to what they already know before explicit teaching of content and strategies occurs.

Upper Primary Growth Years 5-7

Average NAPLAN scores for Year 5 were below schools with similar students however this has improved over the past five years. Student gain from Year 5-7 has shown a significant improvement over the past three years. This higher level of gain ensured that the average score achieved by Year 7 students was closer to the comparison groups. Overall, students still experience a higher growth in reading and writing than they do in numeracy between years 5 and 7, however the gap has closed significantly in 2019.

PAT Maths data indicates that students have also grown at a significantly higher than expected rate from years 5-7. An analysis of bin data shows that a large proportion of students from years 5-7 have moved into the upper bins throughout 2020.

Recommendations

To improve student performance, the following recommendations should be considered for implementation across the school:

1. **Review the problem solving that teachers are using, particularly in R-4**.
   Problem solving must include challenging problems that require students to explore and experiment with concepts that they have not yet been taught. If teachers are predominantly using application or worded problems, these are unlikely to be sufficient to promote growth. Watch out that teachers understand that "unfamiliar" does not mean simply applying known strategies in worded contexts but requires thinking that is unrehearsed. Ensuring that all students are challenged is essential for moving students into higher bands as well as providing adequate stimulus for high performing students to continue to grow.

   Experimental or challenging problems should be used at least once per week for 30–90 minutes by each class. Problems need to include a focus on responsive teaching, with enabling prompts for students who are struggling and extending prompts for those who answer easily. Enabling prompts encourage students to get started on a problem and persist with it when it becomes difficult. They encourage teachers to hold back on helping immediately. Extending prompts add complexity to a task without increasing the content level required. A simple article on extension can be found at this link: https://www.backtofrontmaths.com.au/recent-news-articles/must-cant-simple-ways-adding-complexity-challenging-tasks

2. **Initiate a focus on Analytical Reasoning**. Reasoning not only requires students to show/demonstrate/justify mathematical processes or strategies, but also includes an analytical component. Reasoning at an A and B standard requires students to be able to identify patterns, analyse and evaluate these patterns, adapt or transfer what they already know to other concepts, make deductions, inferences and generalisations. Proficiency in reasoning at this level is essential for helping students to attain higher levels of growth in mathematics and should be included as a major focus for the project work to be conducted this year.

3. **Audit the assessment** that teachers are using, particularly to determine whether students are attaining A and B grades. Are the questions complex and challenging or are they simply application questions with big numbers? Links to guidelines for assessing problem solving, reasoning and understanding are located in Appendix One.

4. **Check all yearly plans** to ensure that they include a specific focus on developing connections between big ideas in number and transferring to other concepts. Develop a suggested teaching sequence that links each concept with the developmental sequence for number and ensure that teachers focus explicitly on teaching the connections. Focus on teaching flexible and adaptable procedures and manipulating these in different contexts.

5. **Introduce Interleaving:** If teachers are not already interleaving questions for fluency practise, it is recommended that they work together to develop this approach. Spending 30 minutes per week on interleaved questions will encourage students to retrieve strategies from their memory regularly, thereby building retention. Information about this approach can be found at this link: Fluency with flexibility

6. **Design and incorporate modelling tasks:** Modelling tasks provide significant opportunity to implement mathematical design principles in real-world problems. These tasks have several important features:
    a. They are real problems rather than application questions. They actually need solving. Someone cares about finding a solution to the problem because it is real and has an impact in the world.
    b. They are complex and messy, and any possible solutions generally need defining in terms of their limitations.
    c. They require searching for patterns, similarities and differences to find a way forward. Usually this also means that they are better suited to solving in teams.
    d. They are not problems that are contrived to fit specific maths, but generally require flexible thinking across multiple domains.
    e. They always require a testing and re-design phase to verify that approaches are working.

    While incorporating modelling tasks can be difficult, they provide considerable satisfaction to students and teachers, have an impact beyond the classroom, and give students an opportunity to show their best work. We suggest using some time in our project this year to design modelling tasks based on real issues of concern to students. This should be a particular focus for upper primary teachers.

Appendix One

Assessment Guidelines for Problem Solving, Reasoning and Understanding:

- Problem Solving guidelines
- Reasoning guidelines
- Understanding guidelines

