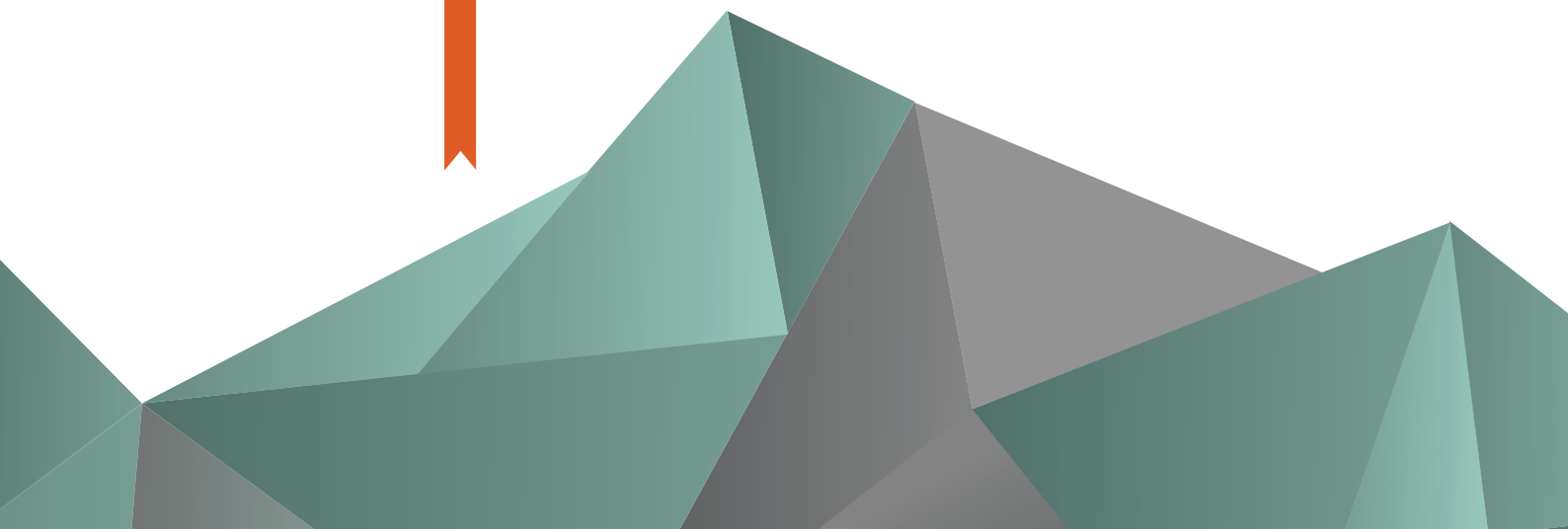




2016 IMPACT REPORT

For educators, students, parents
and lovers of mathematics





WE BELIEVE IN A WORLD
THAT EMBRACES THE
COMPLEXITY, VALUE
AND BEAUTY OF
MATHEMATICS.



TABLE OF CONTENTS

04	Welcome
06	The Challenge
06	The importance of mathematics learning
06	The attainment gap in Australian classrooms
08	The typical trajectory for Australian students
10	The Maths Pathway Movement
10	Our approach
14	The movement so far
16	Impact for Students
16	Impact on students' rate of learning
20	Impact on students' trajectory
24	Impact on other student learning outcomes
26	Impact for Teachers
26	Teacher expertise and practice
27	Impact via professional development
28	Impact on teacher practice
29	Impact on communities of practice
30	A Bright Future

WELCOME

In 2016, Maths Pathway celebrated its third birthday. From our early days of two teachers starting a program with just one school we have certainly come a long way. Maths Pathway now encompasses a community of thousands of teachers, who are working together to deliver the best possible mathematics education for students. As we look back on 2016 and the year's triumphs and challenges, we are thrilled to share stories from this growing community, as well as data on the impact being achieved. We hope that this report will help Maths Pathway Teachers and Schools get a sense of what we have accomplished together so far. We believe that this report will also be of value to new schools looking to join the movement.

In the Maths Pathway 2016 Impact Report, you will see data which highlights some of the challenges faced by Australian mathematics

teachers every day: in terms of both the spread of attainment for students in a typical mathematics class, and their likely future trajectories. You will find a summary of the Maths Pathway Learning Model, and see some exciting data on students' rates of learning, future trajectories and current mindsets. Finally, the data and stories in this report highlight how Maths Pathway has helped teachers through professional development, new classroom practices and collaboration within schools.

We are astounded every day by the phenomenal work and dedication shown by teachers in the Maths Pathway Community, who are unswervingly committed to their students. We are particularly grateful to those teachers who agreed to share their voices and stories throughout this report.



A stylized, handwritten signature in black ink.

Justin Matthys

Co-founder
Chief Integrator



A stylized, handwritten signature in black ink.

Richard Wilson

Co-founder
Chief Visionary

“We are thrilled to share stories from this growing community, as well as data on the impact being achieved.”



THE CHALLENGE

THE IMPORTANCE OF MATHEMATICS LEARNING

Using mathematics with confidence is vitally important for young people. Mathematical skills inform what we do every day — not just in specialist mathematical professions. Mathematics provides a beautiful and elegant way of thinking about the world. We believe that instilling a love of mathematics is valuable in and of itself.

Our society also benefits from a mathematically skilled workforce. According to reports from PricewaterhouseCoopers¹ and the Foundation for Young Australians,² the proportion of occupations requiring science, technology, engineering, and mathematics skills is rising rapidly — while lower skilled jobs are disappearing. As we head towards a more technological future, mathematical skills are becoming even more essential.



THE ATTAINMENT GAP IN AUSTRALIAN CLASSROOMS

As mathematics educators, we want all our students to succeed. However, the reality in Australia is that different students within the same mathematics class can have very different levels of attainment.

Using data from Maths Pathway assessments, we can benchmark students' levels of attainment against Australian Curriculum standards. This is done by diagnosing each piece of mathematics in the curriculum from level one to 10, then computing the student's position on a continuum — accounting for all the gaps and competencies.

Figure 1 shows the where students are positioned at the beginning of Year 7, based on curriculum

standards. The wide spread of student levels that is shown is consistent with data outlined in a recent report from the Grattan Institute.³ The report noted that a typical Year 7 mathematics class has an average of an eight-year gap in mathematical proficiency between the highest and lowest-performing students.

Figure 2 shows how this spread can look for a Year 7 class. This typical classroom includes students who are struggling to count. They sit amongst students who have a deep understanding of the level 7 curriculum content they are learning.

1 Pricewaterhouse Coopers (PwC), *A Smart Move: Future proofing Australia's workforce by growing skills in science, mathematics, engineering and maths (STEM)*, PwC, Australia, April 2015.

2 Foundation for Young Australians (FYA), *The New Work Order: Ensuring young Australians have skills and experience for the jobs of the future, not the past*, AlphaBeta, Sydney, 2015.

3 P. Goss, J. Hunter, D. Romanes, & H. Parsonage, *Targeted teaching: how better use of data can improve student learning*, Grattan Institute, 2015.

The range of student attainment levels creates an extremely challenging situation for any teacher. For students to achieve and grow in their mathematical understanding, it is vital that teaching be targeted to the point of need.

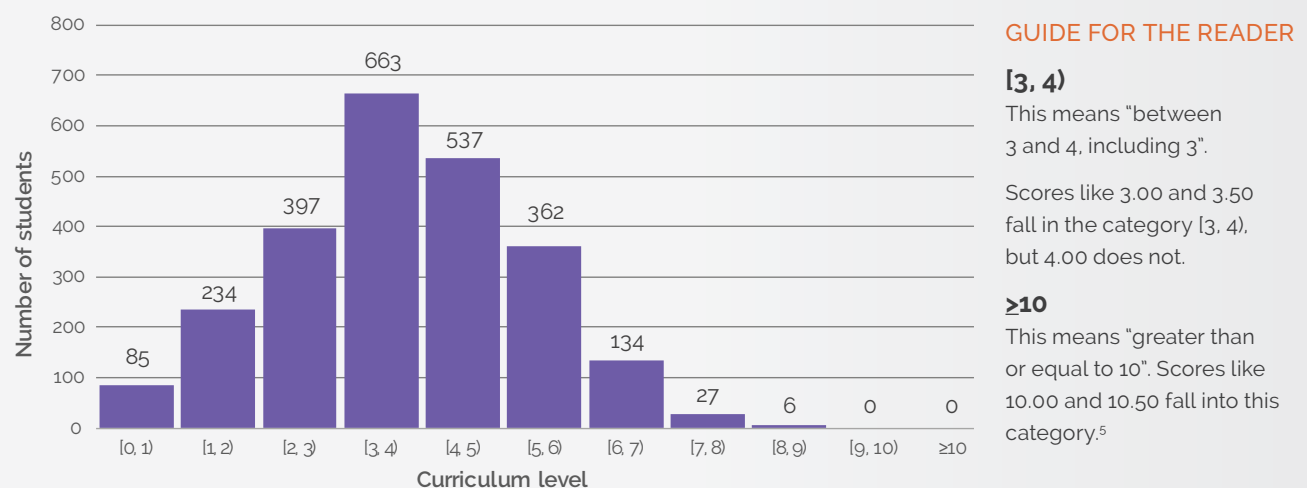


Figure 1: Students' curriculum level at the beginning of Year 7 (n=2445)⁴

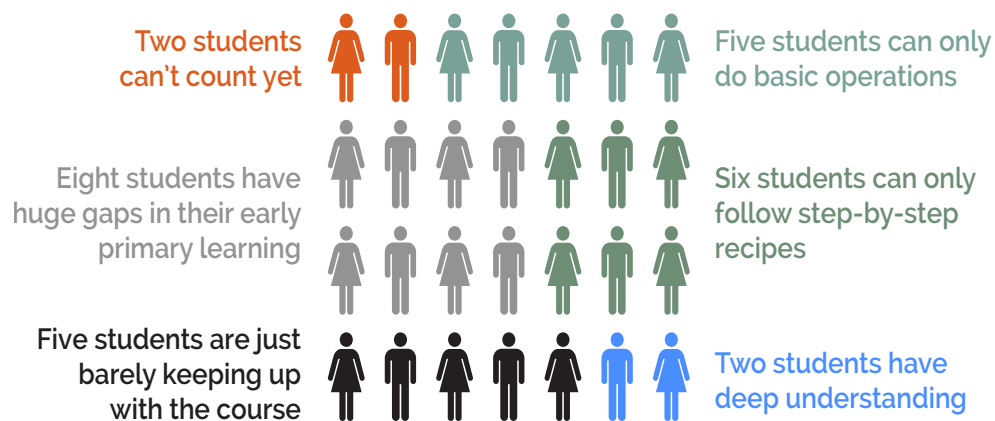


Figure 2: How a Year 7 mathematics class can look

"The vast majority of kids were actually below level in our school. They would come in disconnected from maths. Teachers were trying to explain new maths to kids who we knew from the data were averaging a Grade 5 level, and it just wasn't working at all. We knew they weren't at level but we fooled ourselves into thinking they could bridge the gap if they just tried harder and listened to us. But the problem was we needed to go right back to where they were stuck."

Chris Hill, Epping Secondary College

⁴ This sample consists of students in Year 7, 2016 who were diagnosed across at least 90% of the mathematics curriculum in Maths Pathway and, throughout the year, had been completing regular assessments of their learning.

⁵ Note that the Australian Curriculum Mathematics continues up to level 10A, which is an extension beyond level 10. Hence, it is possible for students to be at a curriculum greater than 10.00.

THE CHALLENGE

THE TYPICAL TRAJECTORY FOR AUSTRALIAN STUDENTS

By knowing a student's current level of attainment, it is possible to calculate their likely future trajectory.⁶ This is important for supporting students in deciding on future academic and professional pathways.

For the same cohort of students presented in Figure 1, Figure 3 shows an estimate of the curriculum level that they could reach by the end of Year 10 when following a traditional mathematics program. Figure 3 projects that about a quarter of students (that is, 514 out of 2445) would be below curriculum level 4 in mathematics when they finish Year 10, compared with the expected curriculum level of 10. This is consistent with research showing that 22% of Australians, aged 15 years and over, are at the lowest level of numeracy skills.⁷ This is defined as being able to carry out one-step or simple processes, such as counting, where mathematical content is explicit and there is little or no text.

At the other end of the scale, Figure 3 shows that approximately 10% of students (that is, 249 out of 2445) are projected to reach curriculum level 9 or higher by the time they complete Year 10 mathematics. This is consistent with the findings of the 'Trends in International Mathematics and Science Study', which showed that nine per cent of Australian students perform at advanced levels in mathematics, and compares with 41% for the top five performing countries.⁸ Across Australia, data also shows that one in 10 students complete advanced mathematics in Year 12.⁹

As shown in Figure 3, the majority of students (that is, 1682 out of 2445) lie somewhere between



these two extremes. This middle group may struggle to find confidence or enjoyment in their mathematical studies — an unfortunate reality for many Australian students — as has been reported by the Office of the Chief Scientist.¹⁰ Such a lack of confidence could be expected to flow onto adult life.

Figure 4 shows how these trajectories can look for a class of students in Australia.

"Teachers ask me what's wrong with our selection process into Year 11 maths, telling me the majority of students aren't ready for General Maths or Maths Methods. The students are aiming to just scrape through. We want them to think they can do better."

Chris Hill, Epping Secondary College

6 The calculation draws upon the same sample as in footnote 4. A student's future trajectory is calculated based on the assumption that they will continue to learn at the same rate until the end of year 10.

7 A. Shomos, & M. Forbes, 'Literacy and Numeracy Skills and Labour Market Outcomes in Australia', *Productivity Commission Staff Working Paper*, Canberra, 2014.

8 Australian Government Office of the Chief Scientist, *Science and maths in Australian secondary schools*, Australia, 2016.

9 Ibid.

10 Ibid.

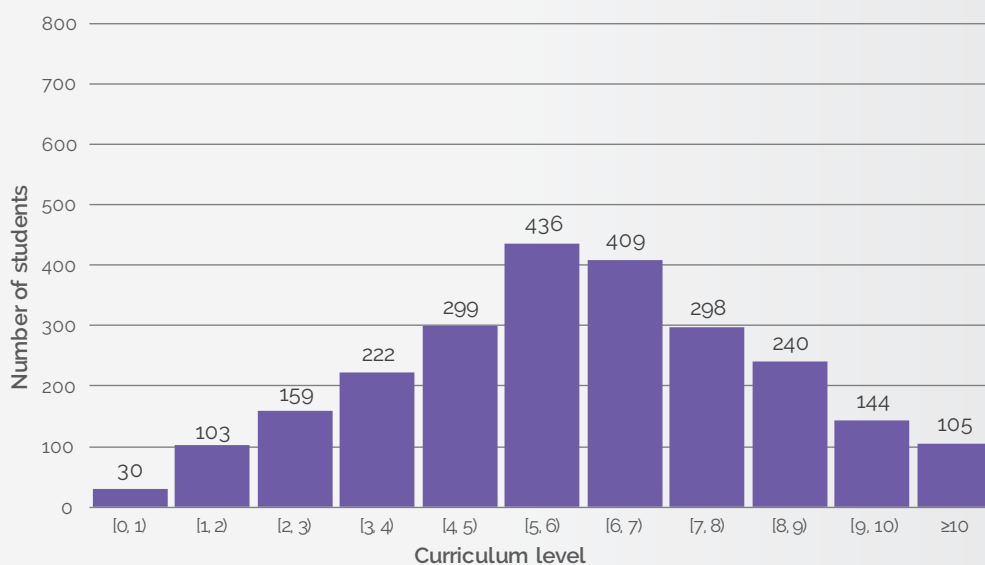


Figure 3: Students' projected curriculum level at the end of Year 10, with a traditional mathematics program (n=2445)

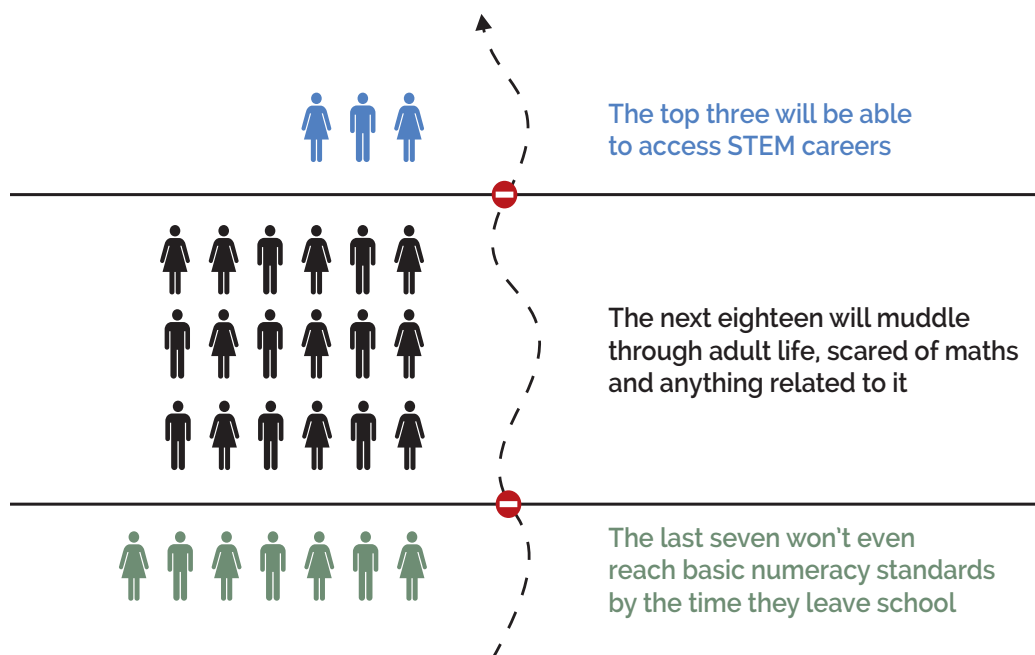


Figure 4: The typical trajectory in mathematics for Australian students

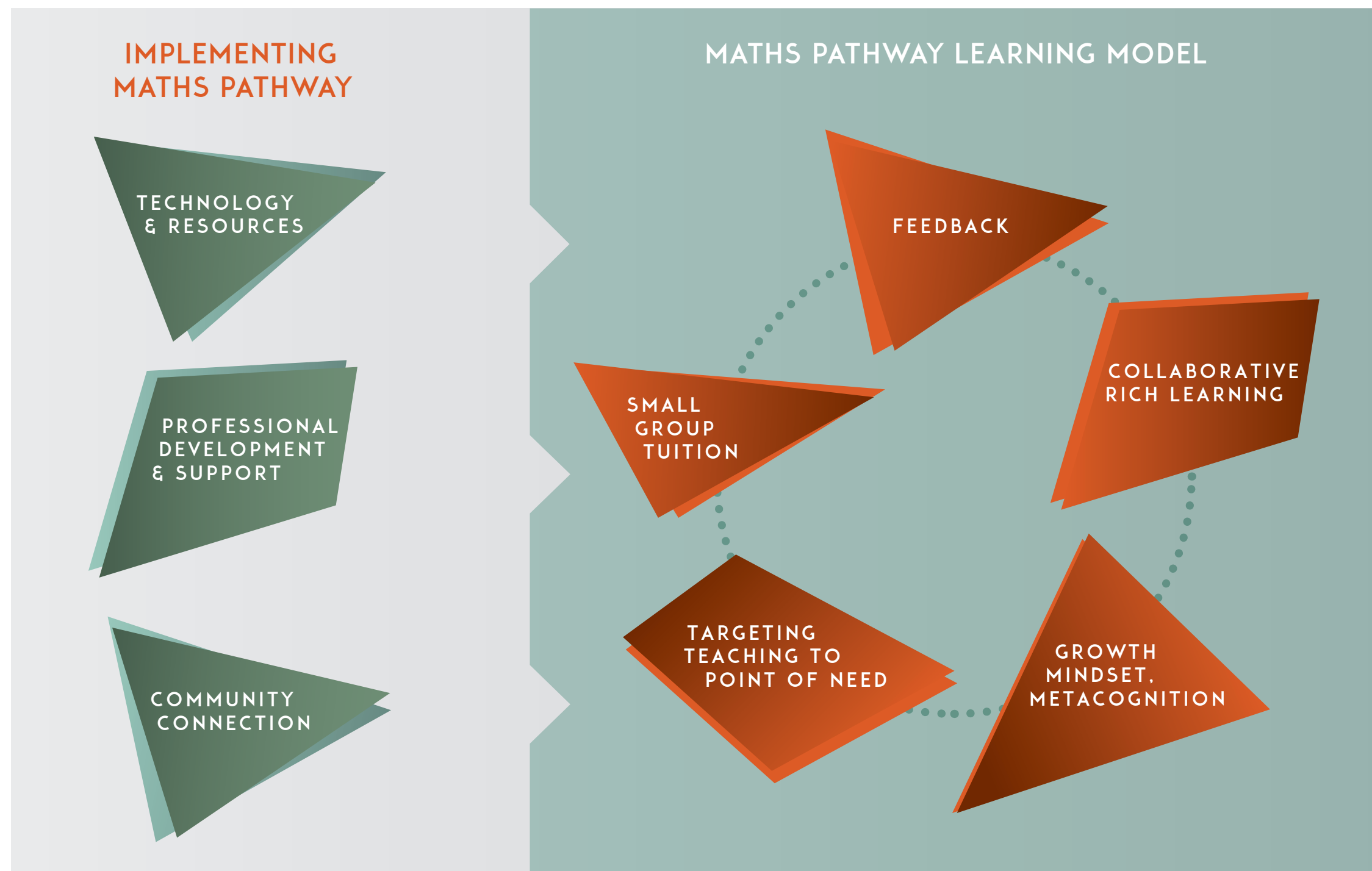
THE MATHS PATHWAY MOVEMENT

OUR APPROACH

To change the trajectory for students, a growing movement is reimagining the way mathematics teaching and learning looks.

Teachers in Maths Pathway Schools implement an integrated and holistic Learning Model, encompassing the structure, teaching and assessment of mathematics for students from Grade 5 through to Year 10. Every Maths Pathway School receives digital technology, resources, professional development and ongoing support, as well as becoming connected to a broader values-aligned community. This equips and enables those schools to implement the Maths Pathway Learning Model.

The Learning Model ties together elements of evidence-based practice from education research, including feedback, metacognition, and small group tuition, which are among the highest impact approaches within the Evidence for Learning 'Teaching and Learning Toolkit'.¹¹ The Learning Model also responds to Carol Dweck's research on growth mindset;¹² Jo Boaler's research on rich, collaborative learning in mathematics;¹³ and the Grattan Institute's call to target teaching to every student's point of need.¹⁴



¹¹ Evidence for Learning (EFL), *All Approaches – Full Toolkit*, 2016. Accessed 2 January 2017, <http://evidenceforlearning.org.au/the-toolkit/full-toolkit/>.

¹² C. S. Dweck, *Mindset: The new psychology of success*, Random House, New York, 2006.

¹³ J. Boaler, *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching*, Jossey-Bass, San Francisco, 2015.

¹⁴ Goss et al., op. cit.

TARGETING TEACHING TO POINT OF NEED

"In the past, you were worried about bringing the kids who weren't ready along. They tended to slow the rest of the class' progress and you would need to spend a lot of time completing the material. Now because each student is working on material at their level, they are making more progress in a smaller amount of time."

Louise Mansfield, St Peter's College Cranbourne

"We have several Year 8 students who are so far ahead of their cohort. In the previous type of classroom, they would have been bored out of their brains."

Jacqueline Lee, Emerald Secondary College

"We're really trying to get the students to understand that maths is a continuum, and that to be good at it we need to make sure you understand all of it and try to build it up from there. Because if you try to learn stuff that you don't have a good foundation for, then you will struggle to learn it."

John Rainbow, East Doncaster Secondary College

GROWTH MINDSET, METACOGNITION

"I'm teaching that learning takes effort; you're not actually learning unless you're trying and testing your knowledge, making mistakes and trying again."

Jacqueline Lee, Emerald Secondary College

"Students realise that what they're rewarded for is taking the time to understand the content and express it, rather than just knowing how to do it. We're trying to embed those soft skills. The long-term goal for the students and the staff is for students to be really self-efficacious; so to recognise what they do know, what they don't know and when to seek help. We'll have students who are capable learners and they will fly because they'll know exactly what they need to learn and when and they'll be a lot more articulate about it."

John Rainbow, East Doncaster Secondary College

"Because the tests are regular, I can see from them if there's a common mistake, which I can explain before the lesson. Also, the quiet students are more noticeable now. With the feedback cycle, you talk to every single student."

Chris Hill, Epping Secondary College

"The process of that feedback conversation is so deep and even though the conversation might only go for 10 minutes, the amount of mathematical knowledge we go through is amazing. From the start to the end of the discussion you can see what their effort has been for the last two weeks and it's a massive achievement for the student and a buzz for the teacher. They clearly understand it and they're linking ideas together and bringing other ideas in from other students because they can express things in different ways."

John Rainbow, East Doncaster Secondary College

FEEDBACK

"Students do problem solving type tasks, probably two or three lessons a fortnight. I know in my class there is a lot of moving around, they're working in different groups and asking a lot of questions. We're ensuring that we're making it accessible to all the students with the tasks we're doing."

Andrew Wood, Marist-Sion College Warragul

"Hands-on lessons are more vibrant and chatty but they do focus on the work. Students are genuinely interested and I get asked lots of questions."

Tony Curnick, Newcomb Secondary College

COLLABORATIVE RICH LEARNING

"Generally each mini lesson goes for about half an hour. They're definitely getting rich, hands-on exposure which is important when you teach a new skill and the best thing about it is that I know I'm only targeting the students that are ready for it."

Thomas Moore, Lilydale High School

"The data is giving me an idea of where my students sit for a particular topic or zone - and that's given me a chance to group students based on their understanding of a particular area."

Louise Mansfield, St Peter's College Cranbourne

SMALL GROUP TUITION

THE MATHS PATHWAY MOVEMENT

THE MOVEMENT SO FAR

In 2013, the Maths Pathway team started trialling the Learning Model with one school in Melbourne. By December 2016, 109 schools across Australia and overseas have become part of the growing Maths Pathway Community.

Figure 5: Maths Pathway Schools over time

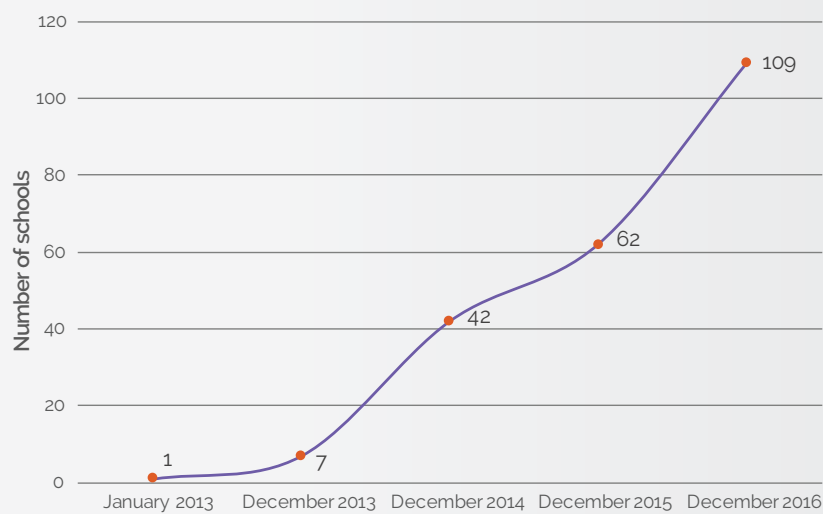
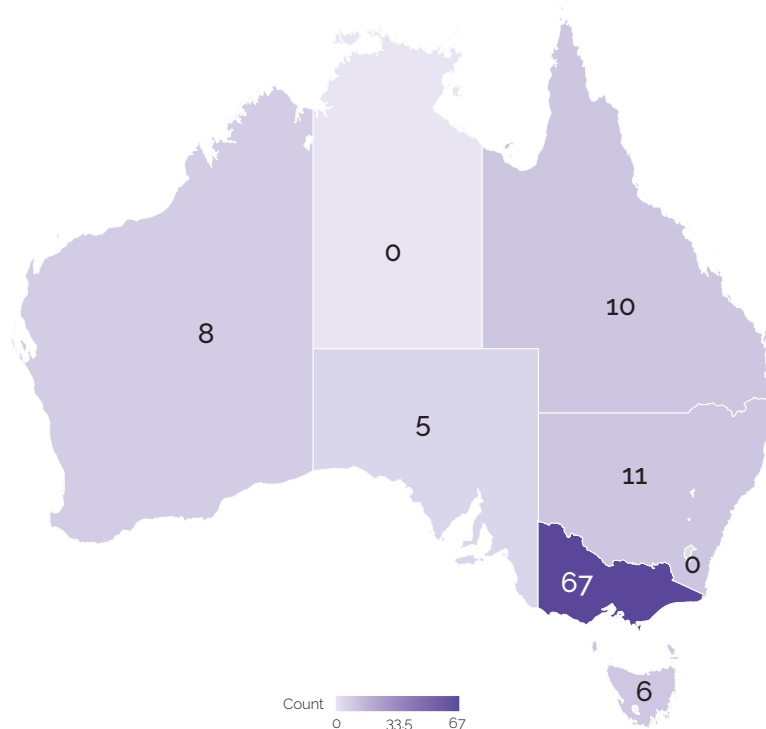


Figure 6: Maths Pathway Schools across Australia (n=107)¹⁵



¹⁵ The two international Maths Pathway Schools are excluded from this figure.

Across the community, there is a mix of Primary and Secondary schools from every Australian state, as well as from the United States and United Kingdom. There are schools from every sector (Government, Catholic and Independent), and a wide range of socio-economic backgrounds.¹⁶ Tertiary students at La Trobe University are also using Maths Pathway as part of their teacher training and to support their transition into the profession.

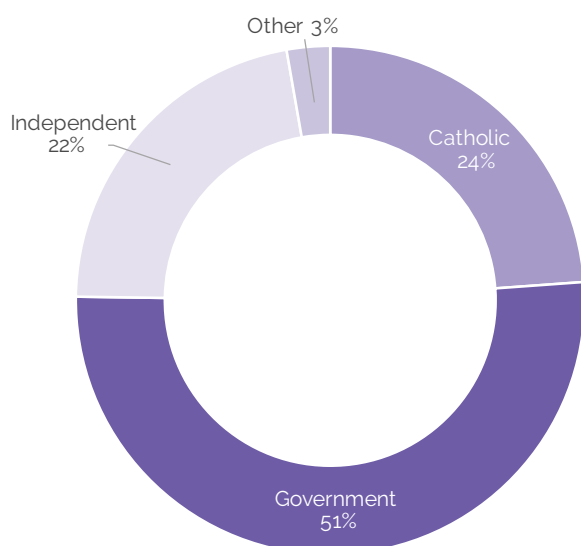


Figure 8: Maths Pathway Schools by sector (n=109)

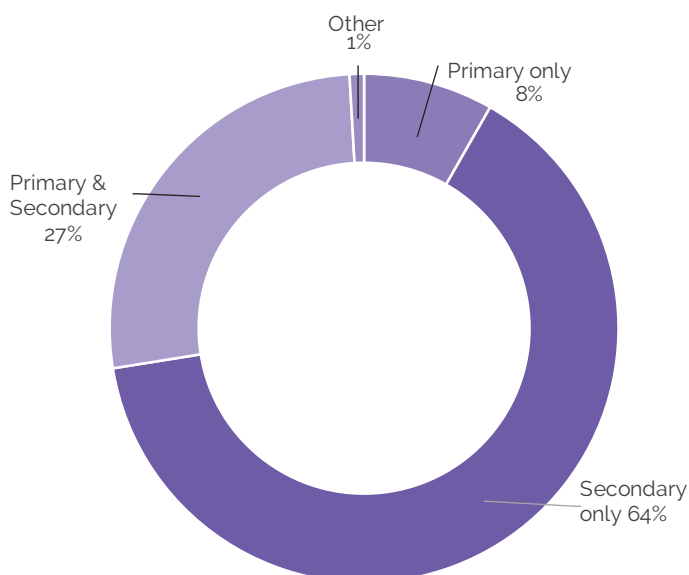


Figure 7: Maths Pathway Schools by primary/secondary level (n=109)

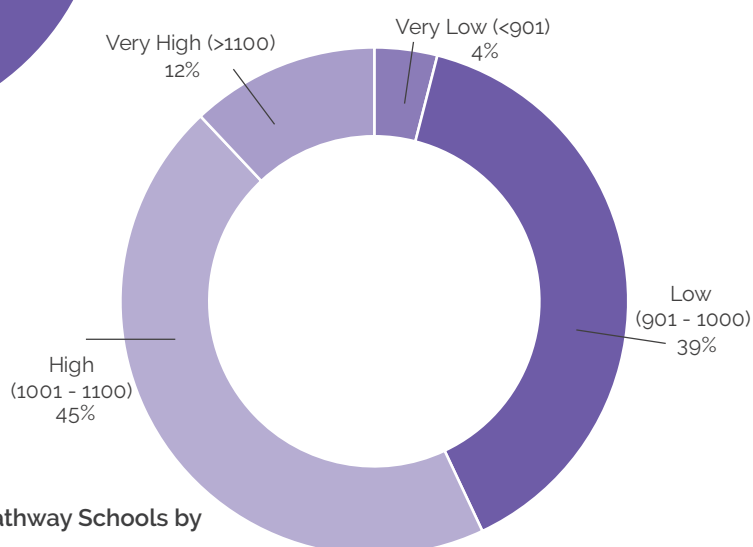


Figure 9: Maths Pathway Schools by Index of Community Socio-Educational Advantage (ICSEA) level (n=100)¹⁷

¹⁶ Australian Curriculum, Assessment and Reporting Authority (ACARA), *MySchool: Guide to understanding ICSEA*, Sydney, 2011.
¹⁷ University and international partner schools have been excluded from this Figure, as have six other partner schools that do not have an Index of Socio-Educational Advantage (ICSEA) level assigned. ICSEA is a scale used to indicate the socio-economic background of a school's student population. The average ICSEA of schools across Australia is 1000. ACARA, op. cit.

IMPACT FOR STUDENTS

IMPACT ON STUDENTS' RATE OF LEARNING

The Maths Pathway Learning Model is driven by the notion that every student can achieve success in mathematics.

To support mastery and a deep understanding of what they learn, students access content that they are ready for. So, in any given class, different students can be learning different content at the same time.

This also means that students can be assessed on different content. Feedback from these assessments does not focus on the percentage of questions answered correctly as this has a different meaning for each student's assessment. Instead, the metric of 'Growth Rate' is used as an indicator of students' success.

Growth rate measurements emphasise both the value of continual development and of building on pre-existing or new knowledge. This metric reflects mastery over new mathematics students have been exposed to, as well as over mathematics from earlier schooling which they did not deeply understand. Growth rates are calculated based on the amount of curriculum content that a student has mastered via assessments. Units of "curriculum levels per year" are used to express growth rates. Table 1 shows how to interpret these units.

In order to see the impact of the Maths Pathway Learning Model on student growth rates — the growth rate prior to using Maths Pathway and when following a traditional mathematics program — can be compared with the growth rate after using Maths Pathway over the course of a school year. Figures 10 and 11 show the growth rates for Year 7 students in 2016 using a traditional mathematics program as compared with the Maths Pathway Learning Model.¹⁸

The growth rate under a traditional mathematics program is an indication of how much of the curriculum content students had been learning per year, before starting with Maths Pathway. It is calculated by assessing students' mathematical understanding the first time they are diagnosed over at least 90% of the curriculum from level one to 10. This is based on the assumption that all prior learning in mathematics happened between the start of primary school and the end of Year 6, with diagnostic assessment capturing all of this learning.

A student who is "keeping up" with the mathematics course has a growth rate of one

Table 1: Interpreting 'Growth Rate'

GROWTH RATE	MEANING
0.50 curriculum levels per year	The student is on track to learn half a year's worth of mathematics every 12 months.
1.00 curriculum level per year	The student is on track to learn one year's worth of mathematics every 12 months.
2.00 curriculum levels per year	The student is on track to learn two years' worth of mathematics every 12 months.

¹⁸ Both figures draw upon the same sample as in footnote 4.

curriculum level per year. As highlighted in Figure 10, just over one per cent of students using a traditional mathematics program (that is, 33 out of 2445) had a growth rate that was at

or above 1.00. Across all students the average growth rate was 0.54 curriculum levels per year — meaning that just over half of a year's curriculum content was being learned per year.

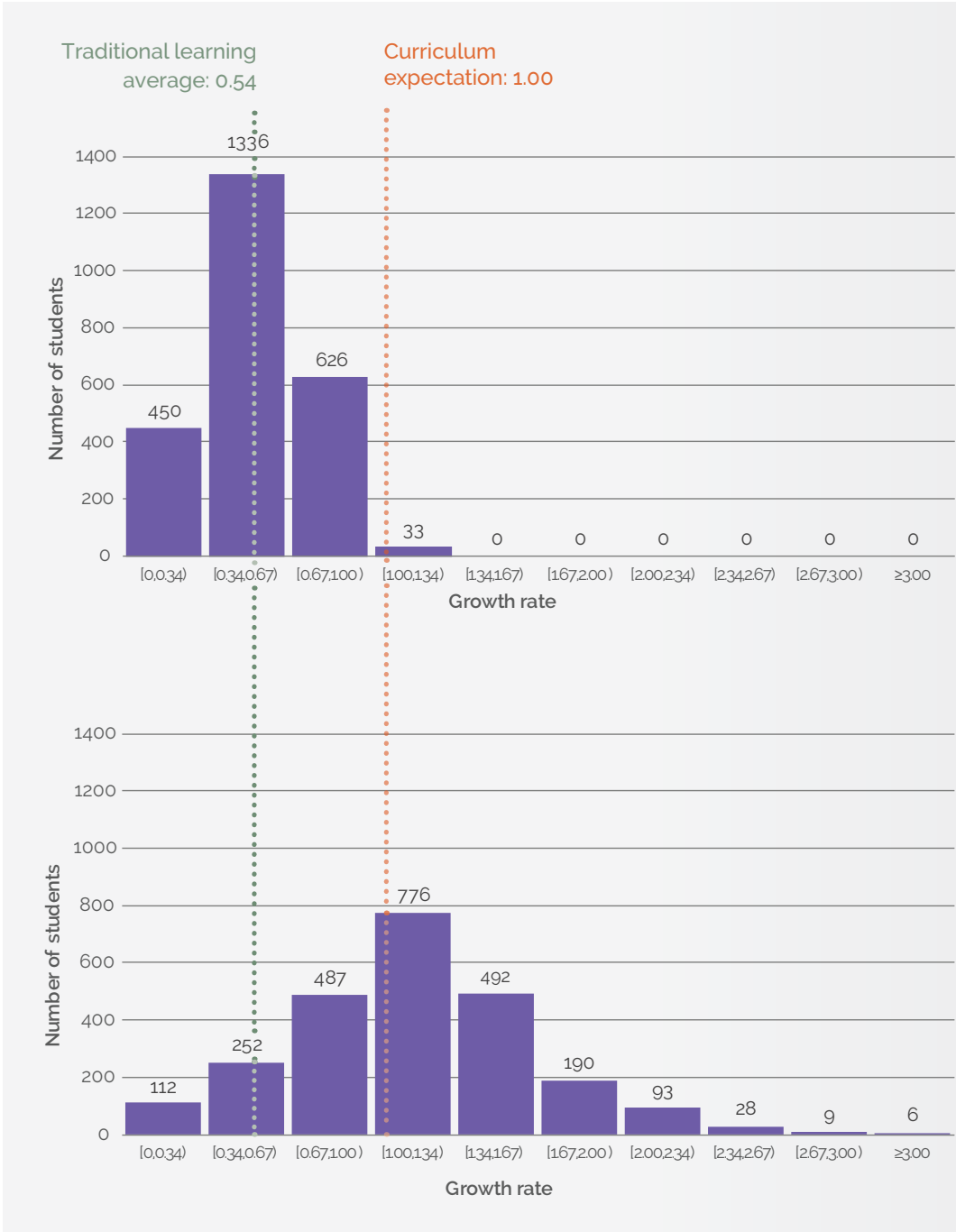


Figure 10:
Traditional
learning
growth rates
(n=2445)

Figure 11:
Maths Pathway
growth rates
(n=2445)

MORE THAN DOUBLE

0.54
curriculum levels
per year

Traditional Mathematics Learning

1.18
curriculum levels
per year

Learning with Maths Pathway

Comparing Figure 10 with Figure 11 shows the change in growth rates for students when using Maths Pathway. Figure 11 highlights that, at the end of 2016, 65% of Year 7 students using Maths Pathway (that is, 1594 out of 2445) had a growth rate at or above 1.00. On average this end-of-year growth rate for students was 1.18, indicating that more than a year's curriculum content was being learned per year. Compared with the average prior growth rate of 0.54, this means that with Maths Pathway students are learning just over double the amount of new mathematics each year.

To further measure student progress when using Maths Pathway, some schools have collected additional data. This has been done using the National Assessment Program – Literacy and Numeracy (NAPLAN)¹⁹ and On Demand,²⁰ which are two standardised assessments used by schools across Australia and Victoria respectively. Among secondary students, NAPLAN is done in Years 7 and 9.²¹ Cohort gain or 'NAPLAN growth' — as referred to by Maths Pathway Teacher, Jacqueline Lee — is the difference in student achievement between the testing done in Year 7 and Year 9. Commonly used by schools, cohort gain provides an indicator of impact that schools have on student learning outcomes in literacy and numeracy.

"Our Year 7 to Year 9 NAPLAN growth was 62% of the national average in 2013, 88% in 2014, 49% in 2015, and now 118% in 2016. The 2016 cohort was the first who had done Maths Pathway all the way since year 7."

Jacqueline Lee, Emerald Secondary College

"We did end of May testing for On Demand. We had two classes that had growth of one full curriculum year from the start of the year — so over about 4 months. Enhanced curriculum classes grew 1.4 years in 4 months. We tested in early February and late May. Not a single child in Year 7 or 8 went down — they all had positive On Demand growth, where usually it goes up and down."

Tony Curnick, Newcomb Secondary College

19 Australian Curriculum, Assessment and Reporting Authority (ACARA), NAP: *National Assessment Project*, 2016. Accessed 2 January 2017, <https://www.nap.edu.au/>.

20 Victorian Curriculum and Assessment Authority (VCAA), 'On Demand Testing Home', in *On Demand Testing*, n.d. Accessed 2 January 2017, <http://www.vcaa.vic.edu.au/Pages/prep10/ondemand/index.aspx>.

21 Australian Curriculum, Assessment and Reporting Authority (ACARA), 'Gain', in *National Assessment Program: Glossary*, 2016. Accessed 2 January 2017, <http://www.nap.edu.au/information/glossary#g>.



IMPACT FOR STUDENTS

IMPACT ON STUDENTS' TRAJECTORY

Where students end up at the conclusion of Year 10 is important, as it provides an indicator of what mathematics and STEM-related pathways they will be able to access, and how numerate they will be throughout their lives.

The estimated curriculum levels that Year 7 students would reach by the end of Year 10, without Maths Pathway are shown in Figure 12. Four per cent of the Year 10 students (that is, 105 out of 2445) would be projected to attain a curriculum level of 10 or higher.²² This suggests that many students would not be sufficiently prepared for continuing with mathematics in the senior years of secondary school. However, when students improve their rate of learning, this impacts their level of attainment over time.

Figure 13 shows the trajectories of those same students, based on the growth rates with Maths Pathway. As the figure highlights, 29% of students (that is, 720 out of 2445) are projected to be at or above curriculum level 10 by the end of Year 10 when using Maths Pathway. While all students would ideally be at this level, the data suggests that Maths Pathway Students are better prepared for continued mathematics studies in Year 11 and beyond.



²² See footnote 5 regarding attainment of curriculum levels greater than 10.00.

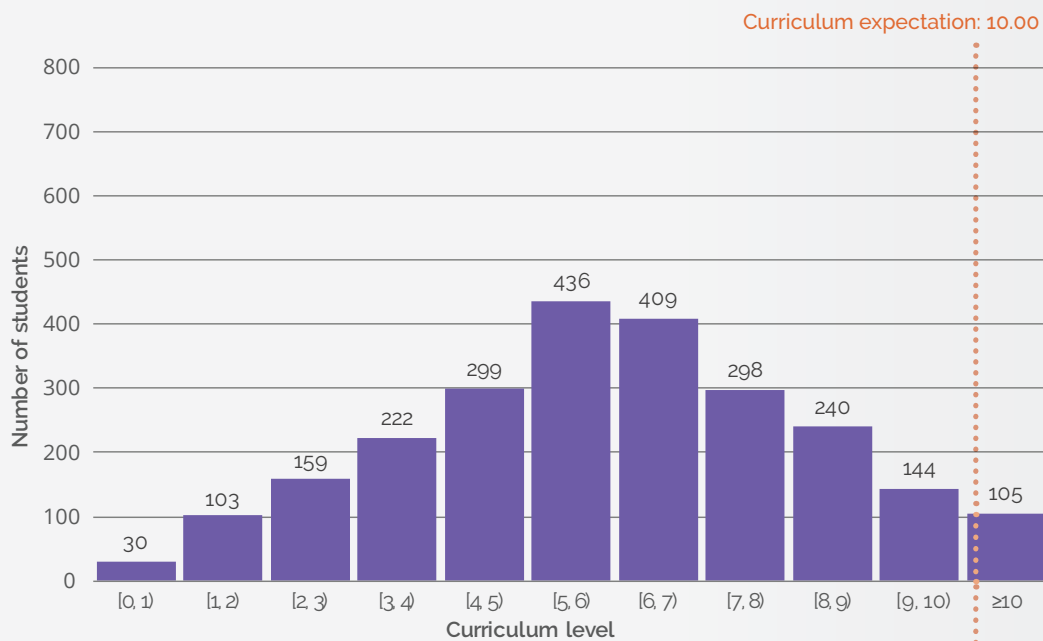


Figure 12:
Under a traditional mathematics program, the projected curriculum levels for students at the end of Year 10 (n=2445)

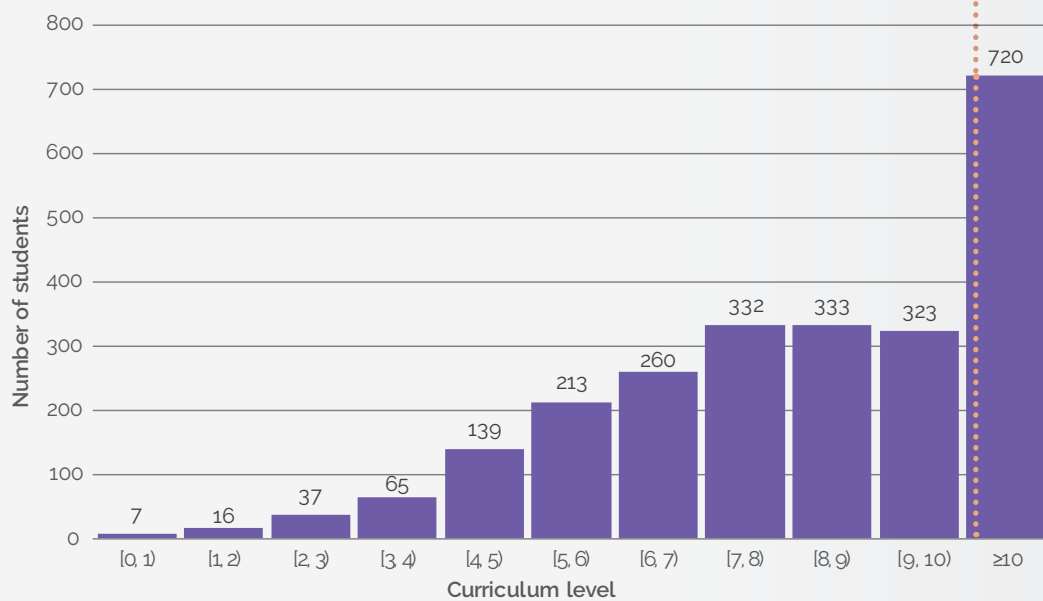


Figure 13: With Maths Pathway the projected curriculum levels for students at the end of Year 10 (n=2445)

IMPACT FOR STUDENTS

IMPACT ON STUDENTS' TRAJECTORY

In line with students' projected curriculum levels, Maths Pathway Teachers have noted ways that they are better able to prepare students for learning mathematics in Years 11 and 12. Using Maths Pathway data, teachers have been able to be more responsive with students about their progress and required preparation for senior

mathematics subjects, well before decisions need to be made about enrolment into those subjects. In the following stories, reference is made to General Maths, Maths Methods and Specialist Maths, which are the Year 11 and 12 basic, intermediate and advanced mathematics subjects taught in some Australian states.

"I like the idea that I'm pushing those top-level kids to realise that, despite being a year and a half ahead, you should still be growing one year in a year. Low level growth and sitting and doing the easy thing is not acceptable. We still need to be pushing them and not allow them to assume they're always going to get 99% on something. Those types of students have often given up when they get to Maths Methods and Specialist Maths because they're used to things being easy straight away. I'm really looking forward to Maths Pathway students getting up to higher level maths because they've learnt to be pushed all the way through. Maths Pathway has allowed us to do that."

Jacqueline Lee, Emerald Secondary College

"We're using the data to inform our Year 9s in their subject selection for Year 10. Then we're going to meet regularly with those students who want to move onto Maths Methods, to ensure that their level, growth and effort are of a standard that will set them up well to enter Maths Methods in Year 11. We will work with and monitor those students and give them targets so that they're well prepared for the end of next year."

Jenny Sutton, Lavalla Catholic College Traralgon

"I'd prefer a student not to make a mistake with fractions than to really understand quadratic algebra before Year 11; I could potentially teach them quadratics quite quickly but I don't have time to go back and teach them basic algebraic fractions and ratios when we're trying to get through the Year 11 course. I explained to students that it could be possible if they can work at a certain level and catch up and gain the growth rate. One student was able to, throughout the year, complete between 10-14 worksheets a fortnight and was passing 8-9 of them. His growth rate was outstanding and he ended up passing students who were way ahead of him at the beginning of the year — just through sheer guts and determination. If I had him in Year 11 Maths Methods in the traditional style he would have struggled through, not knowing the basic number and algebra skills. His work ethic would have got him some way in Maths Methods but the constant risk of making a numerical error would have made his answers nonsensical and it would have been too hard to fix at such a late stage."

Jacqueline Lee, Emerald Secondary College



IMPACT FOR STUDENTS

IMPACT ON OTHER STUDENT LEARNING OUTCOMES

Using Maths Pathway has enabled teachers to work with students on underlying learning skills, such as organisation and accuracy of work, as well as mindset and attitudes.

Here are some stories of the impact that this has had for Maths Pathway Students:

"One student got a 150% growth rate. But it wasn't the growth rate that left her speechless, it was the fact that she had achieved level 4. She couldn't sit still next to me to get her feedback. She couldn't speak, she kept walking away and coming back. When I asked her what was wrong, she was shaking and said, 'I've gone up a level! I'm level 4!' She was so proud of herself and was so excited. She knew level 4 was Grade 4 level, but it was a real hurdle for her that she'd had success and had gone up a level and now felt she was part of the class."

Jenny Sutton, Lavalla Catholic College Traralgon

"At parent-teacher interviews with one student, I asked her how she was finding maths this year and she said 'I love it!' This is a particular student who is working at level 3 or level 4 in some areas and I said, 'Why do you love it?' She said, 'Well, I can actually do work at my level. I'm actually getting it, I'm seeing an improvement and can follow what I'm doing and I know what I'm doing.'"

Andrew Wood, Marist-Sion College Warragul

"Prior to Maths Pathway we had a grouped approach. We had stronger, weaker and middle students grouped together. One student was in the bottom group — she was weaker at maths and didn't really have a positive view of it. Her family was okay with that and would say 'She's not very good at maths.' But after starting Maths Pathway at level 3 she's now developed the confidence in her own ability to be able to at times access content at a Year 9 level — which in our previous system wouldn't have been possible. Her growth is celebrated alongside her more capable peers. So it's not about how good she is at maths in terms of the traditional levels — it's about how much she's learning and how much progress she's making. That's had a really big impact on the way she sees herself as a maths student."

Louise Mansfield, St Peter's College Cranbourne

"One student has always struggled at maths and used to be behaviourally disengaged because the work that was being set was too difficult. He just didn't want to be there. It took him six weeks of doing Maths Pathway before he realised he could attempt the work. If you were sitting down with him he would do it, but as soon as you walked away it was back to the old habits. Eventually after doing a few strategies and realising he could actually achieve it, he started enjoying some of the problems. He ended up doing really well in terms of his accuracy and growth rates, which was a massive change for that student. To pitch the work to their level makes it so much easier."

John Rainbow, East Doncaster Secondary College



IMPACT FOR TEACHERS

TEACHER EXPERTISE AND PRACTICE

Teacher expertise and practice, both in and out of the classroom, are integral for the success of any student learning programme.

Maths Pathway embeds world-class teacher professional development in the Learning Model. This is designed to bring the community of teachers together to learn, make new connections and most importantly to enable

long-lasting impact. Maths Pathway Teachers engage in professional development events and online modules. These modules are used to then inform discussions that are run during regular meetings with a mathematics department.



IMPACT VIA PROFESSIONAL DEVELOPMENT

In 2016, professional development events were run in every mainland Australian state, reaching out to more teachers than ever before. Three types of events were held: Trainer Retreats, Rich Learning Labs and PATH16.

	Trainer Retreats	Rich Learning Labs	PATH16 Conference
	Teachers become change leaders in the transition to the Maths Pathway Learning Model. Careful plans for working with school leadership, parents, students and other teachers are developed. Teachers become part of a nation-wide community.	Teachers build capacity in design thinking and pedagogy for rich learning. Teachers create and access a range of new resources to use with rich learning. Teachers connect and collaborate with other mathematics teachers.	Teachers connect and collaborate with a nation-wide community of mathematics teachers driving reform to improve mathematics learning. Teachers workshop and design solutions for challenges faced in their school contexts.
Number of events	13 events	2 events	1 event
Number of participating teachers	242 teachers	58 teachers	23 teachers
Number of participating schools	136 schools ²³	34 schools	14 schools
Percentage of teachers recommending this event	97% of teachers	100% of teachers	96% of teachers
	"I am well prepared or have access to the necessary resources to implement Maths Pathway."	"It was valuable seeing what a 'rich task' should look like."	"I loved the respect for teaching and teachers that was evident in every session."
	"I'm excited, a little anxious, but am confident."	"Collaborating and sharing with other schools was great."	"It was great to have the chance to stop and reflect and to support each other."

23 This number includes schools that are new to the Maths Pathway Community and are not part of the total number of schools presented in Figure 5.

IMPACT FOR TEACHERS

IMPACT ON TEACHER PRACTICE

When transitioning to Maths Pathway, teachers complete online professional development modules on all aspects of the Learning Model.

This encompasses:

- Lesson structure, fortnightly learning cycles, and establishing routines
- Use of data for assessment, feedback, and reporting
- Pedagogical practices to drive student learning and to embed a positive classroom culture
- Adopting a continuum approach to mathematics, including alignment to curriculum standards
- Communicating and working effectively with parents

The stories below highlight how this professional development impacts on the work that Maths Pathway Teachers do, both inside and outside the classroom.

“My classroom is completely flipped. Instead of me standing at the front writing on the board, I have students writing on the board if they have a question for me. It's a very different way of running the classroom.”

Chris Hill, Epping Secondary College

“I know where each student is at with a lot more detail and with a lot more specific knowledge of the student's skills and abilities than I had before. In the past if students were actively asking for help I'd know they were struggling but I didn't have a lot of formative data to use. I had a pre-test, but that was it. Now I have much more data to draw on to know where students are at and what they should be doing. And therefore my interactions with the students are much more personal and targeted.”

Louise Mansfield, St Peter's College Cranbourne

“We have to be skilled, adept and flexible. Maths Pathway highlights the difference between just in case teaching and just in time teaching. Just in case teaching means I'm going to explain this problem to you just in case you need to do it whether you're ready or not. Now I have kids coming up to me when they're ready.”

Chris Hill, Epping Secondary College

“We did have a lot of traditional style teachers, but this year when the principal has been asking them about Maths Pathway they've said 'I never realised how wide the abilities of our students were', 'I couldn't go back to textbook teaching' and 'How effective is it to be teaching students at level and seeing their growth?’”

Jacqueline Lee, Emerald Secondary College

IMPACT ON COMMUNITIES OF PRACTICE

Communities of practice within schools are an important part of teacher professional development. They involve teachers supporting each other to develop their practice and to enhance student learning. Maths Pathway Teachers have highlighted changes to the way colleagues support one another's classes, and to the conversations that are had in staffrooms.

"I worked closely with a staff member who was struggling. After doing Maths Pathway her classes totally changed. They're much more engaged and focussed. She's now beaming about the program and really raving about how it's going."

Thomas Moore, Lilydale High School

"Often before we used Maths Pathway, teachers would be feeling frustrated saying 'I can't believe they can't get this. I explain it carefully and slowly as best I can.' Now I have really happy stories, with teachers saying 'I can't believe they're doing this'. It's a great moment when a teacher can be proud of what's happening in their class."

Chris Hill, Epping Secondary College

"Rather than the mundane, 'Who's writing the test?', all our conversations are now around 'What are the investigation tasks we're doing? How are we engaging the students? What are the soft skills and how are we developing them? What do you use in your class?' We're sharing those stories and making sure that our tasks have a good flow from Year 7, 8, 9 into Year 10. That's amazing. This year was a huge difference to any other year. It's been really, really good."

Jenny Sutton, Lavalla Catholic College Traralgon

"We've started doing mini lessons. We've been doing more observations to give teachers a chance to practice running them. One teacher observes while the other teacher conducts a mini lesson to get confidence."

Thomas Moore, Lilydale High School

A BRIGHT FUTURE

The Maths Pathway Community — the teachers, the schools, as well as Maths Pathway staff – have much to be proud of. Together, we are building a world where everyone can embrace the complexity, value and beauty of mathematics.

We are so excited to have been able to share with you stories and data on the impact being achieved for thousands of students and teachers. To be able to deepen that impact across the Maths Pathway Community – from those who have been involved since the very beginning, to those who are new – there is much work still to be done. Many improvements and innovations are currently underway: a full offering of rich learning tasks, upgrades to

individual learning activities, better and more integrated professional development, and a stronger focus on student mindsets and effective learning behaviours.

For the educators, students, parents, and lovers of mathematics, we hope that the 2016 Impact Report opens up conversations, sparks ideas and raises new questions about what a mathematics education for all students can look like.







Headquarters:

53 Park Street
South Melbourne
Victoria, Australia
3205

Phone: +61 3 9910 4737

Email: hello@mathspathway.com

