Melbourne Graduate School of Education
Assessment Research Centre

Realising the Potential of Australia's High Capacity Students

Findings and Recommendations

20th June 2018

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Executive Summary

The major aim of this research project was to identify teaching strategies that are related to high capacity students' academic growth in mathematics and reading comprehension. An important condition was that growth for all class members of varying abilities was also maintained. Previous research had demonstrated that students who are performing in the top quarter of their class are not growing as much as their peers in the middle years (Years 5–8) (Care, Griffin, Zhang, & Hutchinson, 2014). This project combines mixed-methods data collection-based research with professional development (PD) programs and assessment testing tools, so researchers, teachers, schools and students benefit similarly.

During 2015, workshops, interviews and observations of successful teachers (those who had maintained growth for their high capacity students in 2014) revealed elements of teaching practice thought to promote the growth of high capacity students. These teaching strategies were combined with those approaches already promoted through the Assessment Research Centre into a PD program for teachers and schools across Victoria who were invited to participate in the Realising the Potential of Australia's High Capacity Students (REAP) project in 2016 and 2017.

A total of 58 primary and secondary schools in Victoria participated in the data collection phase of the project, including a range of high and low performing schools from metropolitan and rural areas from all four regions across Victoria. Over 10,000 students were assessed for their content knowledge in the areas of mathematics, mathematics-based problem-solving and/or reading comprehension. The assessments were administered via the Assessment Research Centre Online Testing System (ARCOTS).[1] ARCOTS places students on a scale that describes a developmental progression covering skills and knowledge linked to the relevant curriculum from Grades 3 to 10. Teachers selected the appropriate level test for students based on their level of proficiency rather than the student's grade level. This allowed high performing students to be assessed more accurately. Traditional tests might not accurately measure the performance of high performing students because of a ceiling effect. Teachers were directed to administer the assessments to their whole class. Testing took place in March/April (T1) and September/October (T2) of each year. Growth of the students over the seven-month period was measured, and this provided an opportunity for researchers to examine which teaching practices were related to improved student outcomes.

In addition, teachers participating in the project completed PD modules about supporting "high capacity students" (Appendix A). Each module contained both PD information and "apply to practice" activities that structured opportunities to explore practical ways to teach high performing students. In addition to

[1] For more information, see www.education.unimelb.edu.au/arc/arcots

assessing subject content (mathematics and reading comprehension), student self-regulated learning (SRL) competence was assessed. The teachers' level of implementation of classroom practices in teaching SRL was also investigated. Specifically, several questionnaires were administered to better understand how teachers support high capacity students in their classrooms.

Strategies collected from teachers were compared with student growth to uncover a series of evidence-based resources for supporting high ability students, which were disseminated as a series of four units for the FUSE DET website (Appendix B). A series of videos were also produced to reinforce the concepts discussed in these units. Teachers selected for interview had high student growth in their classes in 2016, including for their high capacity students. Links to relevant videos were provided throughout the units.

Successful strategies for supporting high capacity students in mathematics included using online learning; curriculum extension activities, tasks or programs; specific interventions for high capacity students such as real-life problem solving-based tasks; setting appropriate learning goals and challenging students at their level of ZPD; and facilitating like-ability peer interactions.

Successful strategies for supporting high capacity students in developing reading comprehension skills included selecting or modifying tasks given to students according to ability and modifying whole-class instruction based on assessment data. There was evidence that supporting students' SRL could encourage growth in reading comprehension skills. Some teachers were found to have reading comprehension abilities lower than their students, resulting in reduced growth for the high capacity students in those classes. This project found evidence that content needed to be correctly targeted to the student's ability level (zone of proximal development; ZPD) in order to provide the opportunity for high capacity students to learn.

Students' SRL behaviours were shown to impact student performance, while students in Grade 8 demonstrated less use of quality SRL behaviours. Secondary teachers were measured to be applying less explicit teaching of SRL skills in their classrooms, possibly explaining students' reduced use of these skills.

Factors contributing to a classroom climate for growth included creating a safe classroom climate where students were not afraid to take risks in their learning, sophisticated decision-making about classroom planning and targeted teaching based on student ZPD.

Factors inhibiting targeted teaching included inadequate time for lesson planning, difficulty in catering for the large spread in abilities in the classroom, student behavioural issues, a need to focus on low capacity students and prescriptive curriculum or assessment structures that inhibit targeted teaching.

Themes

1. Identifying high capacity students
2. Supporting high capacity students in their learning
3. Assessment for growth
4. Reliable rubrics
5. Zone of actual development (ZAD)
6. Zone of proximal development (ZPD)
7. Mathematics and mathematical problem-solving
8. Reading comprehension
9. Self-regulated learning (SRL)
10. Differentiation and targeted teaching
11. Monitoring progress
12. Sustainability

Participants

Fifty-eight unique schools participated over the two-year data collection phase (2016–2018). Selected teachers from additional schools from Assessment and Learning Partnerships (ALP) classes who had growth for top quarter students were involved in 2015 to assist researchers in identifying positive teaching practices for student growth.

In 2016, 8,836 students from 43 schools took part in the project, and in 2017, 6,096 students from 30 schools (15 retained from 2016) took part in the project. Student numbers are totals. These include non-research students, students not in the age bracket of the project (Grades 5–8), and students who completed only one test or questionnaire from the project. The numbers of students involved in particular analyses are listed in totals.

Participating Schools:

- Albert Park Primary School
- Alkira Secondary College
- Baranduda Primary School
- Belmont High School
- Benalla P–12 College
- Bentleigh Secondary College
- Blackburn Lake Primary School
- Brighton Beach Primary School
- Brighton Primary School
- Broadmeadows Valley Primary School
- Buckley Park College
- Burwood Heights Primary School
- Carnegie Primary School
- Caulfield Junior College
- Doncaster Gardens Primary School
- Drysdale Primary School
- Elisabeth Murdoch College
- Eltham High School
- Fitzroy High School
- Footscray City College
- Forest Hill College
- Fyans Park Primary School
- Geelong South Primary School
- Glen Eira College
- Hume Central Secondary College
- Karoo Primary School
- Kingston Heath Primary School
- Kingsville Primary School
- Langwarrin Primary School
- Leopold Primary School
- Lyndale Secondary College
- Manorvale Primary School
- McKinnon Secondary College
- Melton Secondary College
- Mornington Secondary College
- Mount Eliza Primary School
- Mount Macedon Primary School
- Mount Ridley P–12 College
- Mount Waverley Secondary College
- Northcote High School
- Ocean Grove Primary School
- Plenty Parklands Primary School
- Spensley Street Primary School
- St John's Greek Orthodox College
- St. Mary's Williamstown
- Stonnington Primary School
- Sydney Road Community School
- Tarneit P–9 College
- Templestowe College
- Templestowe Heights Primary School
- Trafalgar High School
- Truganina P–9 College
- Tucker Road Bentleigh Primary School
- Victoria University Secondary College
- Wattle Park Primary School
- Wesley College Melbourne
- Yarra Valley Grammar School
- Yarraville West Primary School

Findings

Reading Comprehension

In the REAP project, students' ZPD was measured on a reading comprehension developmental continuum, using ARCOTS. Tables 1 and 2 and Figure 1 show the distribution of the ZPD progression levels that students measured in 2016 and 2017 (T1). Student differences over the two years are resultant on sampling rather than population differences; no conclusions should be drawn from differences.

Although Year 8 students had an average higher ability than Year 7, 6 or 5 students, the variation within each year level was very large. High capacity students in Grades 5 and 6 are ready to learn content that appears in Levels I or J, which are linked to descriptions from the Victorian curriculum at Years 8 and 9.

Comparing average ability estimates per grade (Tables 3 and 4), the high capacity students in Grade 5 had greater ability (2.913 logits) on average than the mean Grade 8 ability (2.639 logits), pointing to the difficulty teachers face in catering to the diverse range of abilities within each grade.

Table 1. Distribution of progression levels based on ARCOTS pre-test 2016

		ARCOTS Level											Total
		B	C	D	E	F	G	H	I	J	K	L	
Grade/Year Level	**5**	0	1	19	15	73	115	74	35	4	1	0	337
	6	1	3	10	17	65	138	100	86	29	5	0	454
	7	1	1	10	18	67	117	144	143	37	12	0	550
	8	1	0	1	9	9	33	32	65	44	10	3	207
Total		3	5	40	59	214	403	350	329	114	28	3	1548

Table 2. Distribution of progression levels based on ARCOTS pre-test 2017

		ARCOTS Level										Total
		C	D	E	F	G	H	I	J	K	M	
Grade/Year Level	**5**	3	11	24	80	180	136	85	22	4	0	545
	6	0	3	8	46	145	175	142	33	3	0	555
	7	0	2	14	45	114	219	184	64	20	0	662
	8	0	1	3	39	70	105	127	80	47	1	473
Total		3	17	49	210	509	635	538	199	74	1	2235

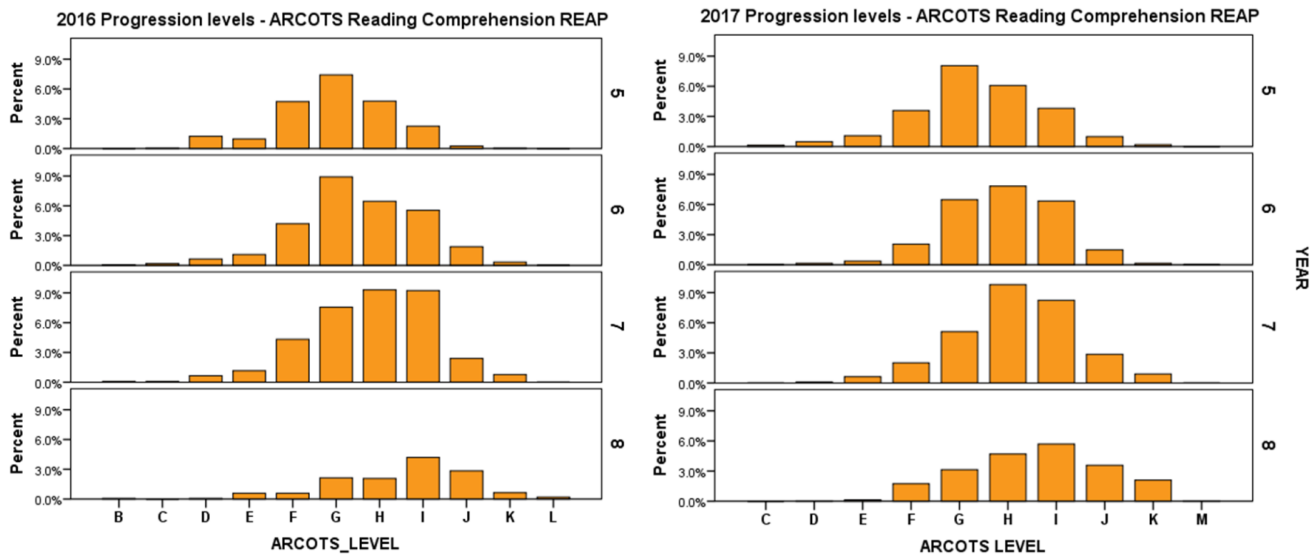

Figure 1. Distribution of progression levels based on ARCOTS pre-test 2016 and 2017.

Table 3. Mean Time 1 (T1) and Time 2 (T2) reading comprehension ability estimates and differences: All Students

Grade Level		T1 WLE Estimate	T2 WLE Estimate	Mean Growth
5	Mean (std. dev) N	2.107 (0.642) 268	2.464 (0.763) 268	+ 0.357
6	Mean (std. dev) N	2.335 (0.675) 391	2.621 (0.757) 391	+ 0.268
7	Mean (std. dev) N	2.408 (0.682) 480	2.651 (0.787) 480	+ 0.243
8	Mean (std. dev) N	2.639 (0.725) 183	2.868 (0.747) 183	+ 0.229
All	Mean (std. dev) N	2.357 (0.695) 1322	2.634 (0.776) 1322	+ 0.277

Note. Standard deviations are in parenthesis.

Table 4. Mean Time 1 (T1) and Time 2 (T2) reading comprehension ability estimates and differences: High Capacity Students

Grade Level		T1 WLE Estimate	T2 WLE Estimate	Mean Growth
5	Mean (std. dev) N	2.913 (0.395) 54	3.069 (0.661) 54	+ 0.156
6	Mean (std. dev) N	3.106 (0.383) 107	3.149 (0.618) 107	+ 0.043
7	Mean (std. dev) N	3.168 (0.436) 114	3.247 (0.634) 114	+ 0.079
8	Mean (std. dev) N	3.467 (0.526) 45	3.399 (0.619) 45	- 0.0675
All	Mean (std. dev) N	3.146 (0.453) 320	3.206 (0.636) 320	+ 0.059

Note. Standard deviations are in parenthesis.

Mathematics

Tables 5 and 6 and Figures 7 and 8 show the distribution of the ZPD progression levels students measured in 2016 and 2017.

Although Year 8 students had an average higher ability than Years 7, 6 or 5 students, the variation within each year level was very large. Many high capacity students are ready to learn content that appears in Level H, and some of these students are only in Grade 5.

Like reading comprehension, the high capacity students had vastly greater mean abilities compared with the mean of the total student cohorts. The high capacity Grade 5 students had a similar ability (3.376 logits) to the mean ability of the Year 8 students (3.452 logits).

Table 5. Distribution of progression levels based on ARCOTS pre-test 2016

		ARCOTS Level									Total
		A	B	C	D	E	F	G	H	I	
Grade/Year Level	**5**	4	16	26	80	146	173	98	13	0	556
	6	0	8	15	66	96	164	91	30	6	476
	7	1	3	14	47	69	121	66	30	9	360
	8	0	0	10	14	38	90	81	52	15	300
Total		5	27	65	207	349	548	336	125	30	1692

Table 6. Distribution of progression levels based on ARCOTS pre-test 2017

		ARCOTS Level										Total
		A	B	C	D	E	F	G	H	I	J	
Grade/Year Level	5	1	9	37	105	131	150	71	14	6	0	524
	6	0	3	12	55	130	202	134	67	16	1	620
	7	1	1	13	51	71	140	97	47	44	2	467
	8	1	2	4	35	50	92	72	78	83	12	429
Total		3	15	66	246	382	584	374	206	149	15	2040

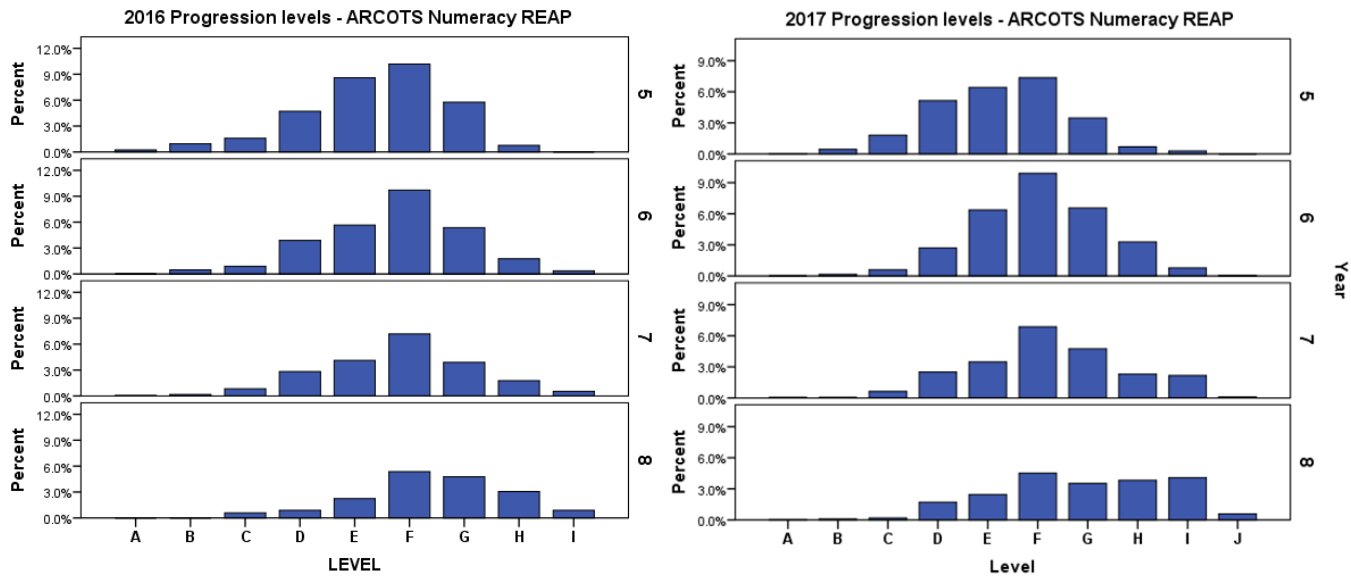

Figure 2. Distribution of progression levels based on ARCOTS pre-test 2016 and 2017.

Table 7. Mean Time 1 (T1) and Time 2 (T2) mathematical ability estimates and differences: All Students

Grade Level		T1 WLE Estimate	T2 WLE Estimate	Mean Difference
5	Mean (std. dev) N	2.371 (0.927) 551	2.811 (1.074) 551	+ 0.439
6	Mean (std. dev) N	2.764 (0.998) 475	3.185 (1.074) 475	+ 0.421
7	Mean (std. dev) N	2.906 (1.036) 360	3.284 (1.158) 360	+ 0.378
8	Mean (std. dev) N	3.452 (0.997) 299	3.826 (1.192) 299	+ 0.374
All	Mean (std. dev) N	2.788 (1.051) 1685	3.198 (1.160) 1685	+ 0.410

Note. Standard deviations are in parenthesis.

Table 8. Mean Time 1 (T1) and Time 2 (T2) mathematical ability estimates and differences: High Capacity Students

Grade Level		T1 WLE Estimate	T2 WLE Estimate	Mean Difference
5	Mean (std. dev) N	3.376 (0.568) 113	3.734 (0.848) 113	+ 0.357
6	Mean (std. dev) N	3.676 (0.703) 134	3.977 (0.833) 134	+ 0.301
7	Mean (std. dev) N	3.868 (0.767) 89	4.082 (1.021) 89	+ 0.215
8	Mean (std. dev) N	4.378 (0.653) 77	4.652 (0.928) 77	+ 0.275
All	Mean (std. dev) N	3.766 (0.754) 413	4.059 (0.949) 413	+ 0.293

Note. Standard deviations are in parenthesis.

Growth

1. Aggregate growth in all subjects was lower in Grade 8 compared with Grade 5, suggesting there is an age-based or cognitive differential growth pattern existing in the data.
2. While high capacity students had lower growth compared to their age-matched peers, the data cannot tell us whether this is based on teaching or cognitive/testing differences.
3. Grade 5 high capacity students had similar (mathematics) or higher (reading comprehension) ability estimates compared with the average Year 8 student, indicating a need for differential teaching methods across a large range of levels.
4. Major differences between classroom dynamics of student scores were observed. There was greater variation in ability estimates within each year level of students compared with between year levels. Schools classes varied in terms of
    a. T1 and T2 measures on the content tests;
    b. growth pattern from T1 to T2.
5. Within-class student variance in growth was far higher than between-class variance (e.g. in 2016, 8.5% of high capacity student variance in mathematics is attributed to class-level effects, whereas 91.5% of the variance is between students within the class). Students within each class were found to range in ability across at least five developmental levels.
6. Although the reading comprehension differential growth pattern appeared worse than in mathematics (high capacity students significantly had lower growth than low capacity students), there was evidence that the quartile the students belonged to is not the preventative factor in students achieving growth. Students with higher cognitive abilities were found to achieve less growth in the period tested, regardless of quarter, when T1 estimates were controlled for (multi-level modelling).

For more information regarding the growth of students, please refer to:

Harding., S., Griffin., P., Graham., L., Arnup., J., Szymakowski, J., English., N., Nibali., N., Alom, BM., & Zhang., Z. (2018). *Achieving mathematics growth for high capacity students: Realising the potential for Australia's high capacity students.* Assessment Research Centre, Melbourne Graduate School of Education.
and/or

Harding., S., Nibali., N., Griffin., P., Graham., L., Arnup., J., English., N., Alom, BM., & Zhang., Z. (2018). *Achieving reading comprehension growth for high capacity students: Realising the potential for Australia's high capacity students.* Assessment Research Centre, Melbourne Graduate School of Education.

Self-Regulated Learning

1. Learning progression of skill increases were created for each of the areas tested (involving SRL skills or teaching). These describe the progression of skills in unique learning areas that provide a valuable set of resources for teachers to evaluate and improve their teaching and to capitalise on the SRL skills of the students to assist with differentiation.
2. Significant differences were found between ages on the student SRL questionnaire, where the Grade 8 students reported to be less able to regulate their own learning compared to the younger students. This finding held for all subject areas: reading, mathematics and problem-solving.
3. In each cohort and overall, students with higher content ability were more able to regulate their own learning; however, age-related differences outweighed content level differences, resulting in reduced use of SRL strategies in the Grade 7 students compared to those in Grades 5 and 6, and in Grade 8 students compared to Grade 7.
4. Teachers at secondary level reported less use of explicit SRL teaching classroom practices. This is hypothesised to be part of the cause of the reduced student SRL skills in the secondary schools (as well as motivational and school structural reasons).
5. Students with high SRL skills in the lower ability quarter (Q1) were more likely to improve in terms of content growth between T1 and T2 than other Q1 students with low SRL skills. This affect was small in Q1 and reduced by quartile until in Q4 there was no effect of student SRL on increasing content growth. This is hypothesised to be due to (1) students in Q4 already had higher SRL skill levels than those at Q1, (2) the top students may not be in an environment conducive to using their SRL skills, and (3) students were not being effectively targeted in terms of content/task focus commensurate with their ability. Therefore, the use of SRL was not the impeding factor contributing to the lack of growth between T1 and T2.
6. While almost all teachers believed that students' SRL skills were important for their academic success and progress, less than a third formally planned for incorporating SRL into their lessons and almost half were not confident in implementing SRL as part of their practices. This indicates a further need for PD for current teachers on SRL instruction. A quarter of teachers reported that their confidence in teaching SRL improved as their experience with teaching SRL increased, suggesting that teachers could benefit from more practical examples of how to incorporate SRL practices into their classroom teaching.
7. The main challenges that teachers identified in incorporating SRL instruction into their practices were not enough time, not enough teaching resources or teacher expertise, student behaviour, student attitude and student readiness to learn.

For more information on the findings from self-regulated learning refer to: Harding., S., Nibali., N., English., N., Griffin., P., Graham., L., Alom, BM., and Zhang., Z. (2018). Self-regulated learning in the classroom: Realising the potential for Australia's high capacity students. Assessment Research Centre, Melbourne Graduate School of Education.

Assessment Literacy

The REAP project found evidence that content needed to be correctly targeted to students' ability levels (ZPD) to provide the opportunity for high capacity students to learn (refer to final section on strategies to support high capacity students). To accomplish this successfully, teachers needed to have skills in assessment knowledge which were covered by the PD modules completed throughout the REAP project.

Teachers received PD on identifying high capacity students through assessment, developing reliable rubrics that stretch high enough for those most able and using assessment data effectively to inform teaching practices. In the final month of the project (November to mid December 2017), 38 teachers completed an assessment knowledge psychometrically validated self-report questionnaire.

At the conclusion of the REAP project,

- no teachers were measured to only have a basic understanding of assessment knowledge (teachers at this level know how to collect and store student assessment data);
- one teacher had a low level (teachers at this level know how to administer student assessments and use the data provided to inform teaching);
- 16 teachers (42%) were at the benchmark for using assessment data appropriately in a classroom setting (teachers at this level know how to review student assessments and data to determine the usefulness for informing teaching);
- 11 teachers (29%) were able to create accurate assessments themselves (teachers at this level know how to analyse data to create tools and systems to inform teaching);
- 10 teachers (26%) exceeded expectations on their knowledge of assessment data, which may include skills such as triangulation of data between assessments (including manipulating assessment data to highlight implications).

The major aim of the REAP project was to identify teaching strategies that are related to high capacity student academic growth in mathematics and reading comprehension. It was presumed that teachers would need to develop their assessment literacy practices in order to effectively target their teaching; therefore, all teachers in the REAP project undertook PD on assessment practices. Therefore, no control group was isolated and the effect of the PD on teachers' assessment knowledge was not analysed.

Teacher Competence

1. *Mathematics*

In mathematics, only 1.2% of students outperformed their teachers (15 out of 1,279 students). Five of these students came from the same class, and it is likely that the teacher in question did not engage with the test to the best of their ability (test time was particularly short for this teaching). All 15 students were in Grades 5 or 6. No secondary school students outperformed their teacher. The sample size was too small to compare growth for these students.

2. *Reading comprehension*

Findings for reading comprehension show that in April 2016, 38 (7%) Years 5 and 6 students across 12 (46%) classes outperformed the teacher; by September, this had increased to 63 (11%) students across 18 (69%) classes. The mean growth score at the highest quarter (Q4) was significantly lower than for the other quarters ($p < .05$). The mean growth score for students who outperformed their teacher in Q4 was significantly less than for those who did not ($p < .05$). This research was presented at the European Association for Research on Learning and Instruction (EARLI), Tampere, Finland (Nibali, Harding, Graham, & Griffin, 2017).

3. *Problem-solving*

In mathematical-based problem-solving, only five students (less than 1%) outperformed their teacher. These results came from teachers who did not specialise in the field of mathematics: the corresponding teachers were (a) language other than English (LOTE) (Italian), (b) humanities and (c) health. There was no hypothetical reasoning for these teachers to have higher content knowledge in the field of mathematical problem-solving; therefore, there was no further data analysis performed.

Teaching Strategies for Growth (Focus on High Capacity)

General strategies

Teachers reported using a range of strategies to help support the needs of their high capacity students. After analysis of data to determine which teachers obtained the highest average class growth, the top third of teachers reported using the following strategies most often:

- encouraging students to take risks in their learning;
- modifying content;
- focusing on creating a safe learning environment;
- promoting individual learning.

Teaching strategies significant for growth for high capacity students in mathematics

Multi-level modelling was used to identify teaching strategies that significantly improved the rate of growth for (1) all students and (2) high capacity students. The following teaching strategies were significant predictors of growth:

- Using an online curriculum;
- Curriculum extension;
- Targeted strategies/interventions;
- Like-ability peer interactions;
- Appropriate goals for learning;
- Students challenged per their ZPD.

Teaching strategies significant for growth for high capacity students in reading comprehension

Multi-level modelling was used to identify teaching strategies that significantly improved the rate of growth for (1) all students and (2) high capacity students. The following teaching strategies were significant predictors of growth:

- Selecting or modifying tasks given to students of varying ability based on assessment data;
- Modifying whole-class instruction based on assessment data;
- Planning for and inclusion of higher order thinking skills;
- Planning for and inclusion of SRL skills.

Note. Planning for and inclusion of higher order thinking skills and planning for and inclusion of SRL skills only reached significance for the all students model.

Qualitative Findings

Expert Teachers

Interviews with teachers who maintained growth for high capacity students were conducted to elucidate teaching strategies or other factors that successful teachers believed would encourage growth for all high, low and middle ability students. Factors were listed under the categories of learning environment, assessment, resources, learning activities, teaching and emotional wellbeing. Although the categories used to present the factors were the same for both high and low capacity students, there are many differences in the approaches described under each category. The similarities and differences of the approaches used for different ability levels may be summarised as:

Learning environment – For high capacity students, the focus was on high and clear expectations and competition/spirit among learners. Common to both high and low ability students was a “safe” learning

environment, including allowing the students to take risks, ask questions without judgement and make mistakes.

Assessment – Both groups of learners required teachers to cater to individual ability and targeted teaching based on ZPD, with proper and rigorous assessment methods utilised to support growth.

Resources – High capacity students were believed to respond to student choice in their learning including the ability to select reading text and involvement in choice in the resources used for learning, including ICT or mathematics tasks. Low capacity students were thought to benefit from hands-on materials and visual aids to learning. Both groups were thought to benefit from the teacher planning ahead and researching the topics to cover in advance.

Learning activities – Both groups of students were thought to benefit from collaborative learning, open-ended tasks, self-reflection of the learning process, regular discussion, shared learning and real-life application of learning tasks. Low capacity students were thought to benefit from repetition approaches, while high capacity students were thought to benefit from encouraging high order thinking skills and using extending learning approaches, such as mathematics extension via an external provider and opportunities to engage in rich tasks to move onto after completion of other classroom activities.

Teaching – The category for the teaching aspect of supporting the growth of students was most different for high and low ability students. The only shared element that emerged from the data was scaffolded learning. High capacity students were thought to require introduction to new concepts and building understanding on breadth as well as deep learning. Shared learning and peer-to-peer interactions were highlighted as necessities for high capacity students. Low capacity students were thought to require more didactic teaching approaches such as extra support from the teacher, back-to-basics content coverage, explicit teaching, links to prior learning and individual attention. It is unclear whether the teachers believed that high capacity students were more able to learn alone, and these approaches were reflective of the ability of high capacity students to regulate their own learning, while low capacity students required one-on-one support.

Emotional wellbeing – High capacity students were thought to benefit from individual attention in terms of their emotional learning, while low capacity students were thought to benefit from building their confidence and focusing on success. Common factors were challenging students (based on their needs) and ownership of learning.

The factors identified by the teachers were largely agreed upon; however, there were some teaching factors that the teachers did not share similar views on, for example:

Factors teachers believed lead to growth for all abilities (low, middle, high):

- Safe classroom climate
- Sophisticated decision-making about classroom planning
- Targeted teaching based on student ZPD

Factors teachers did not reach consensus on:

- Rich and varied classroom activities
- Ability groups based on "below/at/above" levels
- Accelerated content versus enriched content for top quartile growth

Principals and School Leaders

Twenty-nine principals and school leaders representing 21 schools (10 primary, 10 secondary and one P–12) were asked to describe the current situation in their school regarding lack of growth in high ability students. Principals were also asked to describe the best-case scenario for schools in terms of achieving growth and to identify what might facilitate positive outcomes.

Principals and school leaders shared a consensus on how to overcome the lack of growth in high capacity students and suggested many general, systemic and sustainable approaches moving forward. It was immediately apparent that the leaders (a) acknowledged and had first-hand experience of the "flatline" issue in their schools and (b) had suggestions and ideas to resolve the issue. To facilitate growth, principals recommended the following.

Schools should aim to

- assess students regularly;
- gather and triangulate data;
- monitor growth regularly;
- use NAPLAN data for targeting teaching, not ranking or accountability.

The current curriculum should be considered

- as a continuum;
- as a structure consisting of underlying skills, not how to teach by year level;
- as a document describing skills to be taught based on the ZPD of each student.

Teachers should focus on

- all students (not just low performing);
- being comfortable teaching high achieving students, which may include
    - increasing content knowledge;

- increasing awareness of strategies used to teach high capacity students.

High achieving students should be

- engaged;
- appropriately challenged with goals linked to student capability;
- exposed to a vibrant and enthusiastic culture of learning.
- extended through a shared responsibility between students, parents and teachers.

In a best school scenario, teachers and students are engaged and motivated. Teachers have access to and are proficient in the use of reliable assessment data; they use this data to identify student readiness to learn and can target teaching to this point. All students achieve consistent growth in classrooms that may or may not be year level based; flexible (ability) grouping and student access to multiple teachers will be the norm rather than logistics and timetables dictating teacher–student access.

Teachers feel confident that they have the content and pedagogical knowledge to teach all students in their care, and for those who do not feel this way, they feel secure and supported to seek assistance and relevant professional learning as required. Teams of teachers work collaboratively with peers, students and parents to develop plans for teaching students at all levels in an environment that can be teacher or student led as student need dictates.

Curriculum forms the background to developing skills for learning how to learn, for creative and critical thinking and problem-solving and is no longer the main focus of teaching and learning. NAPLAN and other forms of assessment are used primarily to guide teacher planning for targeted teaching rather than as measures for accountability and ranking. What is taught is a reflection of what teachers, students and parents value so schools assess what they and their community value rather than valuing assessment for its own sake.

Expectations for students are realistically high and aligned with student capability, and student progress is not solely reliant on the teacher but is a shared responsibility with the student and the parents; here is a vibrant and enthusiastic culture of learning throughout the school. Teachers have a level of confidence that permits them to comfortably monitor student learning from a distance where students have become independent learners.

Graduate teachers enter teaching with knowledge in content and strategies to teach students at all levels of their specialised areas of teaching, and they are employed to teach in these areas. They join a teaching team that is aware of their students' needs and abilities and that have the expertise to either teach their students directly or seek ways that they may learn and grow. This is enhanced by a school system that has the appropriate policies and communication systems to continuously track students through reliable data

and track current research through reliable resources. The DET will be a non-political organisation that supports schools to this end.

Factors Inhibiting Targeted Teaching

Given the number of identified strategies that require targeted teaching based on student ability, the researchers asked teachers (n = 87) to comment on which factors were preventing them from targeting their teaching for high capacity students. The exact question posed was "Are there any factors preventing you from targeting your teaching (especially in relation to high capacity students)? Please describe".

Responses were collated based on frequency of themes.

21% of teachers' responses indicated that there was nothing preventing them from targeting their teaching; three of these teachers stated that they taught a "SEAL" or an accelerated class, making it easier to target the content.

"No, it is about having TIME (to plan and organise), content knowledge and having resources available. I feel a variety of ability and mixed ability groupings are essential. I feel tasks can be adapted to challenge all students (especially high capacity) rather than always designing separate ability designed tasks".

"No. My students are pre-tested for each topic so are then grouped according to their ability".

"No, we have small class sizes".

"Not really. Planning can be demanding when planning for multiple entry/exit points, and assessment can also be time-consuming but none of those are preventing factors".

"No, there are no factors preventing me from targeting my teaching as students are placed into a specific Levavi [high achieving] class".

"By pretesting I can prevent students who are high capacity from getting bored with the Maths and give them more challenging tasks to complete".

26% of teachers' responses included lack of time as the preventative factor.

Time was described to be a preventative factor for several reasons, including lack of time for planning tasks for high capacity students and lack of time in class to teach high capacity students.

"Time. This is usually the greatest factor as it is required for planning and delivery but the impact is always significant when a commitment is made to supporting all students learn and progress".

"The time constraints are always a problem. Having one teacher in the classroom, to teach the different abilities has its limitations. I find that I need to focus on the students who are just below or below because they don't seem to be able to do anything on their own. By the time, I get to the high capacity students (if I do

at all), there is insufficient time. These are the students I want to focus on but these seem to be the students who always seem to be affected by the logistics of differentiated teaching/ability groups".

"Time in lesson planning is a factor. It is difficult to include targeted differentiation in your lesson plans when you are teaching over 100 students over 4 to 5 classes, particularly if you are a teacher with additional responsibilities".

"Time for preparing high quality tasks for students is a factor".

"Time! The course is very content heavy and it is hard finding time to fit in tasks to target high achievers. It is also hard to find time to make/search for these tasks".

"Time is a factor. The needs of other students in the class as some students are heavily reliant on teacher intervention to complete work and often that is time that is taken away from the high capacity students. Further factors include covering the entire curriculum in a timely manner as it is very broad. Others include students not wanting to be seen doing different things and lack of clarity from the school as to how we cater for these students".

10% of teachers referenced the difficulty in catering for the large spread in abilities.

"Factors such as the sheer scope and breadth in diverse learners can upstage the ability to target my teaching. At times it can feel there are 7 levels of learner groups that go beyond the traditional 'high, medium and low'. When working with high capacity (special needs or gifted/talented) meeting constraints of assessment time, preparation of engaging lessons, resources and timely feedback are contributing factors that can undermine targeted teaching. That said it is part and parcel of the role of us teachers as well!"

"Usually the higher students, the ones covering year 7/8/9 content are ready to learn within their ZPD but they need explicit instructions to move to the next stage in their learning. This is difficult to consistently do in a classroom of 25 where the majority of students are working at level 5/6. We try to have early finisher tasks that require the students to think critically and problem solve in order to refine their skills in different subject areas".

"At our school teachers plan independently. As a teacher, sometimes it becomes difficult to plan for the range of abilities among students we have in class. Targeted teaching for high capacity students is not a focus for planning".

11% of teachers mentioned that students with the lower abilities required more assistance.

"Only the challenge of having extremely low students as well".

"Extra time needed to be spent with students with lower learning behaviour levels to ensure that they remain on task. This can impact on the time to spend with and extend high capacity students".

"Yes, the demand for support from students with low capabilities. Innately I find myself drawn to help these students as the higher students are deemed 'capable'".

"Working with students who are achieving below or well below the standard need a lot of time and assistance making it difficult to ensure high capacity students are receiving the same amount of attention".

"In class discussions, there is a huge discrepancy between the language skills of newly arrived EAL [English as an additional language] students and high achievers who are very articulate. Often teacher will simplify language used aiming for the middle ground when these discussions occur".

"I find my attention is often pulled towards the group who is struggling".

8% of teachers felt that student behavioural issues prevent them from catering to high capacity students.

"Behavioural problems in the classroom".

"Behavioural issues with some of the lower achieving kids that tend to suck up ... you guessed it ... time".

"Behaviour management issues – a lack of self-regulatory behaviour from many students".

6% of teachers responded that prescriptive curriculum or assessment structure inhibits targeted teaching.

"The manner the school has planned the essential learning for each level, where clear parameters of what to be taught for the level rather than meeting the differing needs of students. Therefore, the high capacity students are learning and completing tasks that might not be sufficiently challenging for them".

"I find that there is a vast change in resources and curriculum from primary to secondary. This can make it difficult to teach secondary curriculum within a primary classroom".

"Use of appropriate assessments that truly indicate how far students can go rather than simply how they perform against year level outcomes".

"Prescriptive assessment tasks".

5% of teachers referenced lack of teacher experience/expertise/data literacy.

"As this is my first year of teaching high capacity students, I believe that I need to develop my knowledge and skills by undertaking professional development in this area".

"Time to properly analyse data – and having the skills to read it and gain a sound understanding – more PD needed in data literacy".

"Content knowledge. If you aren't confident in teaching content at a higher level. How to extend a task in breadth and depth and covering the 4 proficiencies".

"Knowledge of 'where to next' for high achieving students".

"Capacity of teachers working with accelerated students".

5% referenced lack of quality tasks/resources.

"Finding quality tasks that allow deepening of learning is something which is a focus of ours – finding tasks that allow for new curriculum content can be difficult".

3% referenced lack of access to technology.

"Students do not have access to computers, so extended research is not possible".

"Minimal access to technology".

Other factors mentioned by teachers were timetabling issues, lack of high capacity students and teacher–student ratios. Two teachers mentioned that limitations to differentiation included students' feelings about the process.

"In previous years we have displayed and used a learning continuum (rockets or worms) and students would place their name or photograph next to their next step for learning or ZPD. Based on formally structured feedback from students, we found that this approach caused problems for some students who felt negatively about having their abilities in certain areas displayed. For high capacity students it can often be a problem of overconfidence and not being exposed to a wider list of progression points. It also didn't allow students to understand and reflect on thinking skills related to their next step learning, including reasoning and explaining. We are now working on introducing a new way for students to create and display appropriate goals in order to accurately target their ZPD without negatively affecting the way they view their learning".

"How to share the developmental continuum with the students. How to develop a growth mindset amongst students who feel they are always in a 'low group'".

Although time was the largest issue facing teachers, some of the planning time involved could be reduced by team planning for levels of ability across classes and year levels so each teacher does not have to shoulder the responsibility for every cognitive level in their class. While researchers found no statistical links between teacher collaboration and student growth in this study, if methods of collaborative planning for student instruction were improved, perhaps a positive relationship would be identified.

Feedback from Teachers

At the conclusion of the project, teachers were asked if they had any comments, suggestions or thoughts about any aspect of the REAP project. On balance, 87% of teachers had positive comments regarding their involvement in the project, while 13% had negative or neural comments.

Positive comment examples

"The REAP project has been possibly the best professional development I have done. I now look at growth for all of my students not just meeting minimum standards and as a consequence the students are engaged in their learning and achieving excellent result. As a professional team we are very keen to spread what we have learnt to the rest of our school. The work of the REAP project has been beneficial for all students not just high capacity students".

"This has been a really interesting study. I have learned a lot and am appreciative of the opportunities given to me. I am beginning to make some changes in my class strategies, but it will take time as it requires a paradigm shift and the resources and support of the school body for it to occur across the board. A whole school approach is needed and all staff need to be involved. Management also must be on board with resources and time allocation. It is pointless if management says they want this to happen but don't give staff the tools and time to focus on the HC students. Limited meeting opportunities are a minus. In a school of many part timers, it can be difficult to be on campus to confer with other staff who may be able to assist".

"I have thoroughly enjoyed the academic discussion that has been brought about by my involvement in the REAP Project. Working with other teachers who also instruct accelerated classes has enabled me to learn new strategies and the data provided has been of great interest".

"Thank you for the support that you have provided this year. The REAP project has been an excellent process and has helped in the professional development of members of the team and has improved the learning of high capacity learners at the school".

"The students have shown significant improvement in problem solving and how to attach worded questions. There has also been an improvement in how small groups collaborate when working on rich tasks and difficult problems".

Negative/neutral comment examples

"We have reflected on our participation in the project and we did not assign enough time to constantly monitor and evaluate it. Or to allow for teacher dialogue around this (even though approx. 1–2 PLTs a term were assigned). Thanks".

"I believed that the REAP team would provide more support to the teachers at the school involved with the program. I was looking for more support with sharing of learning tasks that have been tried and tested from the team. Instead the teachers at the school needed to search and provide our own extension activities. This was disappointing!"

"I found keeping up with the modules during the busy times quite challenging and then found I was reading many at once. More time was needed for REAP team to discuss strategies to try and then to meet and reflect on effectiveness. The testing process was quite challenging when students were asked to do and re-do the test. The recommendation of allowing time to pass between tests is not reasonable in the tight working time lines we need to follow at school. However, it was helpful when the REAP team allowed extensions for the tests for our college".

The teachers' opinions on the value and benefits of this PD-based research project are important when considering future projects that align research data with teaching practices that achieve growth. It is not enough to simply collect the data. Teachers deserve support and resources that help them to progress their practices, while researchers use the data collected to draw conclusions on which practices are working. The success of the REAP project is a result of the dedication and hard work of hundreds of teachers who took the time to learn and grow through PD in order to realise the potential of their high capacity students. We thank them.

Recommendations

1. School assessment should be competency based, progression based and focused on what students "know and can do" (ZAD). This requires that students have the opportunity to show evidence of learning beyond "testing what is taught".
2. Students should be taught content that they are "ready to learn" (ZPD), regardless of the year level curriculum for their age.
3. Teachers should receive support from school leadership and the DET to view the curriculum as a continuum and have the faculty to gather student evidence of learning (assess) at all points of the curriculum relevant for their students.
4. School leaders should be empowered to alter the structure of traditional learning/teaching to allow catering for all students based on ability; this could include streaming across classes, providing opportunity for teachers to collaborate with teaching teams from later year levels, secondary/primary collaborations for supporting high capacity Grade 6 students and changing the reporting structure so teachers have the opportunity to demonstrate students' learning across year level standards.
5. Mathematics:

– Differentiated learning can be enhanced by using an online curriculum program that allows each student to complete exercises and learning tasks that cater to their individual learning needs.

– Like-ability peer interaction is necessary for high capacity learners.

– Appropriate goals need to be set for all students, including those who are ready to learn past the year level content; students should be involved in the goal-setting process.

– Targeted strategies/interventions and curriculum extension for high capacity students is required.

6. Reading comprehension:

– Student tasks need to be modified in line with their assessment data/student evidence of ZPD.

– Classroom instruction should be modified according to the reading ability of the students, including opportunity for students to use high order skills in answering questions posed to the class.

– High capacity students require specific activities that promote high order thinking and reasoning with texts that are relevant for their ZPD.

7. Self-regulated learning:

- Students should be supported to develop SRL behaviours that will increase performance and promote agency.
- Increase student agency in the classroom, especially in secondary schools, allowing students to become creative and connected learners who take responsibility for their own learning.
- Students should be guided to create their own goals based on their assessment data and evidence of learning and to track their progress towards their goals. High capacity students may require student choice in their learning, but this is dependent on the level of SRL behaviour the student possesses.

8. Teacher may require PD on learning interventions and pedagogical practices for levels of curriculum that exceed their expertise.

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Nibali, N., Harding, S-M., Graham, L., & Griffin, P., (2017). When the apprentice surpasses the master: Teacher content knowledge relative to their students. *European Association for Research on Learning and Instruction (EARLI),* Poster presentation. Tampere, Finland.

Appendix A

Modules prepared for the REAP project:

1. Nibali, N., Harding, S-M., (2016). Module 1 High Capacity Students, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.
2. Griffin, P., English, N., Nibali, N., Harding, S-M., (2016). Module 2: Targeting Teaching and Classroom Practices, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.
3. Nibali, N., Graham, L., Harding, S-M., English, N., (2016). Module 3 Understanding Self-Regulated Learning, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.
4. Nibali, N., Graham, L., (2016.) Module 4 Self-Regulated Learning in the Classroom, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.
5. Griffin, P., (2017). Module 5 Rubrics, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.
6. Griffin, P., English, N., (2017). Module 6 Using Progressions, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.
7. English, N., (2017). Module 7 Social regulated learning, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.
8. Griffin, P., Nibali, N. (2016) Module 8 Monitoring Progress, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.
9. Graham, L, Nibali, N., (2016). Module 9 Sustainability, In Realising the Potential of Australia's High Capacity Students Online Professional Development Resource. Melbourne, Victoria: Assessment Research Centre.

Appendix B

Units prepared for the REAP project:

1. Harding, S-M., Nibali, N., Graham, L., (2018). Introduction to Supporting High Capacity Students, In *Supporting High Capacity Students*. Melbourne, Victoria: The University of Melbourne and Department of Education FUSE.
2. English, N., Arnup, J., Griffin, P., (2018). Assessment for Growth, In *Supporting High Capacity Students*. Melbourne, Victoria: The University of Melbourne and Department of Education FUSE.
3. Arnup, J., Harding, S-M., Szymakowski, J., (2018). Supporting High Capacity Students in Mathematics, In *Supporting High Capacity Students*. Melbourne, Victoria: The University of Melbourne and Department of Education FUSE.
4. Nibali, N. and Harding, S-M., (2018). Supporting High Capacity Students in Reading Comprehension, In *Supporting High Capacity Students*. Melbourne, Victoria: The University of Melbourne and Department of Education FUSE.