ADDRESSING GROWTH IN READING COMPREHENSION FOR HIGH CAPACITY STUDENTS

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Author Note

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Abstract

The aim of this study was to explore reason for the decline in growth in reading comprehension for high capacity students (i.e. students in the top 25%). The reading comprehension and self-regulated learning performances of Year 5/6 students were assessed, and individual weighted likelihood estimates were calculated using Rasch modeling and item response theory. Statistical analysis confirmed that high capacity students made less progress in reading comprehension than other students. A correlation was found between self-regulated learning and reading comprehension performance for all students. The assessment for reading comprehension was administered to teachers who also responded to questionnaires about classroom practices. Examination of teacher reading performance relative to that of their high capacity students found further decline in growth among students who out-performed their teacher; however, this decline was ameliorated by greater ability to self-regulate learning. High capacity students in Year 5 progressed at a greater rate than those in Year 6, to the extent that they performed as well as Year 6 students after six months; that is, the Year 5 students continued to develop their reading skills, while the Year 6 students did not. Targeted teaching practices, collaboration between teachers, and the inclusion of higher-order thinking skills were associated with greater progress in reading comprehension for high capacity students in both year levels. The study recommends providing resources to teachers to improve their use of assessment to target the teaching of reading comprehension toward student zones of proximal development. It also highlights the importance of monitoring and improving teachers’ content knowledge and pedagogical knowledge for teaching higher-order skills. Such resources should include professional development such as online, evidence-based modules that include examples and practical resources, monitoring and development of teacher content knowledge and building professional networks within and across schools.

Keywords: High capacity students, quartile, reading comprehension, self-regulated learning, targeted teaching, opportunity to learn, growth
Declaration

This is to certify that:

- this thesis comprises only my original work towards the PhD;
- due acknowledgement has been made in the text to all other material used;
  and
- the thesis is less than 100,000 words in length, exclusive of tables, bibliographies and appendices.

Nives Nibali
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Glossary

\( \bar{x} \): mean

**ARCOTS**: Assessment Research Centre’s Online Testing System

**Collaboration**: working with someone to develop or produce a shared goal

**Flat line**: the decline in RC growth at Q4 when compared to growth that is more consistent from Q1 to Q3

**Growth, gains, progress**: The difference in measured performance between one time of assessment and another

**High capacity students**: Students who performed in the top 25% when compared to other students

**High-performing (HP)**: one of the 6 classes identified with the greatest mean growth at Q4

**Higher-order thinking**: thinking that is goal directed, in response to text and task and includes self-regulation or the role of metacognition

**Learning**: acquiring or developing knowledge or skills through study, experience or instruction

**Non-High-performing (NHP)**: one of the 33 classes not identified with the greatest mean growth at Q4.

**Opportunity to learn**: Opportunity to acquire or develop knowledge or skills and to learn what is in the curriculum, and that which is assessed

**PRD**: Progression for Reading Development (ARCOTS)

**RC (RC)**: The interaction of several component processes that integrate information from a text with the individual’s background knowledge, and which are subject to a multitude of contextual constraints

**REAP**: Department of education and Assessment Research Centre linkage project: Realising the Potential of Australia’s High Capacity students

**SD**: Standard Deviation
Self-regulated learning (SRL): A process that supports learning in which individuals systematically and intentionally monitor aspects of their thinking and behaviour in response to internal and external environments

Targeted teaching: Teaching a defined construct by targeting the student’s level of performance in relation that construct

Teacher content knowledge (TCK): teachers’ RC was measured using the ARCOTS RC assessment tool

Teaching: supporting learning and opportunity to learn
Chapter 1: Overview and context

Historically, demands on education to meet personal, workplace, and civic needs stimulate changes in learning theory and education policy that are designed to ensure minimum competencies are achieved by the greatest number of people; the result may be resources targeted towards teaching middle to low-performing students. In addition, changing workplace expectations and unprecedented access to information have led to a need for flexible, interactive classrooms that develop and capitalise on opportunities to learn through the actions of both teacher and student. In such environments, evolving the roles of teacher and of knowledge in the classroom, and personal learning concepts such as life-long and self-regulated learning (SRL) (based on works by Bandura (1996) and Zimmerman (1989)) have emerged as strong approaches for developing student capacity for the independent, active and volitional management of learning expected of high capacity students and eventually required of all students for success in the 21st century. However, a study of the literature revealed there is little evidence regarding which teaching strategies are linked with gains in reading comprehension (RC) for high capacity students. Similarly, there is a gap in the literature on reliable methods for obtaining evidence of SRL and for linking levels of SRL to RC outcomes for high capacity students.
1.1 Purpose and rationale

The purpose of this study was to assist teachers to improve teaching and learning of RC for high capacity students in Year 5/6 classes. The study aimed to address, ameliorate, and ultimately avoid the internationally observed ‘flat line’ (Reis, McCoach, Little, Muller, & Kaniskan, 2011; Zhang, Griffin, & Care, 2015) in growth for students in the top 25th percentile for RC performance. By focusing on students in years 5/6, research and subsequent intervention can be targeted at the point at which the crucial transition in RC from lower to upper primary and lower to higher-order thinking is well on the way; particularly for HC students.

Consequently, the study analysed teacher and student academic results and researched teaching strategies in RC for students in Year 5/6 classes in the Australian state of Victoria and, through evidence-based research, aimed to:

- define and identify students who performed in the top 25% when compared to other students (These students are referred to as High Capacity (HC) students.)
- identify and discuss the growth patterns of and between academic quartiles
- explore the association between SRL and RC
- identify strategies used for teaching RC that were associated with the greatest gains for HC students

The literature review presented in Chapter 3 supports the view that equity in education is an Australian expectation that is reflected in government policy. All students, regardless of ability or individual circumstances, have an equitable right to access resources required to support their academic, career, social, and personal development (Barr et al., 2008; Rudd & Smith, 2007). Literacy, and more specifically RC, is at the heart of educating students to develop the tools necessary to keep improving skills and knowledge to support their success within and beyond formal education (Alexander, 2005; Shomos & Forbes, 2014).

The Care, Griffin, Zhang, and Hutchinson (2014) ‘flat line’ findings provided motivation and context for investigating the impact of student ability relative to peers and Year 5/6 teaching practices on RC gains for high capacity students.
1.2 Background to the study

This study emerged from the “Realising the Potential of Australia’s High Capacity Students” (REAP) project which involved a partnership between the Assessment Research Centre at the Melbourne Graduate School of Education, University of Melbourne and the Department of Education and Training, Victoria. The REAP project was part of Australian Research Council Linkage Project (LP140100236). The main aim of the research in 2016 was to provide teachers with strategies that support learning for all students, including High Capacity (HC) students. In 2016, 44 schools, 221 teachers and 6805 students were involved in one or more assessments in RC and/or mathematics and/or mathematics-based problem solving and SRL. Teachers were asked to complete at least one assessment in the subject area they chose for project participation and administer assessments for that subject area and for SRL. Participating teachers engaged with Professional Development Modules and were required to complete questionnaires before, during, and after completing the modules. The REAP project and data collection information is detailed in Chapter 3.

The focus of the study is Year 5/6 students in RC and data were collected throughout 2016 in the REAP project which is described in the next section. This study is primarily concerned with understanding the teaching and learning of RC of Year 5 and Year 6 students in Victorian government schools. This chapter introduces the historic and developing context for teaching, learning and assessing RC in these schools.

1.3 The quest to improve student outcomes

The 2008 Melbourne Declaration on Educational Goals for Young People (MDEGYP) is arguably the most significant political contribution to Australian education policy since the Education act of 1872, which created a department of education under the crown and mandated attendance at school for all children aged 6 to 15 years. Needless to say, much has changed since then, most notably the focus and emphasis on assessment; an attempt to unify education across Australia’s five states and two territories through the introduction of a national curriculum; identification of teachers as accountable, professional educators; and, more recently, the view that students are active, self-directed consumers of education each with individual needs (Klenowski & Wyatt-Smith, 2012; Lobascher, 2011; Wiliam, 2010).
In 2008, the MDEGYP goals were boldly set as ‘equality’ and ‘excellence’ for all students, who are expected to become confident and creative individuals, successful learners, and active and informed citizens (Barr et al., 2008; Rudd & Smith, 2007). These are admirable and challenging goals for a highly politicised, heterogeneous education system.

To meet the expectations indicated, Australian schools are moving from classroom practices founded in expert transmission theory (the teacher/text book as the main provider of knowledge), to interactive social learning (practices based on the work of Dewey, Piaget, and Vygotsky, for example). On the macro scale, and almost a decade on from the Melbourne Declaration, other changes include the expansion of the National Assessment Program (NAP) and specifically the National Assessment Program for Literacy and Numeracy (NAPLAN) (ACARA, 2016b) and the establishment of the Australian Institute for Teaching and School Leadership (AITSL) (AITSL, 2017) as a framework for professional practices and educator accountability.

1.4 Teachers and students

From teacher and student perspectives, the latest waves of education reform have meant increased assessment against national standards, a focus on closing the ‘gap’ between the achievement level of the least and most able students and improving students’ levels of basic competence on nationally standardised tests. This has resulted in focused attention on students in the bottom quartile for achievement and the implementation of educational benchmarks and minimum standards (Reid, 2009). While it is important to ensure minimum standards and competencies, it is clear that these efforts have been less than equitable in terms of ensuring progress for all students (Pandina Scot, Callahan, & Urquhart, 2008). Research has uncovered diminished comparable growth in RC for students in the top 25% of ability in and across schools, in and across states, and in and across countries. Statistically, for example, fewer students are achieving growth at the highest level in Australia and the US (Hanushek, Peterson, & Woessmann, 2012; Masters, 2016). This internationally identified phenomenon has been referred to as ‘flat-lining’ (Care, Griffin, Zhang, & Hutchinson, 2014).

Students who performed in the upper 25th percentile for ability within any cohort of students are referred to as high capacity (HC) students. These include, but are not limited to, students...
who may be identified as gifted or talented. The dangers inherent in ignoring the needs of our most academically able students range from individual frustration and underachievement to impoverishment of social standards and the ‘dumbing down’ of our nation to the point where Australia becomes less effective on a global scale and disenchanted on a local scale (H. W. Marsh & Seaton, 2013; Patrick, Turner, & Strati, 2016; Paunesku et al., 2015). The term ‘flat-line’ aptly cautions against the consequences of ignoring our HC students to the point where progress for these students is stifled.

1.5 The importance of reading comprehension

RC is a cornerstone for learning and education (Shomos & Forbes, 2014), and so it is of great concern that HC students in primary and secondary schools are flat-lining in RC. If our brightest and most academically able students are to continue to progress, it is crucial that we identify and understand what schools, teachers, and students are doing to support their ongoing growth; it is equally crucial that we identify obstacles to the realisation of these students’ academic potential. The demands on education systems and on teachers and students are evolving; however, as Hattie (2012) identified, the impact of the teacher on student learning remains crucial.

Teachers have traditionally been considered knowledge experts and have been assumed to be more knowledgeable than their students are. As such, teachers have traditionally been considered the source from which all learning emanates and are accordingly placed at the centre of classroom learning. Explicit teacher instruction and student compliance are still prevalent in many classrooms (Kunter et al., 2013). Historically and in similar learning environments, the role assigned to students is that of passive recipients of knowledge in which they are expected to accumulate knowledge through identification and recall of that which the teacher brings to the classroom (Kunter et al., 2013; Moats & Foorman, 2003). However, the demands placed on RC in 21st century contexts involve significant shifts from identification and recall, to the use of processes for making meaning that rely largely on cognitive and metacognitive awareness (Pearson & Hamm, 2005). The knowledge requirements of students extend beyond what teachers and classrooms can provide and explain. In a world of fast-paced access to information and constantly evolving technology, it is unreasonable to expect that teachers are the complete source of knowledge required by
their students or that they are always more knowledgeable than their students. It follows, then, that all students may not be able to rely solely on practices based on traditional, teacher-centred classrooms or approaches in which the teacher, as the more knowledgeable other, scaffolds student opportunities to learn (Alexander Kurz, Elliott, & Schulte, 2015; Vygotsky, 1978b).

1.6 The changing face and needs of education

The pressure on teachers to create personalised and engaging environments for each of their students is unrealistic. Educators are increasingly frustrated by the misalignment of expectations and resources, including out of field teaching (teaching outside of expert subject area) with the result that teachers are burning out and/or leaving the profession prematurely (DEECD, 2012; Jacobson, Johnson, Gurr, & Drysdale, 2013; Leithwood, Seashore Louis, Anderson, & Wahlstrom, 2004; Townsend, 2011). Teachers simply cannot be everything to all students, all the time. Accepting and using the fact that students can be active and volitional learners - rather than passive and dependent - is the key to moving forward in this brave new world of technologically infused education and constantly changing workplace expectations. There is not only a need to keep education evolving, but it is essential that practices be monitored and adapted for success and sustained for long-term effectiveness.

The relationship between school and work demands are shown in the top boxes in Figure 1.1. The investment in schools for returns in a wider, social context is mirrored in the strengthening of relationships between school and life/work environments and approaches to learning/retraining (Rudd & Smith, 2007). Collaborative and self-regulated practices that focus on purpose and process rather than content are suited to workplaces where change and the need to re-train are the norm; consequently, education in schools needs to mirror this. An essential role of schools is that they prepare students for life beyond school which includes accountability to self and others, process rather than content specialisation, flexibility and adaptability, and the skills involved in achieving sustainable work-life balance.
1.7 Identifying outcomes and measuring student progress

One way to measure the success of an education system is by looking at post-education achievement. The Shomos and Forbes report Literacy and Numeracy Skills and Labour Market Outcomes in Australia (2014) emphasised the close links between literacy and positive outcomes at work and between social participation and lifelong learning and increased literacy levels and increased levels of success. The authors found that between 2006 and 2012, despite significant national efforts and focus on literacy, average increases in literacy levels was very small. This finding is echoed by the National Assessment of Educational Progress (NAEP) findings that only 34% of 4th and 8th grade students are rated as ‘proficient’ in reading (Souè & Warrick, 2015). Given the amount of resources and focus applied to improving levels of literacy, these findings do not bode well for meeting the demands of shifting labour markets which require skills in the adaptation and creative use of acquired knowledge (Shomos & Forbes, 2014). This line of discussion reveals a range of purposes for and impacts of assessment in schools.

Assessment in schools includes large-scale assessments used both internally and externally to assess not only students, but also schools. In their analysis of a decade of assessment in education, Broadfoot and Black (2004) identified the purpose of assessment at school and policy levels. In their review of the literature, Broadfoot and Black (2004) found the main purpose of assessment in education institutions and schools were:
• a feedback to parents, students and teachers
• reporting
• ranking students
• certification
• accountability
• national comparison
• school selection (by parents)
• controlling class behaviour and engagement
• track emerging learning profile of students
• identify individual learning needs
• to encourage deeper thinking
• development of student/teacher capacity and motivation to learn

In contrast, the purpose at the policy level included:

• Monitoring and raising achievement and growth, changing the focus of curriculum practice.
• Changing the focus of teacher classroom strategies.
• Defining and assuring ‘standards’.
• Introducing performance managing systems for teachers.
• Institutional quality assurance and control.
• Comparing schools and allocating resources.

Broadfoot and Black (2004) contended that there are tensions between the purpose of assessment in education between school and policy levels that extend beyond schooling. Included is tension between what has become a ‘test driven’ education culture and ‘lifelong learning’ (Broadfoot & Black, 2004; Sadler, 1994).

Measuring student levels of RC and academic achievement have become common and repeated practice in schools; these skills are measured in many ways and at many times in the lives of students (Manuel, 2012; Shomos & Forbes, 2014). It is, however, unclear how schools and teachers use this information beyond ranking, grouping, and rating students within schools and classes. In fact, high-stakes standardised testing (such as NAPLAN) is reported to have had negative impact on teachers, students and classrooms in that:
• it negatively impacts motivation (Harlen & Deakin Crick, 2003)
• it converges student learning to mediocre standards rather than encouraging students to stretch to their potential (Greene & McGee, 2012)
• it negatively impacts teaching and learning in reading classrooms (Willey-Rendon, 2008)
• teachers are skeptical of and have negative perceptions of the effects that NAPLAN standardised testing has on curriculum and pedagogy (Thompson & Harbaugh, 2013)

Given these concerns, there is clear misalignment here between the aim to improve student learning through assessment and the actual impact of standardised assessment.

Hattie (2005) argued convincingly that it is the teacher’s use of assessment that has the greatest impact on the focus of learning, however teachers appear to continue to struggle to develop the skills necessary to make the most of their role in selecting and using assessment and data. This is especially true for HC students where assessment data are primarily used to discount any deficit in learning and consequent need for intervention. There is little research, for example, beyond the impact that standardised assessment has on students, that is focused on learners’ use of standardised assessment to support their engagement and improve outcomes. This has not traditionally been considered the role of assessment. However, the case of formative assessment (including classroom feedback) is very different (Hattie & Timperley, 2007). Unlike summative assessment, the process of formative assessment involves communication between teacher and student, and student and student, at the point of need and empowers students to be responsible for and active in their own learning (Black, Harrison Lee, Marshall & William, 2004; Broadfoot & Black, 2004; Heritage, 2011). This area of research is proving prominent in the move towards teachers’ developing awareness of the role of independence in their students’ learning and the role of the teacher in fostering learning independence.

1.8 High stakes standardised assessment

Although most teachers agree that some testing is necessary (Thompson & Harbaugh, 2013), most argue that they are spending valuable time teaching to the test and that assessments such as NAPLAN result in more teacher-centred instruction and narrowing of the curriculum
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(Thompson & Harbaugh, 2013). Loveless et al. (2008) go further and explicitly claim that any ‘narrowing (of the) achievement gap’ in student achievement has occurred largely because students at lower ability levels have progressed, while HC students have not (Loveless, Parkas, & Duffett, 2008, pp. 8, 16). They describe the issue with this way of narrowing the achievement gap between students: ‘the distribution of NAEP scores is compressing, with low achievers making gains, high achievers staying flat or even declining, and the achievement gap between the two groups narrowing’ (Loveless, Parkas, & Duffett, 2008, p 16). However, there are other factors in addition to the impact of standardised testing that may be responsible for the differences in student achievement. Alignment of student ability and assessment of the proposed construct is vital to ensure that the tests are valid for students of all abilities. This requires correctly targeting the test so that it is neither too difficult or too easy (Griffin, 2014). When researching HC students, it is important that the results are not skewed by an assessment ceiling effect caused by students topping the test.

Although, standardised assessments are viewed by some as impacting the teaching of reading in classrooms, it is widely accepted that student interest, engagement, and motivation also variously impact RC outcomes at specific ability levels (Gee, 2004; Guthrie et al., 2006; Locke, 2015; Manuel, 2012; Snow, 2001). Positive student interest, engagement, and motivation in both assessment and teaching practices, in addition to embedding assessments throughout the processes associated with learning rather than bookending them, can help ameliorate the negative impact associated with standardised testing (Harlen & Deakin Crick, 2003).

Understandings of progress and success in RC beyond the functional stages of reading taught in early to mid-primary school are complex and contentious. The range of student ability and teaching philosophies about how to teach reading add to the difficulties associated with teaching and assessing RC in typical classrooms. Progress in RC is predicated on the combination of teacher and student history and compatibility, knowledge, ability, personal characteristics and attitudes, and context; all areas not previously subjected to standardised testing (Locke, 2015; Snow, 2001).

1.9 Targeted teaching, classroom practices and reporting

Arguments about whether assessments should be formative or summative (or both) are becoming less crucial than those surrounding who is responsible for an individual’s learning
and access to opportunity to learn where opportunity to learn refers to the opportunity to acquire or develop knowledge or skills and to learn what is in the curriculum, and that which is assessed (Kurtz et al., 2015). Relying on teachers to assess aspects of students’ ability to read, identify, rank, and teach to ‘levels’ or ‘bands’ is not sufficient for developing RC (Duke & Pearson, 2008; Duke, Pearson, Strachan, & Billman, 2011; Gee, 2004; Locke, 2015). The skills required for RC as students move through their schooling are complex, sophisticated, and subtle. Curriculum levels such as those in the Australian Curriculum (ACARA, 2015) and its adaptation as the Victorian Curriculum (VCAA, 2016) assume that students’ learning needs can be placed in a distinct range and combination of knowledge and skills that can be captured at a specific time in school life that can be defined by class or grade level; it is routinely towards these defined levels and times in a student’s schooling that assessment and instruction are targeted.

An example of this is that the NAPLAN assessments are administered to all students when they are in Years 3, 5, 7 and 9, and reported within the ‘expected’ bands for those year levels (ACARA, 2016a). The ‘How to interpret’ NAPLAN results guide on the website clearly states that not all bands are reported for each year level. The explanation of the standards focuses on defining the ‘national minimum standard’ for each year level: ‘Band 2 is the minimum standard for Year 3, band 4 is the minimum standard for Year 5, band 5 is the minimum standard for Year 7 and band 6 is the minimum standard for Year 9’. There is a link available for more information about minimum standards. Although there is a diagram showing an assessed ability range for each Year level, there is no such information about standards above the minimum bands. Also, the benchmark is set at the ‘national minimum standard’ with no mention of the average national standard (only below, at, or above minimum national standard). The bands range for Year 5 is bands 3 – 8. Student reports include results and a summary of skills only within these bands. National assessments are reported against a national minimum standard. The focus is clearly on getting each student to ‘at or above minimum standard’ bands (at least), implying that the teacher re-focus resources on the next student who was assessed at below minimum standard.

The high stakes associated with national testing and reporting are affecting classroom practices. Thompson and Harbaugh (2013) concluded that teachers believe that they are spending valuable time teaching to the test as well as teaching students how to complete the
tests. International research indicates high stakes testing narrows curriculum focus, results in a call for a return to teacher-centred instruction, and decreases motivation (Au, 2007; Reid, 2009); (Barksdale-Ladd & Thomas, 2000; Barrett, 2009; Polese, Dulfer, & Turnbull, 2012; Ryan & Weinstein, 2009); (Ryan & Weinstein, 2009). In the NAPLAN testing years (Year 3, 5, 7, 9) the practice of focusing on the assessment content and format is in danger of overtaking targeting teaching toward student learning needs.

Placing the assessment as the focus of teaching impedes the routine identification and targeting of metacognitive knowledge and skills that individual students are ready to learn and apply. Griffith, Bauml, and Barksdale (2015) argued that this approach becomes increasingly problematic as students enter the middle years of formal education (Years 5-8) when reading knowledge and skill relative to Year level is increasingly assumed; particularly for HC students for whom it is unclear if or how curriculum is differentiated to meet their needs when they do not conform to formal time lines (Heritage, 2008; Tomlinson, 2005). It appears from this discussion that teachers and schools have become more efficient in identifying and intervening when students fall below expected academic levels than when students exceed them.

Targeted teaching through alignment of assessment, curriculum, and teaching to learning needs is a requirement for every student (Goss & Hunter, 2015). Teachers need to negotiate the demands of these variables in complex and varied contexts and in partnership with the student. Therefore, targeted teaching becomes targeted teaching and learning, and the responsibility shifts from teacher, to teacher and student. This 21st century approach can be problematic when standardised assessments such as NAPLAN focus on minimum standards and students come to realise that, while effort is encouraged, it is achievement in very specific terms that counts (Harlen & Deakin Crick, 2003). Goss and Hunter (2015) emphasised the importance of targeting teaching and assessment toward student needs in their concluding comments in the Grattan Institute report, ‘Targeted teaching, how better use of data can improve student learning’. The aptly titled report emphasised that targeted teaching involves the use of data to ‘improve student learning’ – the word ‘learning’ is crucial because it places a distinction between process and outcome. The opening sentence in the report drew attention to the distinctions between schools that do well in NAPLAN assessments and ‘the best schools’, asserting that one is not necessarily also the other. This reflects a distinction
between achievement and progress. Thus, assessments are repositioned as indicators of progress rather than snap shots of student achievement:

*Targeting teaching better would increase learning, raise achievement, and allow us to better evaluate the impact of future reforms. Focusing on progress will build students’ self-confidence and help them develop a mindset focused on learning – vital for success at work and in life.*

— Goss and Hunter (2015)

Although teachers have access to more and more data, they have less access to resources about the limitations of assessments and how to interpret the data as evidence of learning that can be used to inform classroom practices (Brookhart, 2011; Perie, Marion, & Gong, 2009).

1.10 The roles of teachers and students, opportunity to learn and self-regulated learning

The expectations placed on teachers as mediators of educational transformation carries with them an assumption that teachers are equipped with the required knowledge and skills. Educators are not immune to the effects of social and technological changes and nor are their workplace environments (Griffin, Graham, et al., 2017). The ongoing evolution of education systems includes shifting the teacher role from that of knowledge keeper to learning facilitator, and for organisations to change from top down workplace models to using distributive leadership practices that include the kinds of independent and collaborative practices emphasised through professional frameworks. For example, teacher registration through The Victorian Institute of Teaching requires teachers to meet standards set out in the Australian Institute for Teaching and School Leadership’s (AITSL) Australian Teacher Performance and Development Framework (AITSL, 2017). Professional accountability and ongoing professional development are among the most fundamental of changes demanded of teachers in the last ten years.

Professional responsibility, competitiveness, and accountability are expectations across education systems and schools, with some teachers struggling to negotiate what seems to be a collaborative-personal paradox (Brown, 2017). Research into the impact of teacher
networking and collaboration within and between schools on student performance is in the early stages. Elements of collaborative practices and independent learning have been contested by academics such as Butler, Lauscher, Jarvis-Selinger, & Beckingham (2004) and Järvelä & Järvenoja, (2011), who argued for an interdependence between collaborative practices and the ability of individuals to independently regulate their learning.

More recently, while there is evidence of the benefits of professional collaboration for student outcomes, the need to provide training and support for teachers in the areas of professional collaboration and networking has been emphasised (Goddard, Goddard, Sook Kim, & Miller, 2015; Ronfeldt, Farmer, McQueen, & Grissom, 2015). Educating our teachers must be a priority if they are expected to enact and model the skills society has come to prize, and that students are increasingly expected to exhibit. The shift to more collaborative learning and working environments must be accompanied by a shift in philosophical, pedagogical, and practical considerations.

Social and workplace expectations that individuals be collaborative and simultaneously capable of and responsible for continued learning have spilled over into the classroom. This requires a shift from expecting students be passive, individual, and dependent learners who learn in isolation, to expecting them to be active, self-directed participants and co-creators of learning where learning occurs within collaborative communities that are both independent and interdependent. The ability to exercise control over personal learning and to collaborate is equally important to teachers and students (Griffin, English, Nibali, Harding, & Graham, 2017). These abilities impact teaching and learning, and the rate of learning in all subject areas, including RC.

In Year 5/6 classrooms there are increasing expectations that students are acquiring and developing skills required for taking responsibility for and regulating individual learning; while also meeting the increasing demands of academic content that assumes increasingly sophisticated levels of RC. These skills have been collectively referred to as 21st century skills (Pearson & Hamm, 2005; Soulé & Warrick, 2015). Similarly, there is an expectation that teachers are equipped to support students in their development of the necessary skills that underpin 21st century requirements and that they themselves are supported with professional learning. Specifically, given there is increasing focus on SRL for improving
learning outcomes, it is important to understand the influence of SRL on how students learn and take advantage of learning opportunities.

1.11 Conclusion

The most recent wave of education reform involves placing students at the heart of their learning and focusing teaching on increasing each student’s learning capacity and learning longevity by developing individual and independent awareness of and processes for learning. The successes of education reforms based on this approach necessitate teacher expertise in SRL pedagogy and assume that there are links between student achievement and the ability to independently manage or self-regulate learning. In addition, the requirement that teaching and resources be targeted toward the current needs of the student necessitates the inclusion of classroom strategies for targeted teaching at all levels of ability. Accordingly, this discussion integrates previous research into the development of skills for RC initially established in early childhood with further advancement in the Primary and Middle school years through targeted teaching practices that include SRL. Overall, this chapter has provided an orientation to the thesis in terms of specifying its purpose, background, significance and parameters. Further, it has foreshadowed the main ideas central to the research.
Chapter 2: A review of research into reading comprehension and self-regulated learning

This chapter reviews a body of research literature on RC and comes to a definition that is central to the study. Similarly, the history of SRL is traced through the literature and a working definition is established. The chapter also provides an overview of the expectations placed on education in Australian and Victorian classrooms and the teaching and learning practices and outcomes observed in these classrooms. The links between expectations, practices, and student outcomes are explored.

2.1 Reading comprehension

The research literature agrees that literacy, and more specifically RC is essential for learning across all areas; and as such, RC is a practical focus for this study. Derewianka (2012) eloquently expressed the link between RC and learning, positioning reading as the medium through which we shape our thinking, create our identities, engage with others, analyse, critique, reason about, and enjoy the world; these are the corner stones of learning (Derewianka, 2012; Duke et al., 2011). This kind of thinking underpins the focus on literacy by the Organisation for Economic Co-operation and Development (OECD), National Assessment of Educational Progress (NAEP) (Soulé & Warrick, 2015), among other educational assessment and planning bodies, and provides an essential set of elements and conditions for learning in the 21st century. Education in the 21st century is viewed as the key to individual and collective achievement and reading is viewed as the key to education (Aleandri & Girotti, 2012; Reid, 2009; Schneider, 2009). Consequently, student achievement in reading is widely used as a predictor of and contributor to success beyond secondary education and remains the ‘canary in the coal mine’ for both education system efficacy and national advancement.

What is meant by ‘RC’ in modern contexts includes expanding definitions beyond the traditional printed text in bound books. The next section traces the evolving definitions of RC to develop a clear statement of the components of RC for the 21st century.
2.1.1 Defining reading comprehension

Defining RC is complex given our concept of reading has expanded greatly with the expansion and evolution of technology in career, personal, and civic life. Reading requires multiple literacy skills to decode multiple text types from which information is extracted, understood, and shared in a variety of ways and for a variety of purposes. It is convincingly argued that RC involves much more than print or images in hard copy texts (Coiro, 2003; Duke, 2005; Snow, 2001). Most students learn how to swipe, tap, scroll, and follow links on screens before or concurrently with learning how to hold a book, turn a page, or scan from right to left, up to down. From an early age, children navigate print, diagrams, images, links, screen menus, video, audio, and static as well as interactive content (Beschorner & Hutchison, 2013; J. Marsh, Hannon, Lewis, & Ritchie, 2015; Merchant, 2015). Modern reading is multi-dimensional and nonlinear; it is a complex, individual, social and multi-resourced process (Duke, 2005) that requires negotiation of multiple internal and external variables. Digital literacy, as the newest wave of communication, is at least as crucial as traditional literacies with both unique and overlapping comprehension skills required to enable the individual to “not only communicate, but to create, to manipulate, to design, to self-actualize” (Coiro, 2003; B. Jones & Flannigan, 2006, p. 3). As an essential component of literacy, reading has evolved from a process of communicating ideas and instruction into a tool for interpreting, understanding, and creating. Written in the early stages of the digital revolution, Durkin’s definition of RC as “…intentional thinking during which meaning is constructed through interactions between text and the reader” (Durkin, 1993, p. 11) fits well with the volitional emphasis in SRL, and with the evolution of what is now considered text. Harris and Hodges (1995) captured the interactive and dynamic nature of reading in which making meaning is a function of the reader’s active engagement; however, they confine text to that which is written: “the construction of the meaning of a written text through a reciprocal interchange of ideas between the reader and the message in a particular text” (Harris & Hodges, 1995, p. 121; Harris. & Hodges, 1995, p. 121).

The Department of Education and Training Victoria built on Harris and Hodges’ definition in specifying reading as a means of: understanding text and putting that understanding to use; learning and finding out information; entertainment and enjoyment; constructing meaning; forming memory representations of meanings; communicating information, thoughts, and
feelings about what is read with others (DET, 2015). This comprehensive list clearly assumes a variety of text formats for which the reader requires skills in developing, selecting and combining reading strategies according to specific texts, contexts, and purposes. As demand on and from the reader for information and understanding become more complex, the skill levels required for comprehension also becomes both more complex and specialised.

At its most basic level, reading assumes decoding skills which include knowledge about language, text conventions, semantics, syntax, and discourse (or how texts relate to genre and each other across a text) (Duke et al., 2011). The interactive and active engagement required in comprehension and making meaning from text, requires additional skills from readers, which include personal and prior experiences and the ability to select and discern, combine and adapt and appropriately apply strategies. This multi-component process is subject to an assortment of contextual constraints and conditions (Paris & Stahl, 2005). RC and the construction of meaning both within and beyond the original text requires metacognitive processing through which readers can make use of what they read – the purpose for reading. This process includes activating prior knowledge, motivational processes, forming text representation, constructing casual inferences, and integration of prior knowledge and text. Again, these are very similar to indicators of SRL, listed previously, particularly self-observation, self-motivational beliefs, self-control, and self-judgement. There is a clear crossover of skills in reading and SRL that are required of an individual to mediate shifting purpose, perspective, and context for RC.

Fielding and Pearson’s (1994) definition of RC contained further parallels to SRL, in that it highlights knowledge, experience, thinking, and teaching, placing additional emphasises on the need for instruction:

> Once thought of as the natural result of decoding plus oral language, comprehension is now viewed as a much more complex process involving knowledge, experience, thinking and teaching. Comprehension inherently involves inferential and evaluative thinking, not just literal reproduction of the author’s words. Most importantly, it can be taught directly.

— Fielding and Pearson (1994, p. 1)
This definition clearly differentiates between the aforementioned processes and skills required for progressing from learning to read to reading to learn (J. S. Chall, 1983). The transition from decoding through comprehension to meaning making is, if not overtly expected, then tacitly assumed of students as they transition from upper primary to secondary school where functional reading is no longer a main focus (Hopwood, Hay, & Dyment, 2014). Students, however, do not come with timers that turn learning on or off at specific points in time. Development of RC, although a progression, is not strictly chronological; it is an iterative process of constant improvement and reflection. Therefore, an expectation that once a student has reached a certain grade level, they have also reached a corresponding and associated level of RC for that grade level is not necessarily realised (Potgieter, 2013; Thompson & Harbaugh, 2013).

The demand for constant development and improvement of reading skills is responsive to increasingly complex learning contexts where language and literacy serve as vehicles for knowledge and ideas, and knowledge and ideas in return stimulate development of reading skills. Despite the Australian Curriculum’s inclusion of literacy as a general capability for which all teachers are responsible (ACARA 2015), the structure of classroom teaching in the large majority of Victorian schools and certainly beyond Years 5/6 is not conducive to addressing this responsibility and supporting the complex interactions between reading and learning.

The majority of Victorian schools use the English guide in the Australian or Victorian curriculum as a framework for teaching reading from foundation to Year 10. NAPLAN assessments are administered at Years 3, 5, 7 and 9 and used in conjunction with the curriculum for planning and assessment using predetermined levels used to compare and rank student achievement. The Australian Curriculum describes the purpose of levels as threefold: to emphasise the interrelated nature of the three English strands; provide information about the learning contexts appropriate; and to provide an overview of the key features and complexity of a range of texts to be studied. This standards-based approach becomes increasingly problematic in RC when the focus for reading shifts from learning to read to reading to learn (Manuel, 2012). Assessment of and targeting interventions to discreet levels of comprehension skills for students at different levels along the RC progression becomes more obscure as students move up through the year levels. This is even more obvious as students make the transition to secondary school where reading as a subject
within English is no longer a focus and teachers of English are not specifically trained in literacy or teaching reading (A. L. Bailey & Heritage, 2014; P. Jones & H. Chen, 2012; Love, Macken-Horarik, & Horarik, 2015). Galton, Gray, and Ruddick (1999) reported that, in New Zealand, 7% of students in their first year of secondary school ‘unlearn’ reading and their marks drop by up to 33% compared to standardised testing during the last year of primary school. They further reported that up to 40% of students do not make the predicted progress in their first secondary school year (Galton, Gray, & Ruddick, 1999). However, traditional teaching and assessments fail to take this into consideration as content and assessments move from general level to level rather than skill to skill. This inadequacy begins at and compounds beyond the upper primary setting (Dymock & Nicholson, 2010; Galton et al., 1999; McGee, Ward, Gibbons, & Harlow, 2004).

Two possible factors that can be viewed as jeopardising student progress in education and lifelong learning include failure to develop RC skills at least appropriate to the levels at which students are capable of learning content, and where teachers are ill equipped to intervene to support students in the development of either learning to read or reading to learn.

A synthesis of aspects of the definitions explored thus far enables a working definition of RC to be constructed:

**RC** is the interaction of several component processes that integrate information from a text with the individual’s background knowledge, and which are subject to a multitude of contextual constraints. RC inherently involves inferential and evaluative thinking; is not only used to communicate, but to create, to manipulate, to design and to self-actualize. RC simultaneously extracts and constructs meaning through interaction and involvement with written and or digital language.

This is the definition assumed in this thesis when reference is made to RC, unless otherwise specified.

There is an expectation that teachers have an expert understanding of RC; however, teacher ability to identify, assess, and plan for RC cannot be assumed (P. Jones & H. Chen, 2012). Teacher knowledge about reading and about reading pedagogy informs their classroom practices and the teaching of individual students. The assumption that teachers are skilled readers and literacy experts is being revealed as less and less of a reality, especially as
students move from decoding and learning to read to critical literacy and the higher-order thinking skills required in reading to learn (Griffith et al., 2015). This shortfall is increased when the multiliteracies required in this era of multimedia and digital technology are considered. As such, teacher knowledge in and expertise about RC is a relevant area of exploration for explaining HC student gains in RC.

2.1.2 Teacher knowledge and expertise about reading comprehension

Derewianka (2012), P. Jones and H. Chen (2012), and Dymock and Nicholson (2010) highlighted the deficits in teacher knowledge about language. They did so particularly in Australian classrooms where the ability to teach reading is not evident for many teachers and is not a prominent feature in secondary teaching, which makes learning these skills even more crucial in the primary years (Derewianka, 2012; Dymock & Nicholson, 2010; Jones & Chen, 2012). This is despite the explicit inclusion of literacy as a General Capability in the Australian Curriculum. Freebody, Windel and Miller (2012), for example, reported upper primary and secondary teachers overly focus on the teaching of specific content in a set way and do not adapt their program to accommodate students’ reading levels (Freebody, 2007; Windle, Miller, & Literacy, 2012).

It is counterintuitive to conceive of a classroom in which the knowledge and expertise of the teacher is below that of the student in any aspect of literacy; however, this is the case in some classrooms and is especially likely to be so for HC students. This includes not only teachers of English and reading, but also those lacking the ability to teach RC in other subject areas. Teacher level of expertise in supporting the development of student RC in all learning areas is vital given the increasing demands on RC skills as students move through the levels of schooling. For example, in a report of a US national survey involving 373 teachers (69 in Years 3-6 and 143 in Years 7-9), Love et al. (2015) found that only 72.7% of teachers expressed high levels of confidence in teaching knowledge about language (Love et al., 2015). This is disturbing given findings that there is a considerable gap between teacher’s actual subject knowledge and the usual overestimation by teachers of their level and depth of knowledge (P. Jones & H. Chen, 2012; Moats & Foorman, 2003). Metzler and Woessmann’s (2012) Peruvian study identified a significant effect of teacher subject knowledge on student achievement in their analysis of data on the reading achievement of 6th-grade students.
Student achievement increased by 10% of a standard deviation with everyone standard deviation increase in measures of teacher subject knowledge (Metzler & Woessmann, 2012). Although some may view these data as evidence of a clear link between teacher subject knowledge and achievement in students, there are many other factors that muddy the waters and require further investigation. Hattie (2005) agreed that it is plausible that teacher subject knowledge impacts student achievement; however, he contends that there is little evidence to support this claim. Hattie has popularised measures of the effect size of variables that impact student achievement. Based on two meta-analyses and 92 studies, he rated teacher subject knowledge at 0.09 effect size, on a scale where 1.0 is an increase of one standard deviation and in which 0.4 is equivalent to one grade, with anything above 0.4 considered above average for educational research (Hattie, 2005, 2012). This analysis placed teacher knowledge 125th on a list of Hattie’s 138 effects on student learning; however, it is not clear how other related influencing factors (such as teacher training, teaching outside subject area, and the teacher’s verbal ability) moderate the impact teacher content knowledge may have on student achievement. As such, the impact of teacher content knowledge and teacher knowledge about RC in particular, is unclear.

The US 2008 study, ‘The Impact of Two Professional Development Interventions on Early Reading Instruction and Achievement’, found that professional development for improving teachers’ knowledge in 90 schools did not produce a statistically significant impact on student achievement in either the year of the professional development intervention nor the following year (Garet et al., 2008). These findings are in alignment with Hattie’s findings and indicate that teacher subject knowledge may have limited impact on student achievement and that other factors come into play, especially where the gap between teacher and student knowledge narrows, and in some cases, ceases to exist. Teacher professional development, however, extends beyond content knowledge and focuses on supporting teachers to identify and implement targeted intervention and to develop effective teaching practices (P. Jones & H. Chen, 2012).

Whether there is clear evidence that teacher knowledge is affecting student learning in year 5/6 classrooms or not, it is clear that RC education must change to meet the demands of teaching reading in information and technology environments. These changes include the way in which the roles of teacher and student are viewed in relation to learning, and what is
required for competence in RC in the 21st century. Therefore, identification, assessment and measurement of RC are important features for 21st century education.

2.1.3 Reading comprehension in the classroom

Identifying and ascertaining successful RC is a difficult and contentious enterprise. Snow contended:

_The vast differences in what we would call successful comprehension across different levels of reader skill, text challenge and task definition pose a challenge in summarising what we know about reading comprehension, and in integrating, or even providing a road map to extensive research literature on comprehension development, assessment, instruction and intervention._

—Snow (2001, p. 415)

She went on to include many indicators used across the literature, both historic and contemporary, to identify successful RC and to use as foci for reading instruction. Similarly, Locke (2015) put forth the argument that successful reading can be determined in relation to the purpose for which reading is used. Textual and rhetorical competence, for example, is pragmatic and evident in progressive or personal growth (Locke, 2015) as the means by which tasks are accomplished; how individual capacity as thinking and creative beings is expanded; and, how one moves closer to self-actualisation. Others contend that success in RC can be measured by standardised assessments (such as NAPLAN); or by its ability to predict post-school accomplishments; or in the social and cultural exchanges it supports (Gee, 2004; Manuel, 2012; Nodelman & Reimer, 2003).

What is agreed, however, is the importance for individuals in becoming strategic and proficient readers. Proficient readers are individuals who are able to arrange and manage a range of flexible strategies for the purpose of meaning-making and communication, and who know how to select and coordinate the most appropriate strategies for constructing deep understanding, transferring learning, thinking critically, and solving the problem at hand (Brookhart, 2010; Dorn & Soffos, 2005; Fountas & Pinnell, 2001). Duke and Pearson (2008) have combined the work of Pressley and Afflerbach (1995) and Block and Pressley (2001) to establish a comprehensive list of what good readers look like and the indicators (such as
attributes and strategies) that point to their success in RC (Duke & Pearson, 2008). These can be categorised into pre-reading, while-reading, and post-reading strategies. Figure 2.1 configures Duke and Pearson’s (2008) compilation into these three categories to define what a good reader looks like and does.

![Diagram showing pre-reading, while-reading, and post-reading strategies]

Figure 2.1: Things a good reader does

A comprehensive review of SRL is discussed later in this chapter; however, some similarities with RC are again worth noting here. The extent of overlap between RC and SRL is evident when the characteristics of good readers and those for efficient SRL are compared. This overlap is illustrated by comparing strategies recommended for teaching RC with those also
considered important for SRL. For example, comparing the three phases of SRL (Forethought Phase, Performance Phase and Self-Reflection Phase as described in 2.8 ‘Developing a definition and construct for self-regulated learning’), to RC instruction and support in the three phases of working through tasks (before, during, and after reading) is illuminating. In addition, the cognitive, metacognitive, and motivational aspects of SRL align with cognitive, metacognitive and reciprocal teaching (behaviour/motivation-based) models of RC (Harris & Storr, 2005; Mokhtari & Reichard, 2002). What is also evident is that the level of thinking required increases as opportunities to learn expand and the demands on learning increases. RC becomes increasingly complex and sophisticated requiring higher-order skills especially as students move into the upper primary years of their education (Dymock & Nicholson, 2010; Galton et al., 1999; Griffith et al., 2015; McGee et al., 2004). Student progress requires continual development of RC which in turn requires that classroom teaching incorporates opportunities for students to develop and refine RC skills. The development of RC can occur alongside other learning and supports and accompanies other learning throughout the life of the individual.

2.2  Education and lifelong learning

In addition to the importance of RC, the links between education and life skills are reflected in school relationships and the nature of learning tasks respectively. Teacher, student, and peer relationships increasingly involve feedback, self-management and collaboration. Biggs and Tang (2010) contended that learning tasks must move from outcomes that are content based to a model where learning outcomes focus on how, and at what level, the learner can use skills and knowledge in increasingly collaborative environments. Education now includes how students develop and use strategies in “academic and professionally appropriate ways” (Biggs & Tang, 2010, p. 1) and how they develop skills and knowledge for lifelong learning (Baas, Castelijns, Vermeulen, Martens, & Segers, 2015; Stoeger, Fleischmann, & Obergriesser, 2015). Broadfoot and Black (2004) maintained that lifelong learning is indicative of a shift that is taking place from a focus on what is to be taught to who is learning and how one learns. They argue that “learning power” is made up of a constantly developing set of skills that support student responses to the changes and metacognitive demands of twenty-first century life (Broadfoot, 2007, pp. 218-219). Learning power includes skills that are necessary for
monitoring and regulating learning and for creating and taking advantage of opportunities to
learn regardless of individual ability or age (Kremer-Hayon & Tillema, 1999; Zimmerman,
2003). What is also evident is that such skills are not necessarily acquired instinctively, and
that direct instruction is required to increase student competence in self-regulated learning,
strategies (Boekaerts & Corno, 2005). This implies inclusion of teaching and learning self-
regulated learning skills in schools.

Changes in how students acquire and use knowledge and the changing role of the teacher
have made self-regulated learning skills more important than ever. Vygotsky’s popular theory
states that learning is most likely to occur when it is scaffolded by a more knowledgeable
other at the point at which the student is most ready to learn (referred to as the Zone of
Proximal Development or ZPD) (Vygotsky, 1978b). Vygotsky (1978) suggested that the most
effective teaching strategies are those targeted towards the student’s emerging skills, or zone
of proximal development (ZPD). He describes the ZPD as ‘the distance between the actual
developmental level as determined by independent problem solving and the level of potential
development as determined though problem solving under adult guidance, or in collaboration
with more capable peers’ (Vygotsky, 1978b, p. 86).

Teaching models based on this theory are less effective for students in classrooms in which
they are approaching the teacher’s level of knowledge in a specific area or in which the
student is the more knowledgeable other in that area. This becomes increasingly problematic
where the student is the most knowledgeable person in the classroom. Students in these
contexts require other means of support to continue to progress. Of course, supporting
students involves more than the teacher having a higher level of content knowledge implied
in the term ‘knowledgeable other’. There are many complex requirements related to the role
of teacher. Teachers are required to be skilled pedagogical practitioners who can engage
students and encourage them to pursue areas in which they may or may not have awareness
or interest. Teachers are required to use assessment to ensure there are no gaps in a student’s
education and that resources are appropriately targeted.

Teachers also provide opportunities for students to apply, compare, analyse, evaluate, and
synthesize information and develop students’ abilities to curate and view information with a
critical eye. Importantly, teachers are expected to model good learning practices, encourage
students to learn and keep learning, and educate students about how to access resource that
are at or higher than the knowledge/ability of the student (Guerriero, 2014; Hattie, 2012; Hattie, Biggs, & Purdie, 1996; Metzler & Woessmann, 2012). Although not necessarily and exclusively content based, thinking and motivational skills form the basis of learning and are at the core of self-regulation and metacognitive awareness, which are crucial for the ongoing development of skills for the required levels of RC. How learners develop these skills can be described in academic developmental progressions that identify skills, knowledge, and thinking through observed behavioural indicators, which can inform teaching and learning. Like other subject areas and learning constructs, RC and self-regulated learning developmental progressions can be used to identify and target student ZPD (Heritage, 2008, 2011).

2.3 Targeted teaching: opportunity to learn and academic growth

Siemon, Breed, Dole, Izard, and Virgona (2006) defined targeted teaching as related to teaching a defined construct or ‘big idea’. In this study, the construct is RC. Among the requirements for targeted teaching is that it include: assessment of student level of performance in relation to the construct; that the teacher has an established knowledge about and understanding of the stages and content of the construct’s developmental learning progression and strategies for scaffolding learning at each stage; that the teacher has the ability to interpret the varied student responses to interventions and can then adapt practical strategies for addressing those responses either proactively, interactively, or upon reflection; that teachers have access to a strategy tool kit for ensuring that all students can participate and contribute ideas and processes in learning the construct; and, that there be sufficiency and flexibility of time spent in developing an effective teacher-student relationship (Siemon, Breed, Dole, Izard, & Virgona, 2006).

Other ways to provide the opportunity to learn include collaboration between students, which includes giving students access to others of equal or higher ability (Chester, 2014). Tomlinson (2005) and Reis, McCoach, Little, Muller, and Kaniskan (2011) suggested strategies for differentiation that target the needs of highly able students. These strategies include modifying curriculum content and pace of instruction to challenge students, targeting higher-order thinking, reducing whole class instruction, giving students access to individuals of equal
or higher ability and resources and texts of difficulty to match the ability of the student (Reis et al., 2011; Tomlinson, 2015).

The purpose of targeted teaching is to provide an opportunity to learn that increases student performance in a specified construct, which can be measured by assessing students before and after the teaching strategy is implemented (Griffin, 2014; Woods, Mountain, & Griffin, 2015). Therefore, opportunity to learn encompasses the selection of appropriate strategies that result in the individual student’s progress along the construct’s developmental learning progression. As such, OTL is at the centre of consistent student development and academic growth (Ainley & Patrick, 2006; Kurtz et al., 2015). Educational equity demands that student OTL and consequently student achievement should not depend on factors beyond the control of the student (Alexander Kurz et al., 2015; Televantou et al., 2015). Providing students with the access to OTL what is in the curriculum (or learning progression) and what is assessed is traditionally thought of as the teacher domain (Alexander Kurz et al., 2015), which emphasises the importance of teacher expertise.

2.4 Beyond teacher content knowledge

Traditionally, the link between teacher content knowledge and student outcomes is underpinned by the expectation that teachers have greater content knowledge than their students (Loewenberg Ball, Thames, & Phelps, 2008; L. S. Shulman, 1986). The evolution of the internet and technology has facilitated fast paced and convenient access to information such that it is unreasonable to expect teachers to remain the central source of knowledge in the classroom. It may well be the case that some students are outperforming some teachers in some areas, which may in part explain the flat line in student progress at the top end of student ability. This study deals with this contention in greater detail in the section titled, Teacher knowledge and expertise about reading comprehension. However, irrespective of whether insufficient teacher knowledge at the high end of student ability impacts student progress, there are HC students whose rate of progress is at least commensurate with that of their classroom peers. It can be argued that this is because these students are accessing OTL and actively regulating their learning (A. Kurz, Elliott, Kettler, & Yel, 2014; Perry & VandeKamp, 2000). In such instances, the importance of the teacher’s ability to support learning in terms of process and metacognition, rather than solely content, is paramount.
Shulman (1987) popularised the idea that there is pedagogical content knowledge about teaching which comprises a “codifiable aggregation of knowledge, skill, understanding, and technology, of ethics and disposition, of collective responsibility- as well as a means for representing and communicating these” (L. Shulman, 1987, p. 4). This can be summarised as how teachers teach and the strategies they use for teaching. The impact of what is now referred to as teacher pedagogical content knowledge is widely understood and accepted as critical to improving student outcomes (Abell, 2008; Gess-Newsome, 2015; L. Shulman, 1987). Although considered important, Gess-Newsome (2015) highlights the difficulties in measuring pedagogical content knowledge. This makes it difficult to examine and quantify the relationship between teacher pedagogical content knowledge and content knowledge (such as in RC), and impact on student progress. Although Gess-Newsome’s article focuses on Science, Shulman’s previous article emphasises the importance of both content and pedagogical content knowledge in all subjects.

Pedagogical content knowledge on its own cannot ameliorate lack of subject content knowledge and nor is the opposite true; these knowledge constructs overlap and it is the successful and efficient interrelatedness between the two that supports learning in the classroom (Koehler, Mishra, Kereluik, Shin, & Graham, 2014; Mishra & Koehler, 2006). However, the teacher is only half the learning equation; students are the other crucial element.

2.5 Repositioning the student

Developing and using capabilities that increase self-regulation improves learners’ ability to create, monitor and take advantage of OTL. Ainley and Patrick (2006) argued that all students encounter more OTL where learning can be contextualised as “an interactive system that is defined by student and task” (Ainley & Patrick, 2006, p. 5). This highlights the relationships between task – learning – student rather than teacher – student – task, repositioning teacher effect in relation to the student learning through the task. In this conceptualisation, focus is on the students’ ability to regulate cognitive, metacognitive, and motivational (or behavioural) processes rather than traditional content-based instruction. At higher and more complex levels, selection, discernment, and use of information relies heavily on
comprehension and capacity for higher-order thinking which in turn requires increasingly more complex metacognitive skills and motivation involved in learning.

The expectation is that students continue to progress throughout their schooling. However, how much progress students should be making over any given span of time is unclear; there is no hard and fast number that identifies acceptable progress. As contended by Goss and Hunter (2015), though, expected progress is often referred to as at least one year of progress - what this means in practical terms remains unclear in the literature. At the very least, there is an expectation that student progress within any given class is similar for students across all levels of ability (Hattie, 2012). The flat line and recently observed difference in growth trends for HC students compared with other students challenges the assumption that schools nurture appropriate OTL and support HC students to take advantage of these opportunities regardless of their ability level. Where once OTL were considered as the amount of overlap between what is taught and what is tested, Banicky (2000) has argued that OTL should also include quality of resources, school conditions, and the curriculum and teaching that students experience and negotiate.

Similar to the links between teacher RC content and pedagogical content knowledge, student content knowledge requires a set of knowledge about how to learn and how to manage motivation for learning; which is conceptually referred to as self-regulated learning. The literature asserts that students’ ability to manage their learning is a significant factor in their learning (Mega, Ronconi, & De Beni, 2014; Pintrich & De Groot, 1990; Zimmerman & Schunk, 1989). Current education systems, including the one in Victoria, reflect the student-teacher combined accountability model for student learning and academic outcomes (Banicky, 2000). The Victorian Curriculum explicitly includes the learning area of Personal and Social Capability which is divided into two strands: Self-Awareness and Management and Social Awareness and Management (VCAA). However, Perry, Phillips and Hutchinson (2006) reported teachers are less certain regarding their specific responsibilities and ability to teach skills in these areas and teachers report less confidence and perceived impact in providing OTL for HC students than any other students in their classroom (Loveless, 2009; Loveless et al., 2008).

Consequently, there is misalignment between the expectation that students develop skills to self-regulate learning and the development of RC and the opportunity for learning self-regulated learning, especially given the lack of teacher expertise and confidence needed to
teach and support student development in these skills. Given this misalignment, targeting teaching in the classroom for the Self-Awareness and Management and Social Awareness and Management curriculum content is problematic. Teacher expertise and student self-regulated learning contribute to the various school features that impact learning and that are particularly relevant to HC students for whom there is often an expectation that these students work independently more often than their peers (Stoeger et al., 2015). Identifying which environments and practices are most effective for student learning remains at the heart of addressing the learning needs of all students.

2.6 Learning in schools

Hattie asked the important question: “What are the attributes of schooling that truly make a difference to student learning?” (Hattie, 2012, p. 1). The role of a school is viewed as providing an environment specifically designed and purposed to provide opportunity to learn that stimulates and develops learning. Providing and managing OTL requires planning, monitoring, evaluation and reflection on the part of both teacher and student (Coe, Aloisi, Higgins, & Major, 2014; Danielson, 2011; Hattie, 2012). Equity demands that policy, resources, and other educational structures aim to make learning a reality for all students regardless of their abilities (Barr et al., 2008). Supporting students to develop capabilities to identify, create, and take advantage of OTL is vital to optimising not only classroom learning, but also lifelong learning in a variety of contexts (Alexander, 2005; Shomos & Forbes, 2014) and is equally important for learners of all abilities. Creating and sustaining OTL for individual students is a complex endeavour in which the role and capacity of students to be aware of and regulate their learning, has traditionally been underestimated. The lifelong skills encapsulated in self-regulated learning are essential if students are to continually improve their RC skills and maximise learning throughout their lives. Changing learning requirements that require adaptive learning process for text driven technologies necessitate increasingly sophisticated literacy, and more specifically RC. Skills for self-regulated learning and RC are interrelated and interdependent (Solheim, 2011); together these sets of skills impact individual success in both work and non-work place environments. As such, ensuring development of these skills and the equitable opportunity for progress for all students in our schools is essential for maximising individual and collective achievement.
Teachers use different practices in the reading classroom, resulting in different learning environments experienced by students from class to class. Variables in reading classes include grouping practices, task selection, use of assessment, and inclusion of a range of thinking skills that extend across the range of ability present in the class and includes higher-order thinking (Gipps, Hargreaves, & Mccallum, 2015; Pressley & Allington, 2014; Taylor, Peterson, Pearson, & Rodriguez, 2002). Hattie’s (2008) effect size list included over 195 influences related to student achievement; these included varying elements related to practices for grouping students, different types of tasks given to students, and different types and use of assessment. Although common in classrooms, the classroom teaching practices isolated by Hattie had varied impact on student achievement (Hattie, 2008). However, Hattie did not differentiate his analysis to allow for differences in student ability. What may be found to have an overall positive effect on student achievement for most students may not necessarily be the most effective strategy for students of relatively higher ability than their classmates may. Therefore, implementing what may be generally viewed as effective strategies for student achievement may not be as effective for HC students. A case in point is the use of mixed or ability grouping for our most able students, which is debated in the literature (Allan, 1991; C. Bailey & Bridges, 2016).

The results of assessments for RC are challenging notions of equity in the classroom where there are differences in the patterns of growth between defined groups of students. (A note here calls attention to how ‘gains’, ‘growth’ and ‘progress’ are used interchangeably in this study and refer to the difference between measured initial performance and performance measured after a specified period has elapsed.) It has been discussed that individual responsibility for learning and the demands on RC increases as individuals move through school and ultimately into workplace environments. The expectation that individuals continue to learn throughout their lives, places even greater emphasis on RC and SRL skills.

2.7 The importance of self-regulated learning for the development of reading comprehension

The importance of self-regulated learning is identified time and again in literature describing twenty-first century learners and the twenty-first century skills deemed essential in both education and present and future workplaces. Paris and Paris (2001), Artlet, Baumert, Julius-
McElvany and Peschar (2000), Collins (2003), and Soule and Warrick (2015) are among those who have researched and identified the skills evident in effective twenty-first century learning. These skills can be grouped into five general categories which include metacognitive awareness and capabilities; task awareness and planning capabilities; goals and goal setting capabilities; personal awareness and motivation strategies; and monitoring and adaptive capabilities. These categories are expanded in Figure 2.2 to include specific characteristics identified by Paris and Paris (2001), Artlet et al. (2003), and Soule and Warrick (2015) that are among those required for effective self-regulated learning.

While the model already articulated identifies requirements for effective self-regulated learning, it is not a pragmatic model that teachers can easily apply to their classroom practices. The complexity and scale implied in such a model can be overwhelming for teachers who have less training in the area of self-regulated learning than they have in subject content teaching (de Boer, Donker-Bergstra, Kostons, Korpershoek, & van der Werf, 2013). More practically, these skills can be grouped into three general and overlapping components: cognitive, metacognitive and motivational (Boekaerts & Corno, 2005; Pintrich, 2004; Pintrich & De Groot, 1990).
Figure 2.2: Characteristics of effective self-regulated learners

The links between self-regulated learning and the development of RC have long been emphasised by academics such as Zimmerman and Pons (1986), Pintrich and De Groot (1990), Pintrich (1999), Paris (2001), Schunk (2005), Stoeger et al. (2014) Lau and Ho (2016) and Cirino et al (2017). While there are similarities between the definitions of self-regulated learning, found in the literature, a constant and unambiguous definition across the literature is more difficult to locate (Cirino et al., 2017).
Literature about self-regulated learning uses various overlapping, similar, and different terms which have become confusing, practically overwhelming, and potentially misleading when discussing self-regulated learning and associated topics (Kaplan, 2008). Clearly defining terms and establishing a singular model for self-regulated learning provides clarity, consensus, and a common framework for assessing and targeting the teaching of self-regulated learning capabilities in the RC classroom. A common language for discussing self-regulated learning is essential if educators are to include such capabilities and strategies that support students in their development of self-regulated learning, both within and across classrooms. The next section traces the evolution of self-regulated learning and associated models in the research and establishes clear definitions of the self-regulated learning construct and associated learning capabilities, as well as a practical model for implementing self-regulated strategies in the classroom.

2.8 Developing a definition and construct for self-regulated learning

A general relationship between self-regulated learning skills and learning is identified in studies by the Programme for International Student Assessment (PISA) (Artlet, Baumert, Julius-McElvany, & Peschar, 2003) and the OECD (2016), in addition to studies by Loveless and Shomos (2008), Shomos and Forbes ((Shomos & Forbes, 2014), and Lau and Ho (2015).

The next steps involve identifying specific contexts in which this is a positive relationship and clarifying the nature and practical applications of self-regulated learning and exploring how to incorporate these skills in formal education. An understanding of the evolution of self-regulated learning in education sheds light on the relationship between self-regulated learning skills and learning; it also provides valuable information that underpins present conceptual understandings of self-regulated learning as an educational construct.

2.8.1 Evolution of ‘self-regulated learning’

Increased popularity in concepts related to regulation of one’s own learning has resulted in a considerable amount of ambiguity in defining the terms central to this area of research. Kaplan’s (2008) extensive review of related terms established a practical understanding of self-regulation, self-regulated learning, and metacognition through their practical application within a conceptual framework designed to clarify these three central concepts and
surrounding terms (Kaplan, 2008). Although this exact framework is not used in the study, Kaplan resolved definitional issues by concluding that these three areas are not distinct, but rather are three interrelated or nested dimensions of the wider concept that is ‘self-regulation action’ (Kaplan, 2008). He contended that self-regulation is not a static set of behaviours or strategies but rather self-regulated action impacts and is impacted by, among other things, the purpose of engagement in the task. Different tasks, domains, sociocultural contexts, and individuals require different applications of self-regulation. Self-regulated learning, then, refers to the application of self-regulated action (that is, cognitive, metacognitive, behavioural strategies) for the purpose of an individual’s learning (Kaplan, 2008). It is this application that determines the nature of the interaction between students and OTL.

It is widely acknowledged that individuals learn and have access to OTL in many contexts and situations (Barron, 2006). Valuable knowledge and skills (including learning and self-regulated learning skills) are developed at home with the family, in social situations, in the workplace, through participation in sport or hobbies, on holidays, and in formal school settings. It is not within the scope of this study to research all the contexts through which individuals learn. Instead, the focus of this study is on RC and the links between RC and self-regulated learning in Year 5/6 students and teachers.

The construct of self-regulated learning can be understood by drawing on a number of sources in which self-regulated learning is expressed as an academic process in which learners systematically and intentionally monitor cognition, metacognition, and behaviour in response to internal and external environments (Boekaerts & Corno, 2005; Kaplan, 2008; Pintrich, 2004; Zimmerman, 2003; Zimmerman & Schunk, 1989). The bulk of the literature regarding self-regulation and self-regulated learning agreed that the way students use knowledge and skills involves deliberate monitoring and correcting techniques based in self-awareness, self-motivation, and behavioural skill (Zimmerman, 2008). At the most basic level, students need to be conscious of self-regulatory strategies and the links between these and academic progress (Boekaerts & Corno, 2005; Zimmerman, 2003). These should be developed from early childhood through to adulthood with emphasis on increasing awareness, deliberate evaluation, and the adaptation of processes that support lifelong learning (Butler & Winne, 1995; Dreyfus, 2004; McClelland & Cameron, 2012; Reis et al., 2011; Shomos & Forbes, 2014).
Zimmerman and Pons-Martinez (1986) developed an early model of self-regulated learning by using existing literature to identify 15 categories related to an individual’s ability to learn independently. Their definition of self-regulated learning strategies at the time included ‘...actions directed at acquiring information or skill that involve agency, purpose (goals), and...self-perceptions by a learner’ (Zimmerman & Pons-Martinez, 1986, p. 615). This definition clearly places self-regulation in the purposeful domain of the learner. Zimmerman and Pons-Martinez's model (Zimmerman & Pons-Martinez, 1986) includes categories drawn from consideration of Social Cognitive Theory (Bandura, 1986, 1993) in which personal factors, environmental factors, and behaviour interact and impact each other. Consequently, their study of the self-regulated strategies used by 40 10th grade students, reproduced in Table 2.1, drew on this theory and allied theoretical frameworks.

Table 2.1: Zimmerman and Pons-Martinez's 15 categories for self-regulation strategies

<table>
<thead>
<tr>
<th>Categories for Self-Regulation Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self-evaluation: evaluation of quality and progress initiated by the student</td>
</tr>
<tr>
<td>2. Organising and transforming: rearranging instructional material to improve learning (how they arrange the material – e.g.: make dot points, graphic organisers, summary…)</td>
</tr>
<tr>
<td>3. Goal setting and planning: planning goals, sequence, and use of time (first, I will do this and then that…)</td>
</tr>
<tr>
<td>4. Seeking information: e.g. library, internet search,</td>
</tr>
<tr>
<td>5. Keeping records and monitoring: recording events or results; e.g., taking notes, vocab list…</td>
</tr>
<tr>
<td>6. Environmental structuring: arranging the physical environment, i.e. move to a quiet place, turn off radio, go to study group</td>
</tr>
<tr>
<td>7. Self-consequences: ‘If I do this, I will give myself that…’</td>
</tr>
<tr>
<td>8. Rehearsing and memorising: e.g. studying for a test, write it down until I remember, use flash cards to remember…</td>
</tr>
<tr>
<td>9. Seeking social assistance from peers</td>
</tr>
<tr>
<td>10. Seeking social assistance from teachers</td>
</tr>
</tbody>
</table>
Among findings of interest were those that indicated use of strategies among high ability students differed from other students. HC students seemed to rely more heavily on social sources of assistance (categories 9-11) and reported seeking assistance from adults significantly more often (50% asked for assistance from peers; 35% requested help from adults). Therefore, the study highlighted that, as a primary strategy for learning, HC students turned to those perceived to have greater knowledge for support; bearing in mind that in 1986 teachers and adults were considered to be largely in a position to provide that support. This has important relevance in the context of the more knowledgeable other in Vygotsky’s (1978) previously mentioned learning theory. It has been discussed that some HC students are the most knowledgeable in the class and, therefore, may not have access to the kinds of guidance and support expected and available to less capable students.

The conclusion to the Zimmerman and Pons-Martinez (1986, p. 626) study suggested that “theoretical conceptions of students as initiators, planners, and observers of their own instructional experiences have empirical and practical merit” that can be measured and used to inform classroom practices. These may be the very characteristics that can be used to redress the absence of Vygotsky’s more knowledgeable other.

As its use increased, the definition of self-regulated learning evolved to include a synthesis of learning processes and a collection of strategies and behaviours that affect personal learning (Brookhart, 2010). These processes are viewed as deliberate and adapted as necessary to support the achievement of intended outcomes in changing learning environments. The contention that self-regulated learning, and self-regulation skills can be taught, learned, and managed emerged again as an important set of features (Griffin, McGaw, & Care, 2012; Schunk & Zimmerman, 1994) Griffin, McGaw, & Care, 2012; Schunk &

---

11. Seeking social assistance from adults
12. Reviewing records by re-reading notes
13. Reviewing records by re-reading text books
14. Preparing for class or further reading
15. Behaviour initiated by other persons ‘I just do what the teacher/parent says…’
Zimmerman, 1994). These features and characteristics have been at the foundation of various models of self-regulated learning.

A significant evolution of self-regulated learning appeared in Zimmerman’s ‘Becoming a Self-Regulated Learner: An Overview’ (Zimmerman, 2003), in which phases and sub-phases of self-regulation were identified. This model includes processes consisting of combinations of the previous categories sorted into three distinct phases that take effect before, during, and after learning engagement (see Figure 2.3).

![Figure 2.3: Zimmerman and Campillo Phases and Sub-processes of Self-Regulation (Zimmerman, 2002)]
This influential model for self-regulation may be somewhat misleading, however, as the phases occur cyclically in one direction rather than iteratively. A more accurate representation would show each phase as a reaction to and informing previous and post phases respectively, with further iterations of aspects of the cycle within the phases themselves. For example, imagery can affect self-instruction which in turn can affect task strategies and/or self-recording, all of which can impact evaluation of self-efficacy and/or causal attribution. This web of reciprocity within and between phases is well supported in the research (Artlet et al., 2003; Boekaerts & Corno, 2005; Butler & Winne, 1995; Corno, 1986; Dreyfus, 2004; Fredricks & McColskey, 2012; D. Jones, 2007; Pintrich, 2004).

The model for self-regulated learning used in this study was based on the revised 2008 Zimmerman and Campillo model in which ‘Intrinsic interest/value’ was referred to as ‘Task interest/valuing’ and ‘Self-experimentation’ as ‘Metacognitive monitoring’ (Zimmerman, 2008). In Figure 2.4 the 2008 Zimmerman and Campillo model is revised to suggest the reciprocal nature of the processes that occur between individual indicators of self-regulated learning, and to emphasise the inter-dependence between indicators and phases.

Between the 2002 and 2008 models which informed current understanding of self-regulated learning, others were developing including Artlet et al.’s (2003) model for self-regulated learning (Table 2.2), Pintrich’s conceptual framework for self-regulated learning (Pintrich, 2004) (Figure 2.5); and Boekaerts & Corno’s (2005) model (Figure 2.6).
Figure 2.4: Zimmerman and Campillo (2008) self-regulated learning model with revisions that show the reciprocal nature of the processes between individual indicators and phases

Table 2.2: Artlet et al.’s model for self-regulated learning

<table>
<thead>
<tr>
<th>Self-regulated learning</th>
<th>Student strategies</th>
<th>Motivational preferences and volition</th>
<th>Self-related beliefs</th>
<th>Learning situations – preferences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>memorisation</td>
<td>instrumental motivation</td>
<td>self-efficacy</td>
<td>preference for co-operative learning</td>
</tr>
<tr>
<td></td>
<td>elaboration</td>
<td>interest in reading</td>
<td>self-concept in reading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>control</td>
<td>interest in mathematics</td>
<td>mathematical self-concept</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>effort and persistence</td>
<td>academic self-concept</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(volition)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.5: Pintrich’s conceptual framework for self-regulated learning, (Pintrich, 2004)
The various iterations of self-regulated learning are collated and compared in Table 2.3 where elements of previous models of self-regulated learning and additional input from the literature are combined. Table 2.3 illustrates the overlap and ambiguity inherent in the labels used for conceptualising self-regulated learning, and associated capabilities and indicators which presents a challenge for establishing a model to encapsulate the variously defined skills and indicators associated with self-regulated learning. It is through consideration of these models and this study’s review of the literature that an essential definition for self-regulated learning was established.

Figure 2.6: Boekaerts & Corno’s model for self-regulated learning
<table>
<thead>
<tr>
<th>Zimmerman-Campillo Model</th>
<th>Categorised into three ‘phases’</th>
<th>Based on Artlet et al. categories (Artlet et al., 2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FORETHOUGHT PHASE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Task Analysis</strong></td>
<td>Pro-active phase:</td>
<td>Student strategies:</td>
</tr>
<tr>
<td>- Goal Setting</td>
<td>metacognition activation:</td>
<td>control; memorise; elaborate</td>
</tr>
<tr>
<td>- Strategic Planning</td>
<td>goal setting and planning:</td>
<td>Rehearse; organize; critical thinking;</td>
</tr>
<tr>
<td></td>
<td>knowledge of ability;</td>
<td>persistence questioning</td>
</tr>
<tr>
<td></td>
<td>prior knowledge of content</td>
<td>set goals; plan study/learning;</td>
</tr>
<tr>
<td></td>
<td>and environment;</td>
<td>regulation, control and adaptability of study</td>
</tr>
<tr>
<td></td>
<td>level of difficulty and effort;</td>
<td>environment and effort; learning situations</td>
</tr>
<tr>
<td></td>
<td>self-motivation beliefs and</td>
<td>including preferences; cooperative learning;</td>
</tr>
<tr>
<td></td>
<td>interest in task; and plan</td>
<td>and competitive learning</td>
</tr>
<tr>
<td></td>
<td>study/learning</td>
<td></td>
</tr>
<tr>
<td><strong>Self-Motivation Beliefs</strong></td>
<td>Interactive phase</td>
<td>Motivation preferences and volition</td>
</tr>
<tr>
<td>- Self-efficacy</td>
<td>Situational; monitoring effort and progress; intrinsic/extrinsic reward; regulation</td>
<td>instrumental/integrative motivation; interest in reading and task; effort and persistence; intrinsic/extrinsic reward; and action and behaviour</td>
</tr>
<tr>
<td>- Outcome expectations</td>
<td>Control and adaptability of study environment and effort; cognitive processes; judgements of learning</td>
<td></td>
</tr>
<tr>
<td>- Task interest/valuing</td>
<td>(judgements of learning);</td>
<td></td>
</tr>
<tr>
<td>- Learning goal orientation</td>
<td>strategies for attaining goals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(memorise, elaborate, control,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>rehearse, elaborate, organise,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>critical thinking);</td>
<td></td>
</tr>
<tr>
<td></td>
<td>persistence; and questioning</td>
<td></td>
</tr>
<tr>
<td><strong>PERFORMANCE PHASE</strong></td>
<td>Retroactive phase</td>
<td></td>
</tr>
<tr>
<td><strong>Self-Control</strong></td>
<td>Goal achievement assessment</td>
<td></td>
</tr>
<tr>
<td>- Self-instruction</td>
<td>(outcome and process); efficacy;</td>
<td></td>
</tr>
<tr>
<td>- Imagery</td>
<td>use of time; assistance and resources; effort required; self-evaluation of methods; and attributing causation to results; metacognitive analysis (other applications)</td>
<td></td>
</tr>
<tr>
<td>- Attention Focusing</td>
<td>metacognition analysis:</td>
<td></td>
</tr>
<tr>
<td>- Task Strategies</td>
<td>goal setting and planning:</td>
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2.8.2 Self-regulated learning: definition and construct

What follows is the definition of a construct for self-regulated learning which synthesises previous research; this is the definition used in the study:

Self-regulated learning (SRL) is a process that supports learning in which individuals systematically and intentionally monitor aspects of their thinking and behaviour in response to internal and external environments. The proactive, interactive, and retroactive capabilities that support SRL include: task analysis, self-motivational beliefs, self-control, self-observation, self-judgement, and self-reflection.

The adapted Zimmerman and Campillo model illustrated in Figure 2.4 expands on this definition by capturing details of both previous and subsequent models for SRL. This model presents a practical model of SRL by organising capabilities or skills into the three phases indicated (Forethought, Performance, and Self-reflection). However, as previously mentioned and with consideration of Kaplan’s work, the model also illustrates interdependent and fluid categories in which indicators can be conceptualised in terms of practical phases, but that can also be conceptualised in terms of cognition, meta-cognition, and behaviour. It is within this context, and informed by the wider literature, that the various capabilities and indicators included in the adapted Zimmerman-Campillo model for SRL were defined and used in the design of an instrument for measuring SRL in this study. SRL capabilities and indicators used in this study are defined with consideration to the literature in the next section.

2.8.3 Self-regulated learning capabilities and indicators

Self-regulated learning capabilities refer to what the student can perform or achieve. Self-regulated learning indicators (or indicative behaviours) refer to student actions and behaviours from which levels of capabilities can be inferred (Griffin, 2014, pp. 115 - 116). Therefore, indicators indicate the quality of student performance of a particular capability or skill.

In some literature about self-regulated learning, the capabilities and indicators in the motivation component are also referred to as ‘behaviours’ and the cognition component includes the use of ecological organizational and rehearsal strategies necessary, for example, to encode, memorize, and recall information as well as for critical thinking (Baas et al., 2015).
Within the metacognition component are skills that enable students to understand and monitor their cognitive processes.

Examples of metacognitive processes include: pre-reading, think aloud strategies, and using checklists or rubrics (Baas et al., 2015). The motivation component surfaces the beliefs and attitudes that affect the use and development of both the cognitive and metacognitive skills (Boekaerts & Corno, 2005). This includes internal as well as external factors. Internal and external factors that affect behaviour are indicated in low motivation which includes low level of self-esteem and negative peer influence. These three major and overarching components encompass the skills largely identified as requisites for twenty-first century learning.

The capabilities and indicators for self-regulated learning compare well with popular models of twenty-first century skills such as the one established at the conclusion of a study by the World Economic Forum (WEF, 2015) (Figure 2.7). Each of the 16 capabilities in the WEF model can be re-classified into either cognitive, metacognitive, or motivation components. This re-classification emphasises connections to processes that can be used to focus pedagogy and instruction in the classroom in the present and future.

*Figure 2.7: Skills for 21st century learning (New Vision for Education: Unlocking the Potential of Technology, 2015)*
The capabilities identified in the WEF’s ‘Foundational Literacies’, ‘Competencies’ and ‘Character Qualities’ align with those identified for effective self-regulated learners listed in Figure 2.2 and are encompassed in the cognitive, metacognitive, and motivational components associated with life-long learning more broadly. Given that self-regulated learning is becoming synonymous with effective and lifelong learning, the focus turns to identifying and defining specific self-regulated learning skills, indicators, and capabilities; and how to incorporate these into the classroom just as other learning skills would be included.

Dinsmore, Alexander and Loughlin (2008) asserted that metacognition and self-regulation develop in parallel and involve interactions between cognitive, motivational, and contextual factors. Accordingly, the reconceptualisation of the Zimmerman and Campillo (2008) model in Figure 2.4 proposes categories for identifying and labelling the phases, capabilities, and indicators of SRL. Such a structure extends Kaplan’s (2008) work on the nested characteristic of SRL. The six capabilities in the revised Zimmerman and Campillo SRL model are: Task Analysis, Self-motivational Beliefs, Self-control, Self-observation, Self-judgement and Self-reaction. Descriptions of the SRL capabilities and associated indicators were developed from the literature.

Table 2.4 shows the Phases, Capabilities and Indicators nestled in accordance with Kaplan’s description. The terms used in Table 2.4 are also those that appear throughout the literature; however, they are inconsistently used throughout the literature to represent various meanings and concepts. Therefore, a study of the literature informed the following definitions designed to avoid ambiguity when self-regulated terms were used in the study.
### Table 2.4: Nestled SRL phases, capabilities and indicators

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<thead>
<tr>
<th>Phase</th>
<th>Capability</th>
<th>Indicator</th>
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<tr>
<td>Forethought</td>
<td>Task analysis</td>
<td>Goal setting</td>
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<td>Strategic planning</td>
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<td>Self-Motivational belief</td>
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<td>Outcome expectations</td>
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<td>Intrinsic interest/value</td>
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<td>Learning goal orientation</td>
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<td>Performance</td>
<td>Self-Control</td>
<td>Imagery</td>
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<td>Task strategies</td>
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<td>Self-Observation</td>
<td>Metacognitive monitoring</td>
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<td>Self-recording</td>
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<td>Self-Refection Phase</td>
<td>Self-judgement</td>
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### Task analysis

Task analysis is the decisional process that precedes the selection of goals and strategies. During task analysis, learners decide on the intended outcomes. They select or create methods that are appropriate for the task and setting. Highly self-regulated learners analyse the learning task prior to beginning (Zimmerman & Kitsantas, 2007). Because of this analysis, the learner sets goals and begins planning an optimal path to reach these goals. Indicators of task analysis include: Goal Setting, Strategic Planning.
Goal setting: deciding on specific outcomes for learning
Goal setting is a way for learners to decide on outcomes for their own learning. Self-regulated learners are proactive in their use of goal setting and monitoring and have an awareness of what drives them towards their goals (Zimmerman, 2008). Goals act as a standard against which learners can measure their success. Students are more likely to achieve their goals if they set their own goals or are included in the goal setting process (Black, McCormick, James, & Pedder, 2006; Mary James et al., 2006; M. James et al., 2006). Goal setting leads to higher motivation in learning (James et al., 2006). Goals affect motivation by directing learners’ attention in the learning process, increasing the amount of effort exerted to attain the goal, sustaining the degree of persistence in pursuing the goal and increasing one’s affective reactions to targeted outcomes (Zimmerman, 2008).

Strategic planning: selection of learning strategies to attain the desired outcome
Strategic planning is the approach learners adopt to attain their goals. In making a plan to achieve their goals, self-regulated learners select strategies and an environment that will be most efficient to attain the desired outcome. The strategies are selected to support cognition, control affect, and enhance execution as the learner endeavours to reach the goals (Zimmerman & Schunk, 2008). Self-regulated learners use strategic planning to guide efforts to control learning; learners are affected by internal feedback from these efforts (Zimmerman & Schunk, 1989).

Self-motivational beliefs
Self-motivational beliefs are linked to students’ motivation to initiate and sustain self-regulatory efforts (Zimmerman & Kitsantas, 2007). These indicators are predictive of persistence and effort during learning because they assess beliefs about personal competence and value (Zimmerman, 2003). Indicators of self-motivational beliefs include: Self-efficacy, Outcome expectations, Task interest/valuing and Goal orientation.

Self-efficacy: personal beliefs about having the means to learn at designated levels which impacts learning
Self-efficacy is the personal belief about having the means to learn or perform a task and provides the foundation for motivation (Bandura, 1993). Increases in student self-efficacy result in increases in motivation and dedication to learning. If a learner is self-assured in their
ability to perform at a high level whilst learning, they will apply more effort and persistence throughout the execution of a task. Self-efficacy is context-dependent (James et al., 2006). Self-efficacious learners will increase their efforts when things get tough because they believe they can and will learn. In contrast, low self-efficacy is observed in students who doubt their ability to learn (Zimmerman & Kitsantas, 2007). Low achievers often have low self-efficacy and do not accurately assess their ability relative to the difficulty of a task because they lack self-awareness or the cognitive ability to do so. This can lead to a higher than actual assessment of self-efficacy judgements and unrealistic goals (James et al., 2006). Conversely, underestimation of ability and over estimation of task difficulty can lead to underachievement.

**Outcome expectations: expectations about the ultimate ends of performance which impacts learning**

Outcome expectations are the expected consequence of what will happen when a goal is reached or not reached (Schunk, 1991; Williams, 2010). These outcomes are driven by intrinsic or extrinsic motivations. On achieving the expected outcome, extrinsic motivation includes rewards from external sources such as stickers or acknowledgement from peers. Alternatively, intrinsic motivation involves valuing the learning in and of itself. Learners who expect an outcome to be positive will be more motivated to set and attain high quality goals. Outcome expectations can affect Self-efficacy (Williams, 2010); for example, students with a negative view of the outcome may attribute this to a negative perception of their likely performance. The reverse is also true in that if students have low self-efficacy, the outcome expectations may also be low.

**Task interest/valuing: interest/value in a task as factors that impact learning**

Intrinsic interest refers to valuing a task for its own properties rather than valuing a task for its instrumental qualities (Liem, Lau, & Nie, 2008; Zimmerman & Campillo, 2003). If a student is intrinsically interested in a task, they value the task process and value what they might learn as a result of engaging in the task. If a task is valued then the commitment to attaining goals is greater (Pajares & Schunk, 2001).
Goal orientation: focus of motivation to set goals is guided by learning progress or competitive outcomes

Goal orientation is a source of motivation that drives the type of the goal that an individual sets: mastery versus performance. Mastery and performance goals represent different reasons for approaching and engaging in achievement activity (Darnon, Dompnier, Gilliéron, & Butera, 2010). Mastery (or learning) goals focus on developing competence rather than optimising short-term performance (Darnon et al., 2010; Zimmerman & Campillo, 2003). Students who set mastery goals attribute outcome to effort. They are oriented toward developing new skills, trying to understand their work, improving their level of competence, or achieving a sense of mastery based on self-referenced standards (Shomos & Forbes, 2014). Students who adopt mastery goals are more willing to engage in the process of learning. Performance goals refer to a learner’s intention to achieve competitive success and are set to see how the learner stacks up against other learners (Darnon et al., 2010; Zimmerman & Kitsantas, 2007). Students who set performance goals believe ability is evidenced by doing better than others do, or by achieving success with little effort. The student’s self-worth is determined by a perception of his or her ability to perform and, consequently, expenditure of effort can threaten self-concept of ability when trying hard does not lead to success, so effort becomes a double-edged sword.

Self-control

Self-control processes direct learning or performance. They help learners focus and optimise their efforts by improving concentration, by screening out distractions, and employing strategies to mitigate avoidance (Cleary & Zimmerman, 2004; Zimmerman & Campillo, 2003). Students use self-directed strategies and compare their effort with intended outcomes. Indicators of Self-control include: Self-instruction, Imagery, Attention focusing, Task Strategies. For each of these indicators, there are three levels: observation, emulation and self-control. Learners who focus on process rather than outcome are more likely to achieve automaticity; they automatically use self-instruction and imagery and focus attention to direct their learning towards their pre-determined goal (Zimmerman & Kitsantas, 2002).

Self-instruction: learners tell themselves how to proceed whilst learning

Self-instructions guide the learners’ thoughts and actions and helps learners focus on the task at hand. Learners overtly or covertly describe for themselves how to proceed. Self-
instructions can be introduced as written stimuli for learners to follow (Zimmerman & Schunk, 2001). Self-instructional techniques guide a learner’s self-monitoring. Strategies include self-talk and self-questioning (Zimmerman & Kitsantas, 2007).

**Imagery**

Throughout learning, mental images of optimal strategies and their consequences can be used to keep focus on the intended outcome (Zimmerman & Campillo, 2003). Imagery involves forming mental pictures to assist in making meaning of and controlling performance.

**Attention focusing: protect intention to learn from distractions or from competing interests**

Attention focusing involves regulating stimuli from external environments such as sound, conversations, movement, time schedules (e.g. impending play-time) which can have negative effects on ability to focus (Carver & Scheier, 2012). There is an intentional control of attention which involves awareness of paying attention and sustaining attention regardless of distraction (McClelland & Cameron, 2012). Highly self-regulated learners are aware of distractions, can identify distractions, and deliberately use strategies to retain focus or refocus on the learning at hand (Corno, 1986).

**Task strategies: strategies for analysis and synthesis to organise learning**

Task strategies, such as rehearsing, elaborating, organizing, structuring, time management, organisation, and transforming learning content to support meaningful understanding, retention, and revision, may be learned from observing modelling. Independent learners watch, learn, and practice strategies which then become part of an inventory of strategies called upon in future learning (Cleary & Zimmerman, 2004). Use of task strategies is not static; these adapt and evolve according to the requirements of the learning situation. Adaptations can come about as a result of task analysis, reaction to feedback, working through intentions, thinking aloud during a process, trial and error, and hints from others or computer software (Cleary & Zimmerman, 2004). Highly self-regulated learners select, adapt, and combine strategies from an independent inventory, and reason the relevance of chosen strategies for the learning situation at hand (Zimmerman & Kitsantas, 2007; Zimmerman & Schunk, 2008).
Self-observation
Self-observation involves systematic checking own performance (Zimmerman, 1989). (Cleary & Zimmerman, 2004) that entails monitoring thought processes and/or physical record keeping of successful strategies, conditions for success, and the effects that an outcome produces. Self-regulated learners regulate information according to relevance to selected goals (Zimmerman & Kitsantas, 2007). Self-observation includes the ability to selectively track attitude, approach, selection of strategies, and motivations in order to draw on or adapt these strategies for use in subsequent learning situations. Access to timely feedback and the accuracy of self-observations, in conjunction with recording prior experiences, make it easier for a learner to efficiently and optimally select and adjust strategies (Zimmerman & Campillo, 2003). Indicators of self-observation include: Metacognitive-monitoring, self-recording.

Metacognitive monitoring: strategies for awareness and regulation of learning.
Metacognitive knowledge involves strategies for how to organise and regulate thinking processes (Zimmerman & Kitsantas, 2007). If the ‘what’ includes information, then the ‘how’ refers to rational consideration about how the information is used. This includes selection of strategies and the way in which they can be incorporated or combined to develop a process for learning. Therefore, metacognitive awareness includes knowledge about the demands of the task which includes effort personal qualities, and strategies for completing the task, knowing what is to be learned and when and how it is to be learned, as well as self-knowledge of personal capabilities, interests, and attitudes and strategies for engaging with the learning at hand. Self-regulated learners are aware of procedure and can assess personal learning as well as when to alter or adapt an approach to deliberately control processes (Boekaerts & Corno, 2005; Carver & Scheier, 2012)). Monitoring a metacognitive process involves the use of feedback to evaluate whether a process makes sense and whether it includes strategies perceived to result in the most suitable or favourable outcome (Zimmerman & Kitsantas, 2007); (Israel & Duffy, 2014).

Self-recording: tracking and recording own performance
Self-recording is the deliberate development of techniques for encoding and recording processes and outcomes of one’s actions (e.g. use of diagrams, mind maps, schemas, summaries, taking notes, vocabulary and glossary lists …) (Soric & Palekcic, 2009; Zimmerman...
& Pons, 1986). This can involve the implementation of an overall or strategic plan and use of self-monitoring techniques (such as self-verbalisation/questioning, tabulating results) to keep track of and measure progress or success. Awareness of the link between strategic errors or inefficiency and failure, in conjunction with relevant information gathered, is used to evaluate the effectiveness of strategies and learning progress and to improve subsequent learning. Such awareness allows the learner to distinguish between controllable and uncontrollable factors in their learning, so that they may attribute results accurately and adapt strategies accordingly (Cleary & Zimmerman, 2004).

**Self-judgement**
Self-regulated learners can identify and evaluate their strategies, approach, behaviour, and ability in relation to the intended outcome and attribute causal significance to the outcomes (Cleary & Zimmerman, 2004). Indicators of self-judgement include: Self-evaluation and causal attribution (which is described in detail below).

**Self-evaluation**
Self-evaluation refers to or is a systematic comparison of performance with a specific standard or goal, previous performance, or the performance of others (Cleary & Zimmerman, 2004; Corno, 1986). This occurs when a learner reflects upon the quality of completed tasks and applies these reflections to subsequent learning. This involves receiving feedback while engaging in a process or on completion of stages in a process, as well as about the outcomes. Explicit feedback may include student-teacher conferencing, computer software that gives regular feedback to prompt students to move forward or review or making it a requirement of the task for the student to explain the strategy or thinking used at specific stages. Checklists and criteria rubrics are also tangible ways to encourage self-evaluation (Ley & Young, 2001). Self-evaluation can result in continuing as before, adapting an approach or strategy, and/or adapting or rejecting the expected outcome. Adapting or rejecting the expected outcome may occur if, upon reflection, the intended outcome is perceived as incompatible with accessible resources or environment; this may be due to changed or initially ill-perceived circumstances.
Causal attribution
Causal attribution is the perceived causes of success or failure of an expected outcome (Soric & Palekcic, 2009). Examples of internal attributes learners may assign to levels of success include: effort, ability, luck, other people, mood, lack of persistence, attention, knowledge, concentration/focus, self-confidence, and perceived nature of the task; these are self-related factors which are influenced by internal factors. External indicators include the immediate environment (e.g. seating arrangements, weather conditions) and available materials. Dimensions of causal attribution include: locus (such as the internal factors above), stability, and control (or intent). Stability (such as the external factors above) refers to the expectation that conditions remain constant and therefore outcomes experienced in the past will recur. Control refers to the deliberate intention of the learner; for example, to use a strategy or resource in a particular way (Weiner, 1985). Causal attribution can have either positive or negative consequences depending on the learner’s perception of whether they have any control over the casual factor (Tolli & Schmidt, 2008). For example, providing feedback that links success to effort can be encouraging but providing feedback where failure is attributed to effort for a student who is doing his or her best can be demoralising (Souvignier & Mokhlesgerami, 2006). Causal attribution can play a mediating role between satisfaction and achievement; for example, a learner may not be interested in a strategy or learning but can identify a causal link to success/achievement and this becomes the motivation to move forward (Soric & Palekcic, 2009).

Self-reaction
Self-reaction refers to perception of satisfaction as a consequence of an expected outcome and takes into account the learners’ deliberate reactions to potential or actual dissatisfaction (Cleary & Zimmerman, 2004). Indicators of self-reaction include: Self-satisfaction and adaptive/defensive behaviour. Depending on perceived level of satisfaction, one can react to feedback about performance with an adapted or avoidance approach. If an outcome is perceived as negative or as the cause of dissatisfaction, a learner with low-level skills in self-reaction will try to avoid engaging with those tasks in order to defend themselves against dissatisfaction. Conversely, good self-reaction strategies direct learners to adaptive strategies which lead to new and possibly more efficient and effective processes that mitigate
dissatisfaction while remaining outcome focused (Zimmerman & Campillo, 2003b). Indicators include: Self-satisfaction and adaptive/defensive behaviour.

**Self-satisfaction**

Personal satisfaction or sense of fulfilment or enjoyment in an outcome can vary from person to person. Satisfaction can manifest in having someone you respect be proud of you, the feeling of achieving after putting in maximum effort and persistence, doing better than a rival, achieving a personal best or simply enjoying a job well done. The anticipated consequence that an outcome will give satisfaction is an incentive for both selecting and focusing on that outcome. A self-regulated learner balances the level of satisfaction anticipated with other competing factors such as social responsibility, need or necessity, or the personal intrinsic value placed on a task (Weiner, 1985; Zimmerman & Kitsantas, 2002).

**Adaptive/defensive behaviour**

Competence can be defined as ‘the ability to produce effective, goal directed behaviour on demand’ (Rhodewalt & Vohs, 2005, p. 549). Degree of competency is measured by performance feedback, regarding levels of success. Feedback about performance outcomes can be linked to levels of self-esteem. Confidence is boosted when competencies are confirmed but threatened when failure is perceived. Defensive or avoidance strategies are employed when one’s self-image or view of competency is challenged or threatened. Defensive strategies involve individual justifications or explanations that allow ‘interpretations of self and situation that allow us to preserve desired competency images’ (Rhodewalt & Vohs, 2005, p. 550). Self-regulated learners are aware of situations that may threaten their view of their level of competency and, rather than employing defensive strategies, look to adapt their approach or seek alternate strategies to avoid or mitigate dissatisfaction. Adaptive inferences keep learners on track by directing their efforts towards the intended outcome (Zimmerman & Campillo, 2003; Zimmerman & Kitsantas, 2007).

Having clearly defined the SRL capabilities and indicators, these were then used to detail an overall, practical model that can be used by teachers and students to assess and plan for SRL in the classroom. The next section combines the work of Zimmerman- Campillo (date) with that of Griffin (2014) to build a practical model for planning and assessing self-regulated learning.
2.9 Building a practical model for planning and assessing self-regulated learning

The nested conceptualisation of the SRL model enables construction of an assessment model based on Griffin’s developmental assessment framework (Griffin, 2014). The developmental assessment framework for SRL based on the Griffin’s work is illustrated in Figure 2.8.

In Figure 2.9, SRL capabilities and indicators are arranged using a developmental framework.

![Figure 2.8: Developmental model of SRL (Griffin, 2014)](image)

This framework can be used in schools for planning and implementing strategies for teaching and assessing SRL in the classroom. A developmental learning progression of SRL can then be used to inform assessment rubrics that provide feedback to both teacher and student about student SRL performance (Griffin, 2014). It is this kind of practical thinking about SRL that supports implementation of strategies in the classroom for developing knowledge and understanding of students’ SRL.
Figure 2.9: SRL model using the Griffin developmental model: domain, strand, capability, indicators (Griffin, 2014)
Griffin’s developmental model provides a framework for developing assessments and a developmental progression that can be used by teachers to assess, plan, and implement strategies for SRL in the classroom.

Griffin’s approach utilises developmental taxonomies such as Bloom’s revised taxonomy (Anderson et al., 2001) and the Dreyfus model of skill acquisition (Dreyfus, 2004) to approximate the level of difficulty for each skill in a defined construct. Derived progressions are empirically drawn and statistical methods are applied to data obtained from administering multiple choice questionnaires to large numbers of people (Griffin, 2014).

...Derived progressions represent a typical rather than an absolute pathway for students and can therefore be a useful frame of reference for teachers without being prescriptive. Though not deterministic, they can be constructively used in the process of planning learning goals for students. They can assist teachers to select goals that are developmentally appropriate and that maximise the rate of learning of their students (Griffin, 2014, p. 43).

Developmental learning progressions can be used to plan instruction for students at all levels because they describe the teaching and learning requirements at each stage of development for any given construct. Tasks can be differentiated for multiple stages or designed for a specific stage of development along the progression (Woods et al., 2015).

In addition to assisting teachers, developmental progressions can be used by students to assess and monitor their learning and to set goals and clarify expectations and outcomes. They are a useful resource for increasing student motivation and a tool for aligning teacher and task expectations with study outcomes (Heritage, 2008; Heritage, Kim, Vendlinski, & Herman, 2009). The importance of active student engagement with his/her learning is evident in developmental progressions. The role of the student as active, motivated, and responsible for learning is supported by reframing teaching and learning as a way of progressing through stages of development towards clearly defined levels of skill and knowledge. Opportunity to learn depends largely on a student’s ability to self-regulate learning and the classroom practices to which they are exposed and in which they are expected to learn.
2.10 Self-regulated learning in classrooms

Specific links can be drawn between social cognitive theory and SRL and efficacy in academic settings (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Pintrich, Smith, García, & McKeachie, 1993). Caprara et al. (2008) identified three significant levels of self-regulation in schools: student level, teacher level, and learning community level (e.g. in professional learning teams, or PLT’s) - all of which impact student and teacher ability to develop and implement strategies for self-regulation. This is in concert with studies that recognise the necessity for continual, lifelong education and retraining in a world of rapidly changing social and technological environments (Aleandri & Girotti, 2012; Fredricks & McColskey, 2012; Shomos & Forbes, 2014). The deliberate use of the proactive (forethought phase), interactive (performance phase), and retroactive (self-reflection) strategies captured in the Zimmerman and Campillo (2003 model enable individuals to access OTL regardless of individual ability and changing environments. However, SRL includes highly complex and sophisticated skills and learners encounter situations and gather experiences throughout and at different life stages. Through these experiences, learners are able to observe, practice, and master the various skills essential to SRL (Boekaerts & Corno, 2005; D. Jones, 2007). The development and improvement of SRL skills requires direct instruction and modelling and the opportunity to practice, assess, and refine the skills in concert with the cognitive and metacognitive development of the learner (Butler, 2002a, 2002b; Effeney, Carroll, & Bahr, 2013).

There is an assumption that, if students achieve at least competent mastery of knowledge and skills, they are likely to apply these understandings when the opportunity arises. The actuality is, however, that many students do not often make good and independent use of what they know and can do. In contrast, there are those students who exceed expectations by negotiating that gap between what they know and what they actually do. This suggests that the significant difference between these students is not what they know but rather how they use what they know (Salomon & Globerson, 1987). Obviously, this line of argument is not new. Many researchers have attempted to explain why some students bridge the knowledge gap and others do not (e.g., Bandura & Cervone, 1986; Bransford, Franks, Vye, & Sherwood, 1989; Pressley & Ghatatala, 1990; Salomon & Globerson, 1987; and Thomas & Rohwer Jr., 1986)). This gap, referred to by Salomon and Globerson as the zone of proximal learning differs from Vygotsky’s zone of proximal development (Vygotsky, 1978) in that it
does not rely on a more knowledgeable or skilful other to scaffold learning. Rather, it relies on the awareness, application, and regulation of knowledge or skills and high levels of metacognition as defined in the SRL model. SRL, then, may be an explanation for why some HC students continue to progress while others do not.

Another important consideration is whether the rate of progress of HC students differs if these students are re-located in a context that no longer ranks them in the top quartile for ability (or in which they are no longer relatively HC students).

Theories about why some students do not perform as predicted and show progress congruent with students of similar ability generally target four main areas: motivation, personality variables, ability to self-regulate learning, and level of cognition and metacognition. Cognition and metacognition refer to level of understanding, reasoning, or awareness of thinking processes and/or ability to apply, monitor, and adapt, which includes the application of knowledge or skill beyond automaticity or rote learning (Bandura & Cervone, 1986; Bransford, Franks, Vye, & Sherwood, 1989; Pressley & Ghatala, 1990; Salomon & Globerson, 1987; Thomas & Rohwer Jr, 1986). These areas match theoretical models of SRL and are explored further through using the study’s established practical definitions and model of SRL to investigate the contention that there is a link between SRL and student achievement and gains in RC.

Boekaert and Corno (2005) asserted that SRL “develops through purposive engagement with the fundamental concepts and structure of subject matter as students wrestle with complex and challenging tasks” along their mastery pathways (Boekaerts & Corno, 2005, p. 223). This includes instruction that builds upon available school resources, including self, peers, and available tools. These resources contribute to the development of OTL and activate SRL, mediating rather than supplanting students’ control of their learning (Salomon & Globerson, 1987). More specifically, there is a growing body of research that supports the inclusion of SRL in all classrooms (including RC lessons), at all levels (including Year 5/6 students), and for all levels of ability (including HC students). At the center of SRL in any classroom is the student as an active participant in the learning process and the teacher whose role it is to position SRL as crucial for student transition from OTL to actual learning.

Graham and Berman (2012) argued that the demands on students of all abilities include that students are aware of, regulate, and apply learning skills to new situations and contexts to
adapt to educational and workplace expectations. Calls from teachers for recommended strategies for including SRL indicators in teaching (i.e., any or all the indicators in the proposed model, singularly or in combination) are increasing. What is available to teachers is increasing but still falling short when measured against the demand for guidance and resources. The literature offers a limited range of recommended strategies for educators to use to develop and support SRL (Bolhuis, 2003; Fuchs et al., 2003; Ley & Young, 2001; Young & Ley, 2003). These include strategies that foster inclusion through providing learning environments that include opportunities to introduce/use/practice SRL skills. Features of such environments include:

- explicit modeling of SRL (indicators and capabilities);
- use of goal-setting and feedback to present the learner with clear expectations and monitoring opportunities;
- guiding learners to prepare and structure an effective learning environment;
- organising instructional activities to facilitate cognitive and metacognitive processes;
- providing learners with continuous evaluation information and occasions to self-evaluate;
- strategy instruction that address transfer, critical thinking and problem solving directly;
- complex tasks and strategies for analysing task requirements, planning processes, ongoing monitoring of progress and for adapting processes, when and as required;
- providing context related and learning domain specific tasks that intermingle instruction about self-regulation and content;
- using SRL to make learning content more effective and drawing out the links between SRL and achievement;
- encouraging student control over challenging situations;
• encouraging student choice about who they work with, when and how they work; and
• providing opportunities for students to identify and develop individual skills required for collaborative learning;

The long list of environments in which SRL can be fostered highlights the range and reach of SRL skills as well as the naturally occurring opportunities present in the classroom for including the teaching and learning of SRL.

2.10.1 Building teacher expertise in self-regulated learning

Acknowledgement that there is need to evolve school and classroom practices to match education, social, and workplace demands must include acknowledgement of the need to develop teacher knowledge about SRL and how to include indicators of SRL in the classroom as a core requirement for planning and implementing lessons. In 2013, de Boer, Donker-Bergstra, Kostons, Korpershoek, and van der Werf published a meta-analysis of effective strategies for SRL in the classroom. They noted that focus on and inclusion of what are deemed to be strategies for improving SRL in Primary classrooms have increased, but that students are lacking in the skills required to engage with these types of strategies (de Boer et al., 2013). This observation reveals difficulty with the expectation that students have SRL skills when they are required, when instead students should be supported to develop these skills through direct instruction, modelling, and practice. Another problem is that there are no specific recommendations as to which strategies best suit which learning environments and for which content. Although there may be overlap between contexts (including Primary and Secondary school settings) and subject areas, there are SRL skills that are more effective in one but less so in another (de Boer et al., 2013).

Examples of practical resources that can be used by educators can be found on the internet by simple searching using the words ‘SRL’, ‘self-regulated learning’, ‘self-directed learning’, ‘self-regulation’ or ‘independent learning’. These resources are often divided into subject and grade levels but not according to levels of ability. Additionally, there was generally no research-based evidence underpinning recommendations for SRL teaching strategies and their use and effectiveness remains unsubstantiated. There was an absence of resources that
collate and synthesise the vast amount written about SRL in print and online. Consistent and clear understanding of and resources for SRL that are based on best practice and sound research are required to develop teacher expertise in this area of classroom teaching. Such resources are slowly being developed; however, as indicated previously, current demand to meet teacher need is undersupplied and a consistent approach is lacking.

2.10.2 Self-regulated learning and reading comprehension

There is a substantial body of work relating to the interaction and interdependence between the skills and strategies associated with developing RC and self-regulation. Dermitzaki, Andreou, and Paraskeva (2008), Pressley and Ghatala (1990); Zimmerman and Kitsantas (2007), Solheim (2011) Schunk and Zimmerman (2012), Maftoon and Tasnimi (2014), Massey (2014) and Minguela, Solé and Pieschl (2015) are among those who supported the idea that cognitive and motivational variables are critical influences on reading achievement. Important variables associated with deep comprehension include: instruction and modelling directly related to monitoring and control of reading strategies; awareness, self-evaluation, and calibration of own skills and abilities; the ability to analyse a task and determine expectations and requirements and then match and adapt resources; selection of a process best suited for each situation; and awareness and mediation of motivation (Minguela, Solé, & Pieschl, 2015). Cognitive, meta-cognitive, and motivational aspects of strategic behaviours are linked to development of skills in RC (Dermitzaki, Andreou, & Paraskeva, 2008). Awareness and consideration of personal and contextual variables such as student ability and experiences with reading, exposure to texts, student motivation, and valuing of reading are among the individual factors whose effects can be influenced by strategic implementation of skills related to self-regulation. Examples include the ability to self-reflect and self-motivate, developing an interest in reading, and setting realistic goals for developing vocabulary and comprehension of genre and format.

As processes mired deep within motivation, cognitive, and metacognitive processes, and the social, personal, and interpersonal, the interactions between SRL and RC are increasingly viewed as essential in the quest for lifelong-learning. As such, it is crucial that SRL be included in the formal education of students from as early as early childhood education (McClelland & Cameron, 2012).
At the core of this study is student performance in RC, which is measured using standardised assessments, and the differences in growth between students of different abilities. Given that SRL is viewed as interwoven with RC, research into SRL in the context of RC may garner understanding and explanation of the growth flat line observed in HC students.

The skills associated with continued development of RC in the more sophisticated stages and in more sophisticated texts are complex and require a nuanced understanding of the RC construct and the varying contexts in which the different RC skills are applied (Amendum, Conradi, & Hiebert, 2017). In addition to more sophisticated SRL skills, the need for higher-order skills and higher-order thinking increase as student competency in reading and the demands on reading for learning increase (Dymock & Nicholson, 2010; Galton et al., 1999; McGee et al., 2004); as such, classroom practices, content, and resources need to reflect this. Therefore, higher-order thinking is an important area of exploration for explaining the difference in gains between HC students and their classroom peers.

2.11 Higher-order thinking, self-regulated learning and reading comprehension

In year 5/6 classrooms, students generally have the basic functional literacy skills required to decode text; this is especially so for HC students. As students move to more complex content, learning to read is increasingly replaced with reading to learn (J. Chall & Snow, 1982) and lessons are designed and implemented accordingly. In these classrooms, skills in RC are expected to develop along with other discipline-related skills, although formal teaching of reading diminishes (Dymock & Nicholson, 2010; Galton et al., 1999; McGee et al., 2004). Students are expected to develop and modify learning strategies as they move towards independent learning.

Both teachers and curriculum assume that students have and continue to instinctively develop beyond basic comprehension skills to meet the needs of increasingly complex learning; an assumption especially held by teachers of higher capacity students (Reis et al., 2011; Reis, Westberg, Kulikowich, & Purcell, 1998). Increasingly, this parallels expectations that classrooms foster more than basic skills and understanding and that students must learn not only the overt or intended but also the covert curriculum, which in this case includes comprehension skills (Tomlinson, 2005; Whitehurst, Chingos, & Lindquist, 2014). Lewis and
Smith (1993) and then Soule and Warrick (2015) argued that classrooms must evolve from seeking the attainment of knowledge and competency to valuing the attributes of making meaning and how information is extracted and used (Lewis & Smith, 1993; Soulé & Warrick, 2015); in reality, one cannot be developed without the other. Lu and Cross (2012) further asserted that functional and critical literacy overlap and co-develop, yet most curricula do not reflect this (Lu & Cross, 2012). The balance between developing higher-order thinking, self-regulated learning, and RC skills is often misunderstood by teachers. Teachers typically focus on quantity of content than on depth of understanding and strategies for learning (Collins, 2014; Perkins, 2016). Students are often expected to develop skills for learning and self-regulation in concert with increasingly difficult subject content; however, there is limited instruction and support for the development of SRL skills (Heritage, 2008; Sztajn, Confrey, Wilson, & Edgington, 2012). The lack of instruction in SRL may also contribute to the flat line identified in RC growth for HC students.

2.11.1 Aligning curriculum and assessment and student zone of proximal development

The assessment of higher-order skills may be contributing to decline in reading results observed in standardised testing results (Arter & Salmon, 1987). Arter and Salomon identified the issue with using closed, multiple choice items in assessing higher-order skills.

... most definitions of HOTS [higher-order thinking skills] include the ability to think through real-world problems which typically lack a clear formulation, a procedure that guarantees a correct solution, and criteria for evaluating solutions. There are often multiple correct solutions to this type of “fuzzy” problem because more than one answer could have a defensible rationale for choice. Therefore, the situations that we are most interested in assessing are those that are most difficult to put in structured format because of the requirement to have one right answer.

—(Arter & Salmon, 1987, p. 8)

Issues with marking large-scale assessments have meant that the majority of standardised assessments use multiple choice and other closed items that require predetermined responses. If assessment items do not allow or expect students to apply higher-order skills, then how can they be measured? In these cases, assessments may not have enough higher-
order items to elicit corresponding student skills and knowledge. In addition, it is important to consider whether what is being assessed at the higher levels and what is included in the assessments administered is accessible to students through relevant opportunities to learn.

In Australian schools, teachers theoretically plan to a curriculum, teach to a plan, and assess what is taught in the classroom. Curriculum, planning, classroom practices, and assessment manifest in different ways in different schools, but what is vital for the evaluation of student learning is alignment. Most Victorian schools use the Victorian Curriculum (VCAA, 2016) as their base curriculum and apply various planning methods and templates that may or may not include an overarching school focus and may or may not be planned individually or in teams. These plans are then implemented in the classroom by individual teachers to individual students in a unique classroom setting. Students are then assessed using various tests or assessments that may be standardised or informal. This education chain raises many questions regarding consistency and alignment of skills and content taught, learned, and assessed. Roach et al. define alignment as:

\[\ldots\text{the extent to which curricular expectations and assessments are in agreement and work together to provide guidance for educators' efforts to facilitate students' progress toward desired academic outcomes}\]

—(Roach, Niebling, & Kurz, 2008, p. 158)

Or, to put it more simply, Webb (1997) asked the question: do expectations and assessments align? If assessment items call for higher-order skills but these are not taught in the classroom, then students cannot be expected to have these skills and therefore do not show progress in these higher-order skills; they will only be capable of lower order or basic thinking skills that then achieve assessment results for growth that indicate the aforementioned flat-line. Students need opportunities to learn the skills and concepts they are expected to learn (Roach et al., 2008) beyond what is viewed as age- or year-level appropriate standard, and this is no less so in RC and in the higher-order skills that are expected of students and that HC students are most ready to learn. Roach et al.’s article questioned the extent to which curriculum documents offer opportunities for teachers to include higher-order content and skills and the extent to which higher-order content and skills are included in classroom practices and assessment. In order to evaluate alignment, opportunities to learn, and assessment of higher order skills, higher-order constructs need to be clearly defined and measured.
2.11.2 Defining higher-order thinking skills

It is important to develop a common understanding among educators of what is meant by higher-order thinking and higher-order thinking skills. In general, teachers are aware of developmental models and thinking skills and learning taxonomies such as Bloom’s Taxonomy (with levels: remember, understand, apply, analyse, evaluate, create) (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956), the Dreyfus model of skill acquisition (with levels: novice, advanced beginner, competent, proficient, expert) (Dreyfus, 2004). Other popular learning models include the 5E’s (engage, explain, explore, extend, evaluate) (Bybee et al., 2006) and the Four C’s of twenty-first century learning (communication, critical thinking, creativity and collaboration) (developed in the US by the Partnership for 21st Century Learning). These share a common expectation that the highest levels are about not only which or how much knowledge or skill is acquired, but how and for what purpose these capabilities are acquired and used. Lewis and Smith (1993) contended that the expectation that teachers aim to develop in their students the kinds of thinking variously labelled has led to confusion about what exactly is expected and meant by terms used to describe higher-order thinking and associated skills (Lewis & Smith, 1993).

Brookhart’s defining of higher-order thinking extends to three types of higher-order thinking which is particularly helpful in teaching and assessing RC in the classroom. These define higher-order thinking in terms of transfer, critical thinking, and problem solving. Transfer refers to the student’s ability to apply knowledge and skills to new contexts (e.g., Bloom’s analysing, evaluating and creating levels). Critical thinking refers to the ability to reason, reflect, and decide what to believe or do next. Problem solving refers to meeting a goal that cannot be met with a memorised solution or in broader terms is the application of non-automatic strategising (Brookhart, 2010, 2011). There are obvious similarities and overlaps between transfer, critical thinking and problem solving and both SRL and RC skills at higher levels of academic progress.
Afflerbach et al. further differentiated between higher-order and basic thinking in RC (Afflerbach, Cho, & Kim, 2015); these align with Chall’s (1983) notion of learning to read and reading to learn or, in their terms, the basic and higher-order thinking described in Figure 2.10. While basic skills and thinking are often clear, those at the higher-order require elaboration.

![Figure 2.10: RC, basic and higher-order skills (constructed using Afflerbach et al. (2015))](image)

### 2.12 Higher-order thinking skills in reading comprehension

Afflerback et al's (2015) definition of higher-order thinking in RC incorporates goal directed learning, response to text and task, and self-regulation.

**Goal directed.** Goals emerge and evolve in the midst of complex reader-text-context interactions which require effortful thinking. Students identify, select, apply, revise, and evaluate the means to achieving reading goals (Afflerbach et al., 2015).
Responsive (response to text and task). Students interpret, analyse, and evaluate different aspects of text, including content, structure, and intended purposes, to determine the best pathways to goal attainment (Afflerbach et al., 2015).

Self-regulated (the role of metacognition when goal-orientated readers read strategically). Self-regulated reading involves higher-order thinking that connects reading goal, task, situation, and discourse context to reading strategies and skills in a conscious manner. Higher-order thinking that connects these elements helps the student determine and regulate the best sequences and combinations of strategic processes. In addition, a student with higher-order skills in RC will synthesise information across texts and use this information to solve problems and inform creation of new texts (Afflerbach et al., 2015).

At the planning, and consequently the classroom, level the type of task selected by the teacher and/or the complexity of the text can determine the level of thinking required of the student. Tasks requiring students to locate, understand, or recall information from the text elicit basic or lower order thinking. High order skills are required when reading tasks become increasingly demanding and call for complex and frequent inference, evaluation of texts, or interpreting and using meaning derived from text. Accordingly, assessments need to mirror the level of skill tasks and classroom activities are designed to elicit. When curriculum, planning, classroom, and assessment are in alignment, then there can be a transparent and accurate assessment of student achievement and student growth. If this growth is not as expected, then there is a clear path to addressing inconsistent or lack of growth (i.e., the flat line) among high capacity students for whom higher-order skills are typically well within their grasp. In addition, assessments need to include both basic and higher-order skills to determine whether a student is indeed ready to be given tasks that require higher skills; the balance required is determined by the task and construct which themselves determine the opportunities the student has in which to learn at a particular level.

Vermunt and Verloop (1999) contended that lack of understanding of higher-order thinking and how to teach higher-order thinking skills impact on RC outcomes. They write that Pintrich’s (2004) study of learning taxonomies “concluded that the common elements were students’ knowledge base, their procedural skills, their self-regulation of learning, and their motivation and affect” (Vermunt & Verloop, 1999, pp. 2-3). Thus, the links between teacher knowledge, higher-order thinking skills, SRL, and RC are emphasised. However, the impact of
these on RC growth trends for students of differing abilities is not clear and the decline in RC progress among HC students remains unexplained.

2.13 Defining and supporting growth in reading comprehension

Questions about equity arise when the definition of success in education shifts from the overall performance of a student at a time, to the progress or growth that a student experiences over a period. The former positions education as a tool for achieving externally predetermined outcomes, while the latter implies, if not insists, that education be a tool for supporting students to achieve and subsequently redefine their individual potential. So, what can be reasonably expect of HC students in current Victorian education systems and how can these students continue to be challenged to ensure growth not only commensurate with other students but in accordance with individual potential?

Simply put, growth can be defined as the change in performance as measured at time 1 (T1) and (subsequent) time 2 (T2). The changes calculated for the period between T1 and T2 can be positive, negative (students regress), or unchanged (where students flat line). The literature on growth in reading ability suggests that growth rates in RC slow over time; or, more accurately, that growth rates diminish as ability levels increase (Griffin, 2012; Shin, Davison, Long, Chan, & Heistad, 2013). It is important to distinguish between ‘over time’ and ‘as ability levels increase’; the former suggests that the chronological age or time spent in class may contribute to or be the definitive indicator for student growth while the latter more accurately suggests that student ability and proficiency are the important variables.

There are several ways of, and conditions for, defining what is meant by growth expectations. Establishing what is accepted as expected progress for students in RC is a complex endeavour. In 2015, McMillan sought to clarify student growth for the purpose of teacher evaluation (McMillan, 2015); indeed much of the literature on the subject of student growth reflects this pre-occupation with teacher accountability (Gill, English, Furgeson, & McCullough, 2014; Guarino, Reckase, Stacy, & Wooldridge, 2014; Houng & Justman, 2013).

The New Zealand study conducted by Rubie-Davies, Hattie, and Hamilton (2006) included 540 students of 21 primary teachers and found that teacher predictions of growth are not a reliable estimation of student progress (Rubie-Davies, Hattie, & Hamilton, 2006). In their
study, Houng and Justman (2013) used longitudinal data from the NAPLAN standardised testing of grades 3 and 7 and 7 and 9 in two cohorts of Victorian schools to compare two methods for determining growth. They used least-squares regression and Betebenner’s student growth percentile analysis to form “student specific expectations of current achievement based on individual past performance” (Houng & Justman, 2013, p. 3) to which actual achievement is compared. Silberglitt (2007) and Hintze sought to resolve the question of ‘How Much Growth Can We Expect?’ by defining growth in a number of contexts including: mean rate of growth required to achieve external standards designated to a particular year level, individual student growth compared to prior levels of performance, and individual growth compared to peer growth rates (where peers are those in the same year level). The study explained that at the basic level of assessment of oral reading fluency (that is number of words read correctly per minute), it is possible to answer the question of how much growth can be answered, however, the complexities of reading comprehension require consideration of the many aspects of reading. MacMillan (2015) argued that use of value-added and other growth models and pre-test to post-test models which measure growth over specific period of time “lack validity and reliability” and that multiple sources of evidence, such as classroom artefacts, should be considered when measuring student achievement and establishing student growth (McMillan, 2015, pp. 2, 18).

Hattie’s (2009) synthesis of over 800 meta-analyses relating to student achievement resulted in the creation of a single continuum of achievement on which possible influences of achievement could be located; the level of possible influence relative to other influences is referred to as the relative effect size (Hattie, 2012). As the name suggests, the relative effect size is a measure of the comparative effect of an outcome variable or influence on achievement (e.g., teacher efficacy, self-questioning, Piagetian programs, early intervention, and parental involvement). This ranking of most and least influential factors on student achievement, while useful, does not specify what may be considered acceptable or equitable student progress. Hattie explained: “When implementing a new program, an effect size of 1.0 would mean that on average students receiving that treatment would exceed 84% of students not receiving that treatment” (Hattie, 2012, p. 8).

Defining growth in terms of advancing student achievement by a determined number of years adds to the lack of clarity around defining acceptable expected growth in RC; the review of
the literature found that RC and rate of RC progress is reliant on many and varied individual and interrelated factors. In addition, if this refers to the mean progress of students from one standardised level to another, there needs to be a clear indication of the progression used and profile of the ‘mean student’. Silberglitt and Hintze (2007) identified issues with some methods for identifying mean progress among high or low ability students and found some methods to be unreliable at high and low levels of achievement (Silberglitt & Hintze, 2007). Their solution was to measure growth in individual students by ascertaining initial individual student ability and ranking students according to ability, to create groups of students at particular levels of ability. Individual student growth using subsequent testing was then compared to the mean growth of the group identified for that student, using their initial level of performance.

No consistent method for determining expected growth trends across ability levels was found in the literature. This study adopts the Silberglitt and Hintze method for comparing the RC growth of HC students as this method aligns with the focus of the study. The study focuses on students in the top quartile for ability, where initial student scores were used to place students in the top 25% for ability in their class. The difference between subsequent and initial RC scores determined student growth or progress. Student growth for students in the highest quartile and mean student growth between quartiles were compared.

This clear understanding of what is meant by growth sets the parameters for identifying growth trends and anomalies. This information then feeds back into planning at school level as well as at educational policy levels so that growth equity may be realised. When disparity and gaps between groups of students are identified, the need to explain and ameliorate these differences arises.

2.14 Differences in growth trends in reading comprehension and the flat line phenomenon

Chall and Snow drew attention to the decline in acquisition of RC skills in upper primary and lower secondary years. They reported as far back as in the late 1970’s that although there is an increase “in reading achievement in grades 1-4 , reading achievement in the higher grades has either not improved or has clearly declined” (J. Chall & Snow, 1982, p. 8). Although the
report was written over four decades ago, findings echo issues faced by current education systems regarding the decline of RC progress:

This drop constitutes a major problem for society as a whole, since it results in upper elementary and high school students who cannot read well enough to succeed in learning the content presented in social studies, science, career education, and the like (J. Chall & Snow, 1982, p. 8). Where Chall and Snow identified further differences in reading acquisition between high and low income families (J. Chall & Snow, 1982), current studies are identifying differences between HC students and their grade peers.

More recent analysis of student gains in RC in Victorian classrooms drew attention to differences in growth trends where the student performance at the start and the end of a period of instruction was found to differ for different groups of student ability (Care et al., 2014; Zhang et al., 2015). Most alarming was the flat line in Victorian schools across Years 3 to 9 in the category of students with initially the highest measure for performance; that is the HC students. This phenomenon in which gains decline was observed over several years in both RC and numeracy. Analysis of results obtained from National Assessment Program – Literacy and Numeracy (NAPLAN) (ACARA, 2013), the Program for International Student Assessment (PISA) (Thomson, De Bortoli, Nicholas, Hillman & Buckley, 2011) and the Progress in International Reading Literacy Survey (Thomson, De Bortoli, & Buckley, 2013) also report this trend in Australian students. There are several ways to interpret these results and associated causes.

Four ways for interpreting these results are: assessment items are inadequate for assessing higher-order skills (as discussed previously); teachers do not provide strategies for developing skills in the HC students; teachers do not provide strategies for developing skills in the higher-order levels for RC; and gains occur at different rates at different reading levels (Griffin, Care, Francis, Hutchinson, & Pavlovic, 2012; Zhang et al., 2015).

An expansive review of the literature found no information about the expected gains at the different levels of RC. While there is much research about the identification and assessment of progress and scales or levels of RC, this review found nothing specifically about how much progress to expect over any given time for a given level beyond Hattie’s work in measuring, not comparative, but individual student progress, as is defined by effect size (Hattie, 2012). This supports the expectation that equitable gains refer to individual progress. In contrast,
the literature review found extensive research about RC and strategies for differentiating teaching, or targeting teaching strategies toward individual student learning needs, and for teaching higher-order RC skills; some of these include attempts to explain the differences in growth rates between HC students and other students.

2.14.1 Attempts to explain the ‘growth gap’ (flat line)

Research into the differences in growth trends in RC among different groups of students includes social, economic, and cultural factors. Another important and more recent focus is teacher proficiency in teaching across the, often wide, range of ability levels in a single classroom (Denton et al., 2015; Derewianka, 2012; Howard et al., 2014; Retelsdorf, Schwartz, & Asbrock, 2015) and a focus on closing the achievement gap by focusing on lower ability students and enforcing educational standards (Heritage, 2008; Loveless et al., 2008; Masters, 2014; Timperley & Parr, 2007).

Teacher proficiency and closing the achievement gap underlie theories about the influences on student growth and subsequent recommendations for teaching. Loveless et al. (2008) examined the effects of more recent government and educational policies and initiatives which focus on school accountability and standards-based reforms (such as ‘No Child Left Behind’ and ‘Closing the Gap’) and report that, while there are significant gains among low ability students, the higher performing students show comparatively diminished growth. Their US research suggested that, for those HC students who do show increased levels of performance, the explanation may be attributed to ‘luck’ (Loveless et al., 2008, p. 10). This reference to good fortune is an expression of the level of education the mother of a student receives and the quality and level of qualification of their teacher (Loveless et al., 2008). These predetermined factors restrict the student to a passive role rather than viewing students as active, volitional agents with the potential to mediate internal and external factors, thereby navigating individual paths of growth.

If growth diminishes as reading skills become more sophisticated, it can be reasoned that the rate of growth for progressing from specific reading level to reading level is the same regardless of grade level or relative rank in the classroom. Therefore, students in Year 5 at level 7 should show a growth rate commensurate with students in Year 7 who are at level 7. A review of the literature failed to find evidence-based research of different rates of growth.
as a result of different levels of difficulty or the impact of increased complexity and sophistication of content on growth trajectories. The gap in the literature regarding the definitive nature of this relationship and the implications for RC education is given limited consideration in the study, but it is nonetheless an important topic for future research, especially in relation to HC students.

The flat line may be partially explained by the disproportionate focusing of class resources, and particularly teacher time, on lower achieving students compared to higher achieving students (Reis et al., 2011). Among others, Loveless et al. reported that teachers focus resources, including time, on achieving growth in students at the lower end of ability (Loveless et al., 2008). Their study indicated that 81% of teachers surveyed said that academically struggling students are more likely to get their one-to-one attention, which may have an impact on growth for the remaining students. By this logic, in these classes, the rank according to ability determines the allocation of teacher-to-student time experienced by the student. The growth disparity among ability groups may be caused by the phenomenon of focusing more resources on students of lower ability, which indicates a particular-mind set of teachers and a sense of justice in which equality and excellence have become mutually exclusive. Gardner's four and a half decade old question must be universally resolved before the inequity implied in the growth disparity among groups of students with differing ability levels can be effectively addressed: “Can we be excellent and equal too?” (Gardner, 1961). The obvious response is that we must!

Examining classroom practices and the tasks experienced by students may add to the reasons for the growth gap. Paris (2005) suggested that a factor is the nature and content knowledge required of a reading task. Schin, Davidson, Long, Chan and Heistad surmised that Paris

“...recognised that unequal learning ability and increasing task difficulty might cause developmental limits in unconstrained skills (e.g., vocabulary and RC) ...if the reading tests contain items related to constrained skills, ceiling effects in reading scores are more likely to appear, and these could cause declining reading gaps”

—(Shin et al., 2013, p. 93).
The suggestion here is that the nature of the task may limit the student’s ability to grow if it does not permit or require the student to think and work at a higher level. In other words, the design of the task constrains the student’s ability to exercise her skills to capacity. Students who are below the uppermost level implied in the task design continue to show growth, while students limited by the task do not, thereby reducing the gap between lower and higher ability students.

In this scenario, the gap is reduced at the expense of higher ability students who are left to tread water while other students catch up or at best who are assessed incorrectly because they have not been given the opportunity to perform at their optimal level of ability. The development of RC does not have a ceiling (Duke & Pearson, 2008), therefore reading tasks must reflect this so they are designed to avoid a ceiling effect and continue to stimulate growth. The educational value of a task lies in its ability to provide opportunities to learn, and the role of the teacher includes facilitating scaffolding for student learning and completion of the task, as well as identifying evidence that learning is occurring. To do this, teachers need access to an array of strategies and instruction to close any gap between student, task, classroom practices, and assessment.

When growth is expected of all students, irrespective of where they rank or of external standards, the focus on current RC practices and expectations shifts from benchmarking reading levels to what individual students are ready to learn next (Vygotsky, 1978b). Schunk and Zimmerman suggested that SRL should be related to achievement but that some learning environments are more conducive to developing SRL processes than others (Schunk & Zimmerman, 2012; Spörer & Schünemann, 2014). This suggestion is supported in the 2009 Hong Kong Study of PISA and its reading performance and SRL data (Lau & Ho, 2015). This work suggested two related reasons for the flat line observed for HC students at Year 5/6. The first is that, given it is possible to measure gains in RC for all students, students who make relatively more gains than their classmates do, do so in part because they have relatively higher ability to self-regulate learning. The second is that, where targeted teaching and classroom practices for supporting RC is inconsistent, students who experience the least teaching targeted towards their ZPD experience the least gains.
2.15 Significance of the study

Curriculum content and classroom practices and assessment hold important implications for understanding the flat line phenomena in HC students, who are expected to exhibit higher levels of content knowledge and skill than peers do. Although some argue that the jump from decoding to meaning making begins before or at Year 5/6, this critical transition is certainly expected to be well and truly developing in upper primary and lower secondary school (Hopwood et al., 2014; Snow, 2001).

This study is important because it addresses the inequity experienced by one quarter of the students in the education system. In comparison with other students, less is known about the nature of teaching and learning experienced by the 25% most able students in any given cohort. The flat line phenomenon references unacceptable results that reflect a stifling of learning and probable underachievement in our most capable students (Care et al., 2014). The overall teaching practices for HC students can be improved by identifying and implementing strategies associated with gains in RC, thereby ameliorating the declining growth rate among these students.

Developing SRL is emerging as a strategy for improving RC in students of all abilities; it is therefore prudent to explore the effectiveness of SRL on RC development. This is particularly urgent for the HC students whose growth is flagging. Thus, this study aims to contribute to teacher understanding of the growth trends and learning needs of HC students. In conjunction with the review of the literature, these considerations informed the content of the three research questions at the heart of this study.

2.15.1 Research questions

The research questions for this study were designed to address the reported decline in gains in RC for Year 5/6 HC students. The three research questions are:

1. What are the differences in RC gains for Year 5/6 high capacity students compared with class peers?

2. To what extent is self-regulated learning associated with RC gains for Year 5/6 high capacity students?
3. How do teachers effectively support Year 5/6 high capacity students to achieve gains in RC commensurate with class peers?
Chapter 3: Methodology

3.1 Overview

The literature review found that there are indications that differences in growth occur between students of differing abilities. In this study, the RC performance of Year 5/6 students was measured at two points, approximately six months apart, to investigate and compare the growth trends of HC students and students of lower RC ability. The first assessment was administered at T1 (March/April) and the second at T2 (September) in the same school year.

There were six important variables singled out as important to the progress of HC students in RC classes: school, class/teacher, year level, class type (whether the class has students from one or more year levels), teacher content knowledge, and student performance ranking for RC compared to other students. RC assessment data were used to calculate student gains in RC and analysed to address the first research question: ‘What are the differences in RC gains for Year 5/6 high capacity students compared with class peers’.

Addressing the second research question, ‘To what extent is self-regulated learning associated with RC growth for Year 5/6 high capacity students’, required assessing student SRL and analysing results for links with measures of RC and growth in RC. The final research question, ‘How do teachers effectively support Year 5/6 high capacity students to achieve gains in RC commensurate with class peers’, involved collecting data from teachers about strategies used in RC lessons for teaching all, and specifically HC students; these strategies were then linked to student growth in RC. A school case study was used to compare classes that were considered more effective in terms of growth in RC for HC students and to identify strategies that were associated with those classes.

Student RC and/or student SRL ability, SRL in the classroom, and other classroom strategies for teaching RC are not separate, but interactive and interdependent classroom variables. For example, if a HC student has low motivation (SRL) and sits quietly in class completing only necessary work, he/she could be underachieving and not making as much progress as is possible for that student. However, if the teacher of that student is aware of the student’s low motivation and intervenes by directly targeting the needs of the student (e.g., scaffolding goal setting or task appreciation or negotiating the requirements of the task with the student),
the student has the opportunity and means for increasing progress and developing their RC. The research questions were designed to reflect these relationships and the interrelatedness and interdependence of RC, SRL, and teaching practices (Figure 3.1). The relationships summarised in the mixed method study was designed to collect quantitative and qualitative data. This facilitated the scaled and quantified assessment of RC and SRL, as well as a qualitative analysis of teachers’ responses to questionnaires, which also included the quantitative analysis of frequencies within multiple-choice responses.

Also included in this figure are the methods for data collection which will be discussed in this chapter. The mixed method study was designed to collect quantitative and qualitative data. This facilitated the scaled and quantified assessment of RC and SRL, as well as a qualitative analysis of teachers’ responses to questionnaires, which also included the quantitative analysis of frequencies within multiple-choice responses.

**Figure 3.1: Interactions and method for data collection: SRL, RC, and classroom practices. The study collected data about RC by administering ARCOTS tests, about student SRL by administering the SRL student questionnaire, and about classroom practices through teacher questionnaires.**

Rasch analysed, online, multiple choice questionnaires were used to obtain quantitative and qualitative measures of student performance in RC and SRL and teacher performance in RC. The study used questionnaires to collect data from teachers about school and classroom
practices. Reasons for using questionnaires in online surveys as a method for collecting data align with those proposed by Cohen, Manion and Morrison (2013) and include:

- economy and efficiency- the REAP online platform was already established, as was direct access to the project participants;
- ability to generate numerical data;
- ability to gather data that can be analysed statistically;
- provision of descriptive, inferential, and explanatory information;
- derivation of frequencies of key factors;
- ability to gather standardised information through use of the same tool;
- ability to ascertain correlations; and
- ability to observe patterns of responses and make generalisations about teaching practices

The teacher questionnaires regarding school and classroom practices were administered prior to, throughout, and after completing online professional development modules. Teachers were required to complete a questionnaire related to a previously completed module before unlocking the next module. In addition to questions about the previous module, the questionnaires included items about teachers’ perceptions, beliefs, and classroom practices in relation to HC students and SRL. The content of the modules and questionnaires will be detailed later in this chapter.

Quantitative data included measures of student and teacher RC ability, student growth in RC, and student SRL ability by measuring performance on individual tests. All quantitative assessments comprised online multiple-choice items. Item difficulty and developmental progressions were developed using Rasch modelling and item response theory (IRT) following methods pioneered by Griffin (2007). Griffin combined the theories of Vygotsky (1978), Rasch (1980) and Glaser (1981) to devise a method for developing assessment and reporting that adheres to a developmental model of learning (Griffin, 2014, p. 615). Detailed explanation of this method can be found in the Griffin (2014). An overview of the links between data collection and the research questions is laid out in Table 3.1, where the method of data collection, intended use of the data collected, and the relevant research question are shown.
Table 3.1: Linking research questions to data collection

<table>
<thead>
<tr>
<th>Method of collection</th>
<th>Intended use of data</th>
<th>Research question</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCOTS: RC online tests</td>
<td>➢ measure the RC ability levels of participants ➢ establish a measure of growth in RC for a period of 6 months ➢ rank students and identify HC students ➢ explore the links between student ability in RC and growth outcomes ➢ explore the links between RC growth and individual SRL levels ➢ explore the links between RC growth and SRL in classroom planning and practices ➢ compare teacher RC performance with that of their students and professional peers</td>
<td>➢ 1 ➢ 1 ➢ 1 ➢ 1 ➢ 2 ➢ 1, 3 ➢ 1</td>
</tr>
<tr>
<td>REAP Self-Regulated Learning student questionnaire</td>
<td>➢ measure and identify levels of SRL ➢ compare student SRL ability with RC ability ➢ compare student SRL ability with growth in RC</td>
<td>➢ 2 ➢ 2 ➢ 2</td>
</tr>
<tr>
<td>Teacher Questionnaires</td>
<td>➢ identify and describe teaching and assessment practices in RC, especially for HC students ➢ identify and describe planning procedures and strategies for teaching HC students and higher-order skills in reading classrooms ➢ identify and describe planning procedures and strategies for inclusion of SRL in reading classrooms</td>
<td>➢ 3 ➢ 3 ➢ 3</td>
</tr>
</tbody>
</table>

The remainder of this chapter describes the participants, ARCOTS RC and SRL assessments, teacher questionnaires and a timeline for the collection of data.

3.1.1 The REAP Project as intervention

It was noted at the start of the thesis that this thesis emerged from the larger REAP linkage project. Although REAP was intended as a non-experimental study this project included participant access to professional development modules and that therefore there is the possibility that this impacted teacher perspectives, knowledge, and practices. This impact is discussed in detail in section 7.5 The impact of the REAP project and professional development modules.
3.2 Study participants

In partnership with the Department of Education and Training, Victoria, the REAP team invited schools to participate in the “Realising the Potential of Australia’s High Capacity Students” project via email. Schools responded to the Assessment Research Centre (ARC) REAP email address which was managed by the REAP team. The REAP team at the Assessment Research Centre (ARC) consisted of members from ARC and the University of Melbourne Graduate School of Education. The team was led by the Chief Investigator, Emeritus Professor Patrick Griffin, a project manager/research fellow, a programmer, and two doctoral candidates (of which the author is one). Professor Lorraine Graham joined the project approximately one year into the project as a second Chief Investigator. The project ran from 2015 and is due to end mid-2018. Background to the study, including details about the REAP project, were discussed in 1.2 ‘Background to the study’ and an overview of the three-year study can be viewed in Appendix B.

Prior to the commencement of the project, two information workshops were provided for interested principals, school leaders, and teachers, after which schools/teachers self-selected and registered their participation in the project. Data for this study were gathered using participants from Year 5/6 REAP project participants. No additional consent was required of parents of the students because the assessments aligned with expected teaching strategies and activities routinely used by teachers in the classroom. An overview of participants is given in Table 3.2. Initial Year 5/6 registration to the project included 15 schools and 48 classes/teachers.

<table>
<thead>
<tr>
<th>Schools</th>
<th>Classes/Teachers</th>
<th>Year 5 students</th>
<th>Year 6 students</th>
<th>Total number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>48</td>
<td>443</td>
<td>624</td>
<td>1067</td>
</tr>
</tbody>
</table>
Participants were issued with individual passwords that unlocked the Assessment Research Centre’s Online Testing System (ARCOTS): REAP online platform (http://www.arcots.com/REAP/home.php). Here participants accessed the requirements of the project which included: project information, RC/SRL assessments, teacher questionnaires and professional development modules.

Participating schools were located across Victorian suburbs with the number of classes containing Year 5/6 students from any given school ranging from one to six. No schools were identified by the Department of Education and Training Victoria as being among those listed as low socio-economic status (SES) according to their criteria. The Index of Community Socio-Educational Advantage (ICSEA) was used to compare school status (ACARA, 2013).

To fairly compare school results by students in schools across Australia for National Assessment Program Literacy and Numeracy (NAPLAN) tests, the Australian Curriculum Assessment and Reporting Authority (ACARA) created the ICSEA index. The My School website provides information regarding how this value for each school is calculated and states that: ‘A value on the index corresponds to the average level of educational advantage of the school’s student population relative to those of other schools’ (http://www.acara.edu.au/_resources/About_icsea_2014.pdf). ICSEA is estimated using a combination of variables that have been found to correlate with student performance in NAPLAN; these are listed in Table 3.3.

The ICSEA scale has a mean of 1,000 and a standard deviation of 100. Values range from 500 for schools with extremely disadvantaged student backgrounds to 1,300 for schools with extremely advantaged student backgrounds. The ICSEA value was used to compare schools that participated in this study to allow the researcher to adjust for socio-educational advantage if necessary. The ICSEA values for the participating schools are listed in Table 3.4, column 2. The highest ICSEA score was 1162 and the lowest was 931, giving an average score of 1084; all but one school was within 81 points of the average score. Statistical description of schools in the table include: NAPLAN average achievement, NAPLAN reading level, average achievement compared to similar schools, and percentage school distribution by quartiles for each school. The percentage of students in each quarter for achievement has also been listed, where Q1 = top quarter, Q2 = Middle (1) quarter, Q3 = Middle (2) quarter and Q4 = top quarter.
The 2015 NAPLAN average achievement scores for Year 5 students (Table 3.4, column 7) confirm that participating schools are comparable for NAPLAN reading results; no school is more than 100 points above or below another school. Given that 100 points on the NAPLAN scale equates to one reading level, participating schools are no more than one level apart, on average, in reading. On the 2015 NAPLAN band scale (Table 3.4, column 8), school average reading scores for Year 5 students fell between NAPLAN reading bands 5 and 7 (ACARA, 2016c).

### Table 3.3: Variables used in ICSEA Australia (Source: ACARA, 2013)

<table>
<thead>
<tr>
<th>Student Variables</th>
<th>Details</th>
</tr>
</thead>
</table>
| Parent occupation | Professional  
Associate professional  
Skilled non-professional  
Low skilled |
| Parent school education level | Year 12 or equivalent  
Year 11 or equivalent  
Year 10 or equivalent  
Year 9 or equivalent or below |
| Parent non-school education level (tertiary qualifications) | Bachelor’s degree or above  
Advanced diploma/Diploma  
Certificate I to IV  
No non-school qualification |
| School Variables | Percentage of Aboriginal and Torres Strait Islander enrolments  
Accessibility/Remoteness index (ARIA)  
Percentage of disadvantaged students with language background other than English (LBOTE) |
### Table 3.4: Participating schools’ ICSEA, NAPLAN average achievement at Year 5, NAPLAN Victorian Rank and school distribution by quartiles (2015)

<table>
<thead>
<tr>
<th>School code</th>
<th>School ICSEA Value</th>
<th>school % distribution Q1</th>
<th>school % distribution Q2</th>
<th>school % distribution Q3</th>
<th>school % distribution Q4</th>
<th>2015 NAPLAN Average Achievement</th>
<th>Band</th>
<th>Above below, close to similar schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>1123</td>
<td>6</td>
<td>12</td>
<td>31</td>
<td>52</td>
<td>563</td>
<td>7</td>
<td>above</td>
</tr>
<tr>
<td>14</td>
<td>1013</td>
<td>23</td>
<td>36</td>
<td>28</td>
<td>12</td>
<td>508</td>
<td>6</td>
<td>above</td>
</tr>
<tr>
<td>13</td>
<td>1152</td>
<td>2</td>
<td>8</td>
<td>23</td>
<td>67</td>
<td>543</td>
<td>7</td>
<td>above</td>
</tr>
<tr>
<td>12</td>
<td>1162</td>
<td>1</td>
<td>6</td>
<td>22</td>
<td>71</td>
<td>541</td>
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</tr>
<tr>
<td>11</td>
<td>1057</td>
<td>10</td>
<td>23</td>
<td>30</td>
<td>31</td>
<td>505</td>
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<tr>
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<td>3</td>
<td>6</td>
<td>19</td>
<td>73</td>
<td>534</td>
<td>7</td>
<td>below</td>
</tr>
<tr>
<td>9</td>
<td>1002</td>
<td>28</td>
<td>38</td>
<td>24</td>
<td>10</td>
<td>503</td>
<td>6</td>
<td>above</td>
</tr>
<tr>
<td>8</td>
<td>1139</td>
<td>3</td>
<td>9</td>
<td>25</td>
<td>63</td>
<td>538</td>
<td>7</td>
<td>Close to</td>
</tr>
<tr>
<td>7</td>
<td>1107</td>
<td>6</td>
<td>14</td>
<td>30</td>
<td>50</td>
<td>546</td>
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</tr>
<tr>
<td>6</td>
<td>1101</td>
<td>4</td>
<td>19</td>
<td>33</td>
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<td>Close to</td>
</tr>
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<td>1145</td>
<td>2</td>
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<td>27</td>
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<td>563</td>
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</tr>
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<td>4</td>
<td>1090</td>
<td>10</td>
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<td>29</td>
<td>43</td>
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<td>Close to</td>
</tr>
<tr>
<td>3</td>
<td>1061</td>
<td>13</td>
<td>21</td>
<td>33</td>
<td>33</td>
<td>540</td>
<td>7</td>
<td>above</td>
</tr>
<tr>
<td>*2</td>
<td>1016</td>
<td>25</td>
<td>27</td>
<td>34</td>
<td>15</td>
<td>477</td>
<td>5</td>
<td>Close to</td>
</tr>
<tr>
<td>*1</td>
<td>931</td>
<td>55</td>
<td>29</td>
<td>13</td>
<td>2</td>
<td>445</td>
<td>5</td>
<td>Close to</td>
</tr>
</tbody>
</table>

* School ranges from Foundation to Year 9 or higher.


### 3.3 Cleaning the data

Although 1067 students completed the first round of reading assessments, not all these students completed all subsequent assessments; nor did all teachers complete the ARCOTS RC assessment or all the questionnaires. Reminders via the REAP newsletter and follow-up emails were sent to schools who did not complete assessments as requested; however, there were still gaps in the data. The number of students and teachers who completed the RC and SRL online assessments is recorded in Table 3.5. Numbers for teacher questionnaires are given when discussed throughout the study and indicated as ‘n=’, where n indicates number of teachers who responded to that particular question.
To maintain the integrity of the definition of ‘high capacity students’ as students in the top 25% for ability in the context of a whole class, it is important to have as close to complete class numbers as possible. Classes used in the analysis were those for which participants reflect the actual distribution of students in the participating classes; that is, the closest to actual range of scores in the classroom when students are classified as members of each quartile in that class. Generally speaking, HC students in Victorian schools learn in environments that include students of all abilities as well as students with similar ability, so it is necessary and ethical to maintain the contextual integrity of participants. All classes in this study included a range of abilities indicative of the range present in the general student population for Year 5/6 Victorian students – there were no ability-based or streamed classes. There were students who completed the T1 assessment but not the T2 assessment and vice versa; growth measures for students who only completed the pre-test (T1) or only completed the post-test (T2) could not be calculated therefore, these students were not included in the study. A compromise between available classes and participating students was reached to retain classes that provided the most data within the conditions stipulated. This and the fact that some teachers did not assess all students in their class, resulted in the number of students in some classes included in the study as relatively low compared with actual class sizes. The classes included were those in which 11 or more students completed T1 and T2 tests for RC. The mean number of students across the 39 classes is 20. There were 12 schools,
39 classes/teachers and 789 students included in the study. Table 3.6 shows the frequency of students per school per class.

The school and class/teacher identification (ID) numbers and student numbers are given in Table 3.6. The Class ID identifies both the class and class teacher. The number preceding the underscore in the Class ID identifies the School, thereby facilitating investigation of school factors. For example, the classes in the table from school 10 are taught by teachers 41, 21, 10 and 1 respectively and the Class IDs, 10_41 and 10_21, denote two classes from the same school (that is, school “10”) where Teacher ID 41 and 21 are codes for two separate teachers in the respective classes within that school. There are two additional classes in this study that are from School 10: Class 10_10 and Class 10_1. In School 4, students are grouped across two classes for RC and these students are taught at various times by the one teacher, which seemed to contradict what students recorded as their ‘Class name’. When the school was contacted, these teachers clarified which students they taught for the majority of reading lessons (regardless of their “class”). For the two teachers at this school, classes were identified using the teacher and students taught by the teachers for the majority of RC lessons. This resulted is an anomalous class 4_37 in which there was a large number of students, due to the fact that Teacher 37 taught 40 students for the majority of their reading lessons.
The REAP team at the University of Melbourne created eight online modules for teacher professional development (these are detailed in 3.1 ‘Teacher modules and questionnaires). These were preceded and followed by module questionnaires that teachers accessed on the REAP online platform. Participating teachers were requested to complete the modules and questionnaires. Details about the modules and questionnaires are given later in section 3.11, ‘Teacher Modules and Questionnaire’; the contents of the modules are described in that section. Ethics for the study was completed as required by the University of Melbourne Human Research Ethics Committee (2015-2018).

### 3.4 Ethics

Ethics for this study was covered under the ethics application for the REAP study. Details of the application include:

---

**Table 3.6: Students and classes for which growth scores could be calculated**

<table>
<thead>
<tr>
<th>School ID</th>
<th>Class ID</th>
<th>Students per class</th>
<th>Students per school</th>
<th>School ID</th>
<th>Class ID</th>
<th>Students per class</th>
<th>Students per school</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15_22</td>
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<td>19</td>
<td>6</td>
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<td>21</td>
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<td>6_25</td>
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</tr>
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<td>6</td>
<td>6_9</td>
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</tr>
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<td>10</td>
<td>10_41</td>
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<td>89</td>
<td>5</td>
<td>5_45</td>
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</tr>
<tr>
<td>10</td>
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<td>5</td>
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<tr>
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</tr>
<tr>
<td>7</td>
<td>7_44</td>
<td>24</td>
<td>98</td>
<td>2</td>
<td>2_23</td>
<td>19</td>
<td></td>
</tr>
<tr>
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<td>1</td>
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</tr>
<tr>
<td>7</td>
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<tr>
<td>7</td>
<td>7_6</td>
<td>26</td>
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<td>1_29</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1_5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>789</strong></td>
</tr>
</tbody>
</table>
Teachers were issued with a plain language statement and were required to register their consent online (see Appendix A). Registration to the project required teachers tick the relevant box which recorded their consent, before proceeding any further. The type of tests used in the assessment of RC and the SRL student questionnaire were designed to fit in with expected classroom practice and therefore did not require separate student consent. The next section describes the timeline for data collection that was followed in the study.

3.5 Data collection time line

Data were collected to determine gains in RC over a period of approximately six months. An online platform was used to provide the necessary resources and testing materials to schools. Pre (T1) testing occurred at the start of the REAP project when participants were still relatively new to the project and had not yet engaged with the online modules. The results from testing at T1 were used to identify students in the top quartile of ability at the time of testing. Students were administered the RC test again after approximately six months at T2.

As mentioned previously, the data for this study were drawn from the REAP project; an overview of the data collection in that project is provided in Appendix B. The online platform, where all participants accessed the study’s resources, opened in March 2016 and closed on December 2016, although some final teacher questionnaires were received as emailed word documents up to the end of the school year. After consenting to participate in the REAP project, teachers accessed information about targeted testing and how to use the online assessments, before administering the assessments. The process for registering and accessing the online platform was as follows:
1. The school contact person logs into REAP online using the Victorian Registration and Qualifications Authority (VRQA) school number and follows directions set out in the automatically generated email.

2. The school contact adds the teachers who want to participate in the REAP project by registering teacher name, teacher email address, and a Class ID. This automatically generates an email to the teachers registered.

3. Once they receive the REAP automatically generated emails, teachers use their user name and password to complete the initial questionnaire and then access teacher ARCOTS tests, teacher reports, teacher questionnaires and professional development modules.

So as not to overwhelm participants with information, resources were made available on the online platform in stages. This also allowed the REAP researchers to incorporate feedback into the various resources before uploading them. A REAP newsletter was emailed approximately every six weeks or when a new set of resources was uploaded to the platform. The newsletter included participation rates and responded to frequently asked questions. The contents of the online modules and questionnaires are detailed in section 3.11, ‘Teacher modules and questionnaires’.

It was expected that all responses to the questionnaires be given online; however, not all teachers had fully completed the required items before the platform was closed. In addition to online communication, it was necessary to follow up with some interviews over the telephone where teachers did not complete the required items. Where responses were collected over the telephone, teachers were asked identical question to those on the online platform and the responses were recorded verbatim by the researcher.

Teacher and student resources and data collection time lines relevant to this study are described in Table 3.7. An explanation of the administration of the tests follows and the testing system used to assess RC and student SRL is described after that.
Table 3.7: Data collection time line

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/2/16</td>
<td>Copy of official letter of participation/agreement made available for consent through the REAP platform.</td>
<td>teachers and school leaders</td>
</tr>
<tr>
<td>1/3/16</td>
<td>School leaders receive login information to access the REAP platform, give consent and answer a questionnaire</td>
<td>school leaders</td>
</tr>
<tr>
<td></td>
<td>School leaders add participating teachers to the platform</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Automatic email sent with a username and password for teachers to use throughout the study</td>
<td></td>
</tr>
<tr>
<td>14/3/16-24/3/16</td>
<td>Teachers access REAP online, give consent and answer questionnaire</td>
<td>teachers</td>
</tr>
<tr>
<td>14/3/16-</td>
<td>Test Targeting Guide (explaining ARCOTS testing system)</td>
<td>students</td>
</tr>
<tr>
<td>14/3/16-24/3/16</td>
<td>Testing Manual (Explaining requirements for administering tests</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Module Guide (Explaining expected teacher engagement with modules)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teachers/students complete ARCOTS testing in RC</td>
<td></td>
</tr>
<tr>
<td>14/3/16-</td>
<td>Reports available 4.15 pm on the day of testing via REAP online</td>
<td>teachers and school leaders</td>
</tr>
<tr>
<td>2/12/16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14/3/16</td>
<td>Questionnaire for previous two modules</td>
<td>teachers</td>
</tr>
<tr>
<td></td>
<td>Module 3 – High Capacity Students available to teachers</td>
<td>school leaders</td>
</tr>
<tr>
<td>11/4/16-</td>
<td>Students complete REAP SRL assessment</td>
<td>Students</td>
</tr>
<tr>
<td>22/4/16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/6/16</td>
<td>Module 3 questionnaire</td>
<td>teachers</td>
</tr>
<tr>
<td></td>
<td>Module 4: Understanding SRL</td>
<td>school leaders</td>
</tr>
<tr>
<td>27/6/16</td>
<td>SRL student reports released via REAP online</td>
<td>teachers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>school leaders</td>
</tr>
<tr>
<td>3/7/16</td>
<td>Module 4 questionnaire</td>
<td>teachers</td>
</tr>
<tr>
<td></td>
<td>Module 5: SRL in the Classroom</td>
<td>school leaders</td>
</tr>
<tr>
<td>18/8/16</td>
<td>Module 5 questionnaire</td>
<td>teachers</td>
</tr>
<tr>
<td></td>
<td>Module 6: Monitoring Progress</td>
<td>school leaders</td>
</tr>
<tr>
<td>3/9/16</td>
<td>Module 6 questionnaire</td>
<td>teachers</td>
</tr>
<tr>
<td></td>
<td>Module 7: Targeting Teaching</td>
<td>school leaders</td>
</tr>
</tbody>
</table>
Administration of tests

Quantitative data were collected to determine changes in RC performance over an approximate six-month period. T1 testing was administered to students prior to the availability of the REAP online professional development modules. T2 testing was administered part way through the release of all modules. Teachers were also required to complete the ARCOTS assessment for RC at T1. The ARCOTS RC T2 assessment reports provided information about student growth by comparing T1 and T2 performance in RC. These reports were uploaded to the REAP online platform and made available to teachers, who could access them using their individual passwords (as per the timeline shown in Table 3.7). These reports included levels of performance and descriptions of levels according to the Progression for Reading Development (PRD) (see Appendix C). The PRD report identified the Zone of Proximal Development (ZPD) (Vygotsky, 1978a) in individual reports for each test taker, and a class report which included an overview of the range and levels in the class.

The REAP online ARCOTS instrument recorded data about the time taken and whether the participant completed the items in one or several sittings. In this way, information was available regarding the effort expended in completing the assessments. The REAP Self-Regulated Learning (SRL) assessment was similarly administered, with the progression for Self-Regulated Learning skills (see Appendix D) underpinning the reports. Although teachers were requested to administer the SRL assessment again at T2, not enough classes and students completed the second SRL assessment for the data to be used in this study. The T2
SRL questionnaire was identical to that in T1. When requested to administer the SRL at T2, there were teachers who reported that they did not have the time to repeat the assessment while others commented that they did not have time to incorporate what they had learned from the SRL professional development provided in to their teaching practices and that the time between assessments was too short to show meaningful progress. Consequently, few teachers completed the second SRL student assessment.

ARCOTS RC tests were administered to students in the school environment at the convenience of the teacher and/or school; this allowed for a familiar setting for students as well as giving teachers the opportunity to integrate the assessment into classroom routine and monitor student engagement. There is no specified time limit for the tests so theoretically, the tests can be administered over a number of sittings. Administration of the tests was detailed in the ‘Test Targeting Guide’ and ‘Testing Manual’.

It was included in the REAP project participant requirements that teachers complete at least the ARCOTS assessment for their main chosen area of study in the project (that is, teachers could select any or all of either one of RC, Numeracy or Problem Solving but need only take the ARCOTS test for one). Regardless of prompts to do so, there were reading teachers who administered the ARCOTS RC assessment to their students, but they did not complete the assessment. Similarly, completion rates for the student SRL assessment varied. Consequently, there were several student samples from the overall population used in the study. Student samples included those in which students completed the T1 and T2 reading assessment and

- no other assessment;
- whose teacher completed the reading assessment;
- the REAP Self-Regulated Learning assessment;
- the REAP Self-Regulated Learning assessment, and whose teacher also completed the reading assessment; and
- whose teacher responded to Module or other questions about classroom practices

Table 3.5 discussed earlier gave the participation for schools, classes, and students where both the T1 and T2 RC assessments were completed. From the 789 student who completed these assessments, 531 students also completed the T1 SRL assessment and 20 of the 39
teachers involved completed the T1 RC assessment. An explanation of the ARCOTS RC assessment tool follows.

3.7 The ARCOTS reading comprehension assessment tool

The ARCOTS RC tests are designed to place the test-taker on the ARCOTS Progression for Reading Development (PRD). The PRD is empirically calculated using the method referred to in 3.1 ‘Overview’ and Griffin (2014). The PRD levels cover a range of RC skills on a progression, charting development through 11 levels of difficulty that range from A to M where A includes the least difficult and M the most difficult skills (see PRD in Appendix C). Each test consists of a range of items where metacognitive demand increases from item to item in accordance with the developmental model. The model used seeks to elicit and identify skills as evidence of student capabilities (Griffin, 2014). The RC tests were piloted and used in a previous Assessment Research Centre project known as the Assessment and Learning Partnerships Project, and are available to paying, registered users and to participants in ARC sanctioned projects. As well as placing participants on a reading scale that identifies their ZPD, or what students are ready to learn next (Vygotsky, 1978), ARCOTS generates report profiles for teachers, students, and parents that are used according to teacher or school discretion.

ARCOTS combines the output of an item bank with targeted assessment. Each test takes approximately 20 -30 minutes to complete, but the individual can take as long as required to complete the items and pause the testing at will. The tests comprise 40 items each with four multiple-choice responses scored from 0, 1, 2, and 3; where 0 is the least correct response and 4 the most. Where the participant completes all 40 items correctly, an additional 10 items are administered. If the participant also completes the additional items correctly, a level cannot be calculated and a recommendation to complete the next highest test is made. Student ability can only be measured and calculated if the test is administered correctly so that there are items where the difficulty exceeds the student’s level of ability. Where the student’s reading level could not be calculated, the student was not included in the study.

Each set of items that make up a test correspond to the PRD levels on the RC progression. Within the suite of ARCOTS assessments, the tests have been assigned a colour of the rainbow from the least to most difficult: Red, Orange, Yellow, Lime, Green, Aqua, Blue and Purple,
where the Red test is the easiest and the Purple test is the most difficult. There is overlap between the tests so that, as mentioned earlier, if a student achieves all correct responses, they are prompted to take the next test to accurately allocate a level on the PRD. It is important that the correct initial test is selected for each student. Participating teachers were required to read test targeting and test administration guides designed to assist them to select and target the tests to each student’s estimated RC ability. It was assumed that teachers knew their students best and therefore they were responsible for selecting the most appropriate test for assessing student RC in the first instance. The suggested starting point for teachers to start exploring the tests for students in 5/6 was the Lime test. The Lime test covered the RC content and skills in levels F to K in the ARCOTS PRD and included content and skills from the Australian and Victorian English Curriculum that are targeted toward the average students in grade Year 5 and Year 6.

3.8 Comparing teacher and student reading comprehension

To compare teacher content knowledge (TCK) with student content knowledge, the study drew on calibrated teacher and student ARCOTS RC scores to establish a measurement of teacher RC ability comparable to that of their students. This was possible because both teacher and student completed the same ARCOTS RC assessment which placed them on RC levels on the same learning progression. The targeted skills included in the PRD (detailed in 3.7 and 3.6) and items used in the assessment are representative of and align with the skills detailed in the classroom curriculum and assessed in the NAPLAN, therefore, they are a valid indication of teacher content knowledge, given they are charged with the responsibility of teaching these skills. It is acknowledged that more than content knowledge is required to teach reading comprehension, however, at the grade 5/6 level, there is a reasonable expectation that teachers will outperform students in such an assessment. The PRD As mentioned in the previous section, students completed the ARCOTS RC tests under teacher supervision and as per testing administration guidelines, while teachers completed the T1 assessment at T1 unsupervised.

There were HC students in the study who performed at the Year 7/8 level, which supported the decision to have teachers complete the Aqua test. This test is two tests higher than the Lime test, which is aimed at the average ability of Year 5/6 students. The Aqua test includes
content and skills expected of average Year 7/8 students with some items overlapping with the next highest test which was designed to assess skills typically expected of Year 9 students. Therefore, the Aqua test assessed RC skills ranging from Levels H to M. Given that teachers hold graduate degrees or other tertiary teaching qualifications, the Aqua test assumed a realistic minimal expectation for the RC competency of teachers of at least at the Year 9 level. In addition to the difficulty of the items, the range of student ability in Year 5/6 classes supported the decision to use the Aqua ARCOTS RC test to assess teachers’ RC content knowledge.

3.9 The REAP self-regulated learning assessment tool

There was no available instrument deemed fit for purpose for the measurement of student SRL as required for this study. The construct for SRL used in this study is outlined in the literature review and is underpinned by the Zimmerman-Campillo (2003) model discussed therein. The suite of contemporary instruments for assessing SRL presented in the literature reflects a movement towards a criterion-referenced approach to establishing indicators and assessing the skills required for students to become successful life-long learners. Notable large-scale examples of assessment of elements included in the SRL model are PISA questionnaires for measuring student characteristics as learners (Artlet et al., 2003) and the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, 2004) where students are tracked over time. The Zimmerman and Campillo model (2002) was considered the most comprehensive model and consequently it was used by the REAP research team to develop an instrument for assessing levels of skill in SRL. The Zimmerman-Campillo model of SRL, in combination with the developmental model for learning, was used to identify behaviours for each of SRL indicators and capabilities. These describe not only what the student can say, do, make, or write, but also the level of competence (Griffin, 2014).

Multiple-choice items for the SRL assessment questionnaire were written using the developmental model for SRL described in the literature review. The instrument for assessing SRL was a self-report student questionnaire that included items about the capabilities and indicators of SRL that have been identified in the literature review (2.8 Developing a definition and construct for self-regulated learning’) and that are the basis of the REAP teacher professional development modules: ‘Module 4 Understanding Self-Regulated Learning’ and
‘Module 5 Self-Regulated Learning in the Classroom’ (for more details about the modules refer to 3.11 ‘Teacher modules and questionnaires). Therefore, there was an inbuilt understanding of both the SRL concept and terminology about SRL, between the researcher and the REAP project’s participating teachers.

<table>
<thead>
<tr>
<th>Level</th>
<th>Students at this level are self-regulated learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Students at this level have internalised strategies to maximise their learning. When they get a reading task in class they set challenging goals for themselves and regulate all aspects of learning to achieve their goals. They make a plan but can reflect on the plan and adapt to ensure the plan is effective. They submit completed reading tasks and do extra to learn more. When they encounter difficult reading tasks, they use automated regulation processes so they can be successful. When they become distracted, they find ways to refocus. At this level, students value learning in and of itself and understand their own approaches to learning in ways that allow them to take advantage of the learning experience at all times.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Students at this level are teacher directed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Students at this level need to be guided by the teacher when they are given a reading task to do in class. If they believe the reading task is too hard for them, they attempt only the parts they know they can do. They hand in work unfinished or it's finished but not their best effort. Their learning approach is driven by external influences like wanting a good report or wanting to please the teacher. They allow themselves to be distracted when doing reading tasks and rely on other students to model task-focused behaviour for them. Their motivation for doing reading tasks can stem from a desire to save face in front of their peers or to be told by their teacher that they are doing well. They do not elicit feedback but will do what the teacher tells them to do. They enjoy learning when they find reading tasks easy. When they do not do well on a reading task, they do not believe that there is much they can do about it.</td>
</tr>
</tbody>
</table>

Figure 3.2: Progression of Self-Regulated Learning: Levels G and A

Following the method used in the ARCOTS RC assessment, the characteristics of Rasch modelling and the theories of Vygotsky and Glaser were used to determine levels of competence in a developmental progression for Self-Regulated Learning. The Progression of Self-Regulated Learning identifies and describes increasing levels of proficiency in SRL. The levels range from Level A to Level G where A is the least skilled and G the most skilled in SRL. The Progression of Self-Regulated Learning can be found in Appendix D; however, Figure 3.2
includes the highest and lowest SRL Levels on the progression as examples of the structure of and descriptive detail in each SRL level.

This study used developmental progressions derived from responses to the SRL questionnaire items to describe the level of competence of students in SRL. These measures of SRL could then be compared to student performance and growth in RC (as measured using the ARCOTS RC assessment). The instrument for measuring student SRL was developed as part of the REAP project by the REAP team at the Assessment Research Centre at the Graduate school of Education, University of Melbourne. A paper for publication detailing the design, implementation, and reliability of the instrument is pending; however, a summary of the process follows.

3.9.1 Designing a framework for the self-regulated learning questionnaire items

The process for building evidence frameworks for the SRL instrument used in this study incorporates procedures described by Griffin, Gillis, and Calvetto (2004) (Griffin, Gillis & Calvetto, 2004). The design of the SRL items and subsequent multiple-choice questionnaire included items that addressed all sixteen SRL indicators identified in the SRL construct described in Chapter 2, section 2.8 ‘Developing a definition and construct for self-regulated learning’. The items begin with a stem that addresses a specific SRL indicator. Table 3.8 illustrates an example of the process for designing an item based on indicators of levels of proficiency of self-instruction, where self-instruction is one of the indicators for the self-control capability drawn from Performance Phase.

<table>
<thead>
<tr>
<th>Strand</th>
<th>Capability</th>
<th>Indicators</th>
<th>Item stem</th>
<th>Response options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td>Self-control</td>
<td></td>
<td>While I do a reading task, I say to myself...</td>
<td>I repeat to myself what the teacher said</td>
</tr>
<tr>
<td>Phase</td>
<td></td>
<td>Self-instruction:</td>
<td></td>
<td>I remind myself to use a process that I know works</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repeating teacher’s instructions</td>
<td></td>
<td>I tell myself to keep going if I find the task gets difficult</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Using self-talk to identify relevant strategies</td>
<td></td>
<td>Nothing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>used in the past</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Using self-talk to increase motivate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not self-instruct</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Strand | Capability | Indicators | Item stem | Response options
--- | --- | --- | --- | ---
Final item in questionnaire | | | | "While I do a reading task, I say to myself…"

- a. I remind myself to use a process that I know works
- b. I repeat to myself what the teacher said
- c. I tell myself to keep going if I find the task gets difficult
- d. Nothing

#### 3.9.2 Creating the self-regulated learning questionnaire

The student questionnaire includes 30 questions with a minimum of one item per SRL indicator and includes 10 SRL items related to learning in general and 20 items specific to RC. The questionnaire used for assessing SRL can be found in Appendix E.

Responses for the entire REAP project population of student participants were analysed to determine item difficulty and to derive a developmental progression for student SRL. Each of the indicators was situated in a partial credit, latent trait model (Masters, 1982) where the indicator describes attributes and behaviours of SRL in students. Instrument validation relied upon statistical analyses conducted within an item response theory (Rasch, 1980) framework. To ensure the instrument fit the purpose, the following process was undertaken: develop a construct definition, describe the phases, capabilities and indicators that make up the SRL framework, write indicators and items, pilot the items and conduct cognitive labs with students, modify the items as required (Griffin, 2014). A review of literature about SRL and developmental taxonomies (Dreyfus, 2004; Krathwohl, Anderson, & Bloom, 2001) was used to initially establish skill levels for each of the indicators and behaviours respectively. In accordance with Willis, Royston, and Bercini’s (1991) verbal report method the student items were piloted with 65 Year 5/6 students from which nine students of varying academic ability were interviewed. These students provided feedback about each of the items and the feedback was incorporated into the items to be used in the final SRL instrument.

#### 3.9.3 Calibrating the self-regulated learning assessment instrument

The SRL items were analysed using a partial credit model on the item response modeling software, ConQuest (Wu, Adams & Haldane, 2008). A strong internal consistency is indicated by 0.87 alpha reliability (EAP/PV) resulting from the analysis. The mean of the weighted item-fits is 0.99 with a standard deviation of 0.089, indicating the data fit the model. The item
reliability is 0.99 and the person separation reliability is 0.86, indicating that the ability of the items to map the given construct for SRL was appropriate over the range of abilities of the students assessed.

3.9.4 Assessing and reporting self-regulated learning

When the REAP SRL assessment was finalised, it was uploaded to the REAP online platform where it was administered to study participants using the same process as for the RC assessments. Results for the REAP SRL assessment were also issued to teachers via the REAP online platform in the same way as the RC results. The SRL reports identify student SRL levels as described in the ‘Developmental Progression of SRL’ and provided teachers with an overview of the range of SRL levels in their class.

3.10 Case study

A case study was used to combine the analysis of the statistical data and teacher questionnaires with a practical description in a case study (Cohen, Manion, & Morrison, 2013), that could then be used as an example of trends in the wider population. The ‘single case’ design was used for the best performing school in the study. Cohen, Manion, and Morrison included in their definition of single case design that the study should ‘focus on a critical case...’ that is ‘representative or typical’ and/or ‘revelatory’ (Cohen et al., 2013, p. 291). School 5 was found to include these design elements. There was a range of results for Q4 and overall RC growth over six months where three of the five classes from School 5 were identified as in the top six performing classes for growth; however, the remaining two classes were ranked in the bottom half. This provided an excellent opportunity for identifying links between classroom strategies and growth outcomes across a range of growth results. The comparison between these groups of classes highlighted the differences in classroom strategies and teaching approaches of high and non-high-performing classes. The case study is described using a narrative report where a ‘prose account is provided’ that includes findings, arising issues, analysis, and conclusion (Cohen et al., 2013, p. 301).
3.11 Teacher modules and questionnaires

The REAP online platform offered a secure and easily accessible location for teachers to access the various resources for and requirements of the project, as well as for collecting self-report questionnaire data. Teachers gained access to professional development modules by completing preceding questionnaires. Modules 1-3 could be accessed after completion of the pre-modules questionnaire and access to each of the other modules required completion of a questionnaire related to the previous module’s content. These are referred to as ‘module questionnaires’

3.11.1 Teacher modules

Throughout the REAP project, teachers were encouraged to engage with professional development by way of on-line modules. Each module contained a list of objectives, core content information, and resources, ‘Apply to Practice’ examples and activities and, in some instances, short reflective questions. Table 3.9 contains a summary of the modules and guide uploaded to REAP online.

*Table 3.9: REAP online modules*

<table>
<thead>
<tr>
<th>Modules</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1: REAP online Guide</strong></td>
<td>• Present a broad overview of the REAP project (detailed background is in Module 1)</td>
</tr>
<tr>
<td></td>
<td>• Explain what the school contact is required to do</td>
</tr>
<tr>
<td></td>
<td>• Assist you in using REAP online, by providing details about the login process.</td>
</tr>
<tr>
<td></td>
<td>• Explain how you consent to the REAP project</td>
</tr>
<tr>
<td><strong>Module 2:</strong> Understanding and Using Assessment Reports</td>
<td>• Explain practices that apply principles of assessment</td>
</tr>
<tr>
<td></td>
<td>• Use assessment data to identify student zone of proximal development (ZPD)</td>
</tr>
<tr>
<td></td>
<td>• Use ARCOTS reports to help students, teachers and parents understand student learning</td>
</tr>
<tr>
<td><strong>Module 3: High Capacity Students</strong></td>
<td>• Identify HC students</td>
</tr>
<tr>
<td></td>
<td>• Provide accelerated and extension opportunities for students</td>
</tr>
<tr>
<td></td>
<td>• Create differentiated learning experiences</td>
</tr>
<tr>
<td></td>
<td>• Support the social and emotional development of students</td>
</tr>
</tbody>
</table>
3.11.2 Teacher questionnaires

The questionnaires comprised multiple choice and short response questions. The items related to teacher engagement with the module content and suggested resources, as well as teaching and planning practices and experiences. The questionnaires were designed to take from 15 to 20 minutes to complete. The questions were designed to elicit self-report data about the organizational and strategic aspects of teaching and learning RC and SRL, and included items that focused on HC students, higher-order thinking skills, and teacher strategies for planning. The questionnaire design included multiple-choice items to provide the opportunity for quantitative analysis where frequency and relative percentages, for example, could be established. Such analyses were conducted using Excel 2013 and IBM SPSS statistics 22-computer software. Although participation in the REAP project required teachers to complete all questionnaires, the completion rate ranged across all, few, and most
questions completed. Open items were used to encourage teachers to report strategies not represented in the choices given. Accordingly, types of items in the questionnaire include:

- check boxes requiring a single selection;
- check boxes allowing for multiple selection;
- comment only; or
- a comment option in addition to the first 2 options listed above

Examples of the types of items used in the teachers’ questionnaire can be found in Appendix F.

3.12 Preparing and using the data

3.12.1 Assessment data

To investigate the research questions, it was necessary to rank students into Quartiles. This required discriminating between students’ performance in greater detail than possible when using PRD levels generated by ARCOTS. Therefore, it was necessary to convert the raw data into more detailed measures of student performance so that students could be ranked within levels as well as between levels. This section explains the method of preparing the data for quantitative analyses.

As indicated earlier in sections 3.7 and 3.9, the skills and ability levels of students were measured using the REAP online platform and ARCOTS RC and SRL online assessment; these were then described according to the developmental progressions for Reading Comprehension and Self-Regulated Learning. While the developmental progressions give a broad description of the skills and levels achieved by the test-taker, they do not provide the finer measurement required to differentiate between individual participants or to detect growth over a six-month period. The weighted likelihood estimates (WLE) are a more useful unit because they measure the estimate of ability for a particular set of participants for a particular set of items. WLE scores are fine grained, giving a more precise measure of student ability. The WLE scores for the RC and SRL assessments were calculated using raw scores and taking into account item difficulty. WLE scores were then scaled such that the mean is 50 and the standard deviation (SD) is 10. This is referred to as the STD50 score and is calculated for each WLE value: 

\[ \text{STD50} = (\text{WLE} - \text{mean}) \times \frac{10}{\text{SD}} + 50 \]
To ensure consistency, the mean and SD of the T1 data was used to scale all WLE scores. Unless otherwise indicated, all scores reported in this paper have been scaled to a mean of 50 and standard deviation of 10. All analysis of assessment and questionnaire results were conducted using IBM SPSS statistics 22 and Excel 2013 software.

The student quartile samples used in this study are Q1, Q2, Q3, and Q4. Quartiles are ranked in ascending order where the least able students are in Q1 and the most able students are in Q4. Student quartiles can be calculated in a number of ways. Zhang, Griffin, and Care (2015) identified as initially high capacity, students whose RC test scores were in the top quartile (equal to or above 75%) in at the pre-test stage (T1). Students were ranked in two contexts: across classes and within class (Zhang et al., 2015). As the name suggests, within class ranking ranks each student relative to the reading proficiencies of students in individual classes. The second method used by Zhang et al. was to group students according to their abilities relative to the distribution of the reading proficiencies of all Year 5/6 RC students who participated in the study (Zhang et al., 2015); this was referred to as ability grouping across classrooms. This study found that the two methods resulted in almost identical quartile rankings.

The study used mainly within class ranking; however, across classroom ranking was used when investigating the effect of Year Level (that is, whether the student was in Year 5 or Year 6). The scores used for ranking students are the T1 STD50 ARCOTS RC scores, with the exception of the use of raw scores in the analysis conducted in section 4.6 ‘Test contribution to growth differences’. Raw scores were used in this instance because, in this section, the study compared number of correct responses per test.

Calculating and using within class rankings for students allowed the study to tackle the research questions in the context of individual classes which facilitated the exploration of the links between student outcomes and teacher classroom practices, and between student outcomes and school organisation of students into grades (e.g. classes contain students of Year 5 or Year 6 only, or a mixture of Year 5 and Year 6 students in the same class). Using quartiles calculated across entire year levels (e.g. Year 5 or Year 6 only), on the other hand, allowed the study to explore the research questions more broadly at Year 5 and Year 6 separately.

Where the study made comparisons between in-class Quartiles (Q), students were grouped according to their rank within their class, which was established using T1 RC scores. This was
referred to as Q by class. Where the study made comparisons between Quartiles at Year level, students were grouped according to their rank within their Year level which was established using T1 RC scores. This was referred to as Q by year.

In summary, Quartiles (Q) in the study were established and identified as follows:

- **Q by class**: Students were ranked within classes by RC scores in the ARCOTS assessment at T1; there was no differentiation for year level. High capacity students were defined as those in the top quartile when the population was ranked in this way;
- **Q by year**: Students were first divided into year level and then ranked by RC scores in the ARCOTS assessment at the start of the year; there was no differentiation by class. Each year level (5 and 6) had approximately the same number of students in Q1, Q2, Q3, and Q4;
- **Q by raw score**: Students were ranked within classes by raw score for RC assessment at the start of the year. Each class had approximately the same number of students in Q1, Q2, Q3, and Q4 (within individual ARCOTS tests).

When students were ranked into Q by class, some adjustments were required to reflect how students might be grouped in the classroom by teachers. When the cut-off scores between quartiles are identified by sorting student scores from lowest to highest, and then dividing students into four groups, where each quartile has an equal number of students, there is no accounting for individual scores and student ability. For example, there are 19 students in class 2_23 and dividing these students into statistically sorted quartiles results in 5 students in each of Q1, Q2 and Q3, and 4 students in Q4. However, closer inspection of the scores reveals that ranking students strictly in this somewhat arbitrary way can be misleading and does not reflect the environments in which students are, for example, grouped or planned for in the classroom. Class 2_23 is a good example of how this method of dividing students into quartiles is problematic.

Table 3.10 shows two methods for how students can be placed into Q for class 2_23. The problematic nature of simply dividing ranked students by 4 to assign them to a Q becomes clear when individual scores are examined and compared more closely. The 19 Students in class 2_23 are ranked lowest to highest and their scores are listed in column 1. Column 1 includes shading of students into 4 groups by counting down the ranked scores in sets of 5
(with 4 left in the final set). Column 2 lists the Q assigned to the groups in column 1. However, this does not take into account multiple students with the same score. Nor does it take into consideration the cut-off score between the quartiles. In class 2_23, scores 49.13 and 49.48 are separated into Q3 and Q4 respectively despite the closeness of these scores which indicates that these two students would be performing similarly and have similar learning needs in the classroom.

In addition, there are five sets of students with the same score distributed across the range of scores for this class, which also impacts how students can be grouped. It is important to maintain the integrity of the definition of ‘high capacity students’ as students in the top 25% for ability in the context of the whole and individual class; therefore, quartiles should reflect as realistic classroom contexts and groupings as possible. Column 3 in Table 3.10 shows a re-shading of the class into quartiles where the additional factors for grouping students have been taken into consideration. Column 4 lists the Q assigned to the students (as represented by the student score) when Q are revised and calculated according to class context. It is important to note that assigning students to Q in this way results in uneven number of students per Q. In the class example given, there are four students in Q1, six students in Q2, six students in Q2, and three students in Q4.

Table 3.10: Assigning Q by class – example class 2_23

<table>
<thead>
<tr>
<th>Student score (STD50)</th>
<th>Method 1: statistical ranking into Q</th>
<th>Student score (STD50)</th>
<th>Method 2: revised ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.60</td>
<td>1</td>
<td>35.60</td>
<td>1</td>
</tr>
<tr>
<td>38.81</td>
<td>1</td>
<td>38.81</td>
<td>1</td>
</tr>
<tr>
<td>38.81</td>
<td>1</td>
<td>38.81</td>
<td>1</td>
</tr>
<tr>
<td>40.32</td>
<td>1</td>
<td>40.32</td>
<td>1</td>
</tr>
<tr>
<td>43.26</td>
<td>1</td>
<td>43.26</td>
<td>2</td>
</tr>
<tr>
<td>43.81</td>
<td>2</td>
<td>43.81</td>
<td>2</td>
</tr>
<tr>
<td>44.67</td>
<td>2</td>
<td>44.67</td>
<td>2</td>
</tr>
<tr>
<td>45.90</td>
<td>2</td>
<td>45.90</td>
<td>2</td>
</tr>
<tr>
<td>46.06</td>
<td>2</td>
<td>46.06</td>
<td>2</td>
</tr>
<tr>
<td>46.06</td>
<td>2</td>
<td>46.06</td>
<td>2</td>
</tr>
<tr>
<td>47.43</td>
<td>3</td>
<td>47.43</td>
<td>3</td>
</tr>
<tr>
<td>47.43</td>
<td>3</td>
<td>47.43</td>
<td>3</td>
</tr>
<tr>
<td>47.43</td>
<td>3</td>
<td>47.43</td>
<td>3</td>
</tr>
</tbody>
</table>
The method used for establishing class Q in the study is the second method. This is the method used in the class 2_23 example illustrated in Table 3.10, where each quartile-group was revised and re-shaded in column 4. In column 4, the students’ rankings were examined to try and place students with similar ability in the same Q. The Q4 students identified in this way are referred to as the High Capacity (HC) students. Figure 3.3 shows the number of students per quartile per class where the number of students is on the left vertical axis, the Q is on the right vertical axis, and the Class ID is on the horizontal axis. For example, the bars circled in red represent number of students per Q for class 2_23 (the class used in the previous example).

<table>
<thead>
<tr>
<th>Student score (STD50)</th>
<th>Method 1: statistical ranking into Q</th>
<th>Student score (STD50)</th>
<th>Method 2: revised ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>49.13</td>
<td>3</td>
<td>49.13</td>
<td>3</td>
</tr>
<tr>
<td>49.48</td>
<td>4</td>
<td>49.48</td>
<td>3</td>
</tr>
<tr>
<td>49.48</td>
<td>4</td>
<td>49.48</td>
<td>3</td>
</tr>
<tr>
<td>52.71</td>
<td>4</td>
<td>52.71</td>
<td>4</td>
</tr>
<tr>
<td>54.20</td>
<td>4</td>
<td>54.20</td>
<td>4</td>
</tr>
<tr>
<td>54.20</td>
<td>4</td>
<td>54.20</td>
<td>4</td>
</tr>
</tbody>
</table>

*Figure 3.3: Number of students per quartile per class for Q by class*
In this study, numbers of students in classes can be considered statistically small and even smaller when classes are divided into quartiles. Where the numbers were too small for parametric analysis (Muijs, 2010) the data were used to rank and identify classes which may be of interest for non-parametric investigation.

3.12.2 Teacher questionnaires

The online teacher questionnaires were administered to all teachers of the 39 classes included in the study. However, not all teachers responded to all the items in the questionnaires. The results for each item are reported as percentages of the number of responses for that item. The individual number of overall responses is given for each question.

**Context for completion of questionnaires:** Although schools self-selected for participation in the project, it did not necessarily follow that teachers were equally engaged or invested in the project. This may explain why there were gaps in the data both for ARCOTS assessment of teacher RC and for completion of questionnaire items. It is also noted that perhaps teachers did not have the time to fully engage with the project. Although teachers were not asked specifically why they did not complete all aspects of the REAP project, they were asked why they registered for participation. When asked for reasons why they registered in the REAP project, 24 of the 39 teachers in this study gave a response. 63% of the teachers that responded indicated that they were required to take part in the project either by the ‘Principal’ or by ‘Leadership’. 25% of teachers commented that the reason for participating in the project was to learn about strategies for improving or supporting growth in HC students, including one teacher who joined to learn how to ‘identify high achievers’ and another to learn about self-regulated learning as a strategy for supporting HC students. One teacher commented that he/she wanted strategies for growth for all students and another teacher wanted to access ‘additional PD [professional development] on how to effectively teach ‘reading’ to students working beyond year 6 standards’. It is within this context that the data from the questionnaires were collected.

**Teachers of high-performing and non-high-performing classes:** The teacher questionnaires were used to differentiate between classes where RC growth for HC students was similar to that of other students, and classes where RC growth for HC students was less than for other students in the class. The top six classes are identified as those having the greatest mean
growth at Q4; these classes are referred to as the High-performing (HP) classes. Other classes are referred to as Non-High Performing (NHP) classes. Comparison of data for HP and NHP classes was used to identify, group, and describe differences between classes and teachers for what can be determined to be effective or less effective strategies for teaching HC students. The HP classes in the study are identified in 4.5 ‘School and class membership’ using the RC assessment data.

HP classes are defined as those for which:

- mean growth scores in Q4 are ranked in the top six of all 39 classes for which growth scores are available in this study;
- there is no significant difference between quarters for mean growth scores; and
- RC gain is greater than ½ standard deviation, where 5 points = ½ standard deviation (i.e., an increase of greater than approximately 17%).

Teachers responses to the questionnaires were separated into two groups according to the progress made by HC students compared to the other students in the class; there were the:

- High-performing (HP) classes (6 classes identified with the greatest mean growth at Q4). These are classes 5_14, 4_26, 5_36, 1_31, 5_45 and 6_25.
- Non-high-performing (NHP) classes (classes not ranked in the top 6 for mean growth at Q4 scores (n indicated))

3.12.3 Statistical significance

The level of statistical significance most commonly used in educational research and in statistical packages such as the SPSS software package used in the study, is calculated at less than 0.05 (Cohen et al., 2013) Accordingly, the statistical significance in the study is calculated at $p<0.05$.

3.13 The uses of change scores and regression to the mean

It is prudent at this point to address the contention that regression to the mean and unreliable use of change scores may impact calculation and results for student mean gains, therefore impacting any finding regarding growth trends. This contention is rejected using subsequent
findings from the year level analysis in this study and an example of studies reported in the available literature.

Allison (1990) rejected assertions that change scores ‘tend to be much less reliable than the component variables’ and that regression effects when using pre-test and post-test measurements are a serious caution against ‘the use of change scores’ (Allison, 1990, pp. 94-95). This study meets conditions outlined in Allison (1990) for the refutation of objections to the use of change scores. The change score in this study is growth in RC WLE’s calculated across a latent continuum. The pre (T1) and post (T2) test scores used to calculate the change score in this study satisfy those stated by Allison as ‘appropriate’:

...there is a true causal effect on the pre-test on the post-test, or when cases are assigned to groups on the basis of pre-test scores.
— (Allison, 1990, p. 93)

The methodology in this study used general linear models with normal errors which align with Allison’s study (Allison, 1990). Allison’s findings can therefore be applied to this study and where change scores are used, they were done so with confidence.

3.14 Reporting results and discussion

Combining the results in one chapter and the discussion of the results in another proved problematic for the complex and interrelated nature of the analyses conducted for the study. The study analysed a variety of combinations of student data for RC, growth in RC, and SRL, including the use of standardised scores, levels describing stages in developmental progressions, and raw scores. Chapters 4, 5, 6 and 7 present the study’s results as they apply directly to the research questions. Each chapter begins with a research question and includes a discussion of the results described in that chapter. The pragmatic decision to divide the results and discussion into chapters that were focused on each of the research questions makes both the purpose and outcomes of the analysis clear. Using research questions to sign post chapter content for reporting and discussing results lightens the cognitive load on the reader, who is required to distinguish between categories of student data and assessment results in the light of specific research questions. The chapter structure used to report and discuss the results of the study ensures the content is directed towards addressing the
research questions. Therefore, the following chapters refer directly to each of the study’s research questions and there is a ‘Results’ and ‘Discussion’ section for each of the chapters.
Chapter 4: Reading comprehension performance and growth measures

Chapters 1 and 2 argued the importance of understanding RC (RC) levels and growth trends for students in the top quartile (Q4) for RC (i.e. the HC students) compared to other quartiles (Q1, Q2, and Q3). This chapter describes and discusses the results associated with the first research question: ‘What are the differences in reading comprehension gains for Year 5/6 high capacity students compared with class peers?’

The change in reading performance between the start (T1) and end (T2) of a six-month period was used to calculate growth and compare results by Q for RC for students in Year 5/6. Unless otherwise specified, the change score or difference between RC score at T1 and T2 is referred to as ‘growth’ or ‘progress’ or ‘gains’. The ranking of students into Q was described in Chapter 3 as ranking students according to T1 reading scores; in the following section, students are ranked and grouped into quartiles within their class. 12 schools, 39 classes/teachers and 789 students were included in the analysis of RC growth (see Chapter 3 section 3.2 ‘Study participants’ for participant details). It should again be noted that class 4_37 has an anomalous, number of students, due to the fact that 40 students in this school were taught by teacher 37 for the majority of their reading lessons. Therefore, the number of students per quartile per class varies from 2 to 12 where the class with 12 students per Q is the anomalous class 4_37. The process for assigning students to Q was detailed in section 3.12 ‘Preparing and using the data’ in chapter 3.

4.1 Growth trends

The literature review included studies that found students of higher ability are not making gains commensurate with their peers. This finding led to the first research question which is designed to investigate the differences in RC gains for Year 5/6 high capacity students, compared with class peers. Accordingly, the study investigated and described growth trends for Year 5/6 students at each of the quartiles.
4.1.1 Results

The RC data for 786 students were analysed to investigate the patterns for growth for each Q. A correlation between the results of the RC assessment administered at the start of the year (T1) and the RC assessment administered six months later (T2) was explored and found to be statistically significant (p<0.05). The first scatter plot graph in Figure 4.1 plots the data for students with the lowest RC (Q1), the second and third graphs plot the data for students in the middle two Quartiles (Q2 and Q3) and the fourth graph plots the data for the highest performing students in Q4. Each graph includes a line of best fit. The gradient of the lines in the graphs (shown in Figure 4.1) illustrate the change in score between T1 (on the horizontal axis) and T2 (on the vertical axis) for each of the respective quartiles. The flattening of the gradient in the line at Q4 shows that the difference between T1 and T2 scores declines compared to Q1, Q2 and Q3. Less difference between T1 and T2 scores at Q4 signifies less measured growth in Q4 than in the other quartiles. These results replicated the flat lining at Q4 that is referred to in the studies discussed in the literature view, section 2.14 ‘Differences in growth trends in RC and the flat line phenomenon’.

![Figure 4.1: Comparison of T1 and T2 RC per Q](image-url)
Mean growth using scaled RC scores was calculated for each quartile and the mean growth of each quartile was compared. Figure 4.2 shows the mean growth in RC on the vertical axis for each Q (on the horizontal axis). The difference in RC growth between each pair of quartiles is statistically significant with \( p < 0.05 \) except for Q2 and Q3.

A one-way between subjects Analysis of Variance (ANOVA) (Muijs, 2010) was conducted to compare the effect of Q on mean growth. There was a significant effect for Q on mean growth at the established \( p < 0.05 \) level. Post hoc comparisons using the Tukey HSD test indicated that the growth mean for the Q4 (\( \bar{x} = 0.78, SD = 6.84 \)) is significantly lower than for each of the other quartiles: Q3 (\( \bar{x} = 3.81, SD = 6.52 \)), Q2 (\( \bar{x} = 3.94, SD = 6.64 \)) and Q1 (\( \bar{x} = 6.05, SD = 6.84 \)). Growth mean is highest at Q1 and decreases at Q2 and Q3 where there is no significant difference between Q2 and Q3. Another way of looking at this is that Q1 showed 776% greater mean growth than Q4, Q2 showed 505% greater mean growth than Q4, and Q3 showed 488% greater mean growth than Q4.

48% of students in Q4 performed lower in the T2 assessment than in the T1 assessment, indicating that at the very least, they made no progress. Less than half of the remaining students (21%) did not make any progress according to their T1 and T2 assessments; that is for 20% of students in Q3, 24% of students in Q2 and 16% of students in Q1 performance at T2 is lower than at T1. Students were grouped into Q using their T1 RC assessment. However, when students were grouped into Q according to their T2 assessment, 37% of the T1 HC students were no longer HC students; that is, they had been overtaken by other
students and were no longer ranked in the top Q for RC in their class. Not only do students in Q4 make less progress than other students, more students in Q4 make no progress compared to other students.

4.1.2 Discussion

Progress in RC in Year 5/6 reading classes over six months was similar for the middle ability students (Q2 and Q3), but different for the upper (Q4) and lower (Q1) ability students. When compared to the other quartiles, students Q1 had significantly greater mean growth and Q4 had significantly less mean growth. The middle quartiles progressed uniformly while growth for the least able students was accelerated. Conversely, growth for the most able students significantly declined compared to the mean growth in all three other quartiles. It is especially concerning that almost half of the students in Q4 made no progress at all and performed worse in the ARCOTS RC assessment when assessed six months later.

Growth decreased as student ability increased. There are two possible explanations for this decline at Q4: less growth is to be expected as students move up the RC developmental progression and RC becomes more difficult and more sophisticated. The results indicated that the teaching of Q4 students was less effective and the learning needs of HC students were not met, resulting in less RC progress for the HC students.

Student Qs were established using individual class rankings of students regardless of whether they were in Year 5 or Year 6. Therefore, the range of RC levels per Q overlapped because the range of student RC ability in individual classes varied. For example, the Q3 students in one class were in the same RC level as Q4 students in a different class. If less growth is expected at the higher RC level, rather than as a result of within-class ranking, there should be similar growth for students who are at the same RC level regardless of whether they are in Year 6 or Year 5, or in Q3 or Q4. The findings of the analysis conducted when quartiles were separated into year levels is described and discussed in the next section, 4.2 Comparing outcomes by Year Level Quartiles. However, if uniform growth is expected across reading levels, there are implications for educational equity, the significance of which is captured in the Goals set out in the Melbourne Declaration of Educational Goals for Young Australians. As discussed in the literature review, the goals were designed to underpin Australian educational policy and influenced education in schools since 2008 (Barr et al., 2008). The requirements of Goal 1 speak directly to the growth inequity observed in our HC students: Australian schooling
promotes excellence and equity promotes a culture of excellence. Goal 1 specifically states that all schools must:

- promote a culture of learning in all schools, by supporting them [students] to provide challenging and stimulating learning experiences and opportunities that enable all students to explore and build on their gifts and talents
- promote personalised learning that aims to fulfil the diverse capabilities of each young Australian (Barr et al., 2008, p. 2)

There is no differentiation between students or, more specifically, between student ability in comparison to other students. The goals emphasise individual and personal learning for all students per the needs of the student, not the needs of the student in comparison to the needs of other students. If uniform growth is expected across levels of ability, a disparity in growth between Qs points to ineffective teaching of HC students.

**Exploring causes for growth inequity.** Issuing educational policy and resources reflect a focus on closing the achievement gap between lowest achieving students, minimum standards, and higher achieving peers (M. Heritage, 2008; Loveless et al., 2008; Masters, 2014; Timperley & Parr, 2007). HC students have been traditionally viewed as students who require and experience the least attention and low capacity students as needing and receiving the most resources and attention from teachers in the classroom (Loveless et al., 2008). In this context, the focus on equity is primarily about improving outcomes for students performing at the lowest levels of ability, rather than focusing on the progress of all students. This could explain the fact that most growth is achieved at Q1, and the least growth at Q4, regardless of the range and level of ability of students in that quartile.

Similar growth for Q2 and Q3 suggested that instruction and resources (including teacher attention), are targeted toward middle ability students (that is Q2 and Q3) with the focus placed on students who fall below or very much below the middle range observed in the class, so that these students are brought up to the middle. The literature review supported the argument that, while schools may take pride in high stakes testing results, such as the NAPLAN results, reporting students ‘above similar schools’, there is a sense of urgency that student achievement across the school is at least in the range of ‘similar schools’ at the ‘expected’
range for NAPLAN results (Thompson & Harbaugh, 2013). There is a stigma and demand for accountability associated with having too many students below the expected range which impacts public perception of school performance, increasing the stakes related to levels of achievement in deference to growth measured. Reducing the number of students below the ‘expected’ range is a major school focus and teaching is targeted towards the ‘expected’ or middle range for student achievement, rather than for growth (Thompson & Harbaugh, 2013). Consequently, the gap between teaching practices and the zone of proximal development of HC students widens. At Q4, there appears to be a misalignment between the level at which teaching is pitched and student ability, resulting in ineffective teaching and/or scaffolding for learning, resulting in a decline in growth. Vygotsky’s learning theory clearly stated that, whatever the zone of actual development of the student, the learner requires scaffolding at the zone of proximal development to progress to the next level (Vygotsky, 1978a).

Subsequent results from the teacher questionnaires form the content of later chapters but are worth briefly mentioning here. Teachers were questioned about their classroom practices and results showed that, in the best performing classes, that is the classes where growth is not only high at Q4 but is consistent across all four Qs, teachers employed more strategies for targeted teaching and did this more frequently than other teachers did. In these classes, teaching practices reflected a focus on all levels of ability in the class regardless of rank relative to other students in the class.

Having established that a decline in growth occurred at Q4, the study explored other possible reasons for the differences in growth trends. Possible explanations explored for lower mean growth at Q4 include those discussed in the literature review: student Year Level, student competence in SRL, lack of targeting teaching (i.e., teaching and resources not targeted to student zone of proximal development), insufficient teacher content knowledge, and ineffective classroom strategies for teaching higher other thinking skills and/or HC students. Other areas explored were the year level configuration of students in the classroom (i.e., one or two year levels in the one class), and whether the tests used to assess RC were too easy for the students resulting in inaccurate measurement of RC. These possible reasons for the difference in growth at Q4 can be grouped into four distinct areas:

- Class type and Year Level
- Possible ceiling effect because of the tests used in the assessment
• Effective targeted teaching (classroom practices and teacher content knowledge)
• Self-Regulated Learning

These four areas informed analysis of the data for factors associated with the differences in RC growth between Q4 and Q 1, 2 and 3.

4.2 Comparing reading comprehension outcomes by Year Level and Year Level Q4

In the previous section, Year 5 and Year 6 student data were combined because the common class types within and between the schools included classes with students in Year 5 or Year 6 and classes with students in Year 5 and Year 6. In most Victorian schools, students are placed into classes per their age which initially defines their Year Level at the commencement of formal schooling. However, classes may have students from one or more Year Levels. Therefore, it is possible that students are in a class with students of same or different Year Levels. In section 4.4 ‘Class Type’, the study investigates the impact of the combination of student Year Level in any given class on RC outcomes; the effect of Year Level is explored in this section.

The data were separated into Year Level, with two distinct groups for Year 5 and Year 6 students. There were 451 Year 6 and 338 Year 5 students for whom growth was measured. The analyses of the data were used to explore whether growth trends for Year 5/6 students were the same as when students were separated into Year 5 and Year 6.

4.2.1 Results

To compare Q4 students from the different Year Levels, the student sample was first divided into year level and then ranked by T1 RC scores (i.e., in quarters by year as explained in Chapter 3 section 3.12 ‘Preparing the data’). In the participating schools, there were composite (students in more than one Year Level) and straight classes (all students in the same Year Level). Dividing the population into quartiles by year, rather than within class, evenly distributes the number of students across Q1, Q2, Q3, and Q4 for each Year Level. This also highlighted the difference in growth per Q and per year level within and between Year Levels.
As expected, the mean score for RC at the start of the year is lower for Year 5 students than Year 6 students. The results for the T1 RC assessment are shown in Figure 4.3. The mean growth is on the vertical axis and the Year Level is shown on the horizontal axis. The results for RC are slightly lower at T2 than at T1, resulting in negative mean growth for Year 6 students (Year 6 $\bar{x}$= -0.0859), indicating RC performance for Year 6 students flat-lined over the six-month period. This was not the case in Year 5 where students performed better after a six-month period (Year 5 $\bar{x}$= 2.789). Mean growth at Year 6 was significantly lower than for mean growth at Year 5 ($p<0.05$ for Year 5 compared with Year 6).

Ranking students in Q by class resulted in more Year 6 students than Year 5 students in Q4: 14% of the total sample of Year 6 students was in Q4 compared to 9% of the total sample of Year 5 students. Table 4.1 lists the results for mean scores in RC at Q4 by Year Level, (that is, when students are first divided into Year Level and then ranked into quarters for T1 RC scores). It is not surprising that the mean score for RC at T1 for Q4 is higher at Year 6 ($\bar{x}$=60.95) than at Year 5 ($\bar{x}$=57.87). What is surprising is after six months (at T2), the Year 5 Q4 students...
progressed such that they caught up with the Q4 students in Year 6; the Year 6 students not only did not progress as much as the Year 5 students, but a slight decline in performance was measured.

Table 4.1: Year 5 and 6 mean RC assessment results at Q4 by year level

<table>
<thead>
<tr>
<th>Year level</th>
<th>n</th>
<th>Results in Q4 for:</th>
<th>Mean ((\bar{x}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>81</td>
<td>RC at T1 (first assessment)</td>
<td>57.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RC at T2 (second assessment)</td>
<td>60.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Growth (change in RC scores)</td>
<td>2.79</td>
</tr>
<tr>
<td>6</td>
<td>113</td>
<td>RC at T1 (first assessment)</td>
<td>60.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RC at T2 (second assessment)</td>
<td>60.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Growth (change in RC scores)</td>
<td>-0.086</td>
</tr>
</tbody>
</table>

A finer grained analysis of growth means using Q by Year Level was called for to explore within year level performances by Q at each of the Year Levels. The bar graph in Figure 4.4 shows the mean growth (vertical axis) and Q (horizontal axis) for Year 6. At Year 6, growth measured for Q4 was significantly less than for each of the other quartiles. The graph shows no significant difference between Q1, Q2, and Q3 at Year 6 but there was a difference between Q4 and Q1, Q2, and Q3. The bar graph in Figure 4.5 shows the mean growth (vertical axis) and Q (horizontal axis) at Year 5. There is no significant difference between Qs in Year 5.
Figure 4.4: Growth measured in Quarters at Year 6

Figure 4.5: Growth measured in Quarters at Year 5
A one-way between subjects ANOVA was conducted to compare the effect of Q on mean growth by Year Level. At Year 6, there was a significant effect of Q on mean growth score at Q4 \( F(3, 447) = 12.573, p<0.05 \), supporting the finding that mean growth in Year 6 at Q4 differs from that of each of the other Qs. In contrast, although at Year 5 the mean scores at Q3 and 4 are lower than at Q1 and 2 (Figure 4.5), the one-way between subjects ANOVA comparing the effect of Q by Year Level on mean growth revealed that these differences were not statistically significant. Growth patterns per Q at Year 6 were different to those at Year 5 \( F(3, 334) = 3.727, p<0.05 \) and the flat line at Q4 found at Year 6 was not found at Year 5, when Q are calculated for Year 5 and Year 6 students separately.

Year 5 Q4 students achieved almost three times more growth (mean scaled WLE = 2.79) than their Year 6 counterparts did (mean scaled WLE = -0.09). The explanation for this may lie in the nature and complexity of the skills and content in the Progression for Reading Development (PRD) assumed in the ARCOTS RC used to measure student performance (refer to: ‘The ARCOTS RC assessment tool’ section in Chapter 4 for details about the RC tests and PRD). The range and content of levels measured in the T1 assessments were analysed.

**Range of RC levels:** The results for the T1 assessments for range and number of students in each RC level for the ARCOTS Progression for RC are shown in Table 4.2. In Q4, the range of levels for Year 5 was G to K (with only one student in each of the highest and lowest levels, respectively). In Year 5, only 6% of the students in Q4 were in either of the two highest levels (J or K) compared to 28% of Year 6 Q4 students. At the start of the year, there were more than double Year 6 students at Level I and almost seven times more Year 6 students at Level J compared with Year 5 students at these levels.
Table 4.2: Number of students in and range of RC levels at T1 – Q4 by Year level

<table>
<thead>
<tr>
<th>RC Level</th>
<th>Year 5</th>
<th>% of Year 5</th>
<th>Year 6</th>
<th>% of Year 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>1</td>
<td>1.2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>H</td>
<td>40</td>
<td>49.4</td>
<td>16</td>
<td>14.2</td>
</tr>
<tr>
<td>I</td>
<td>35</td>
<td>43.2</td>
<td>65</td>
<td>57.5</td>
</tr>
<tr>
<td>J</td>
<td>4</td>
<td>4.9</td>
<td>27</td>
<td>23.9</td>
</tr>
<tr>
<td>K</td>
<td>1</td>
<td>1.2</td>
<td>5</td>
<td>4.4</td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>100.0</td>
<td>113</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The development of RC and the differences between levels for the H-K range is shown in Figure 4.6. The skills in Levels J and K are becoming more abstract and require the reader to ‘imagine’ and use understanding of different perspectives to reflect on and evaluate the implicit meaning of the text; students are required to evaluate the text for inconsistencies and anomalies that can be used to formulate a deeper understanding that includes empathy with the subject and content of the text as well as the author’s intention and the purpose of the text. Examples of these skills are highlighted in Figure 4.6. It is in these higher levels that students develop the skills to respond to the text in a sophisticated manner that goes beyond decoding the grammatical and syntactical elements of the text that are the focus of the lower levels. There were more Year 6 students with a ZPD at the higher RC levels that included the development of more sophisticated RC skills than there were Year 5 students.
## Difficulty increases as level increases

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Focus on indeterminate meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Students are able to combine knowledge of writing conventions with general knowledge to draw probable inferences when no conclusive evidence is provided in a text. They can identify unsubstantiated claims or arguments that are masked by rhetorical devices. They can postulate likely explanations of character behaviour when motivations are not explicitly stated. They demonstrate understanding of the difference between empirical evidence and theory, supposition or anecdote. They can follow complex arguments or detailed instructions while accommodating ambiguity and incompleteness. They draw on personal experience and imagination in their interpretation of texts by taking different perspectives to achieve understanding. They can understand unusual, nuanced or creative language in fiction, and technical terminology or jargon in non-fiction. They are able to imagine and speculate about underlying reasons for choices of subject matter and style that may be problematic or indeterminate.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Focus on distinguishing the conventional and the unconventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>Students demonstrate an awareness of social and narrative conventions and a capacity to accommodate the unexpected or unconventional, both in form and in content. They are able to comprehend perspectives, experiences and uses of language that do not conform to predictable patterns. They can offer reasons for the use of different writing styles. They can connect parts of speech not presented in the usual order, analyse detailed text to discover embedded rules or patterns, and identify inconsistencies. They demonstrate understanding of the conventions of rational argument and the social norms of conversation as presented in dialogue. They can engage with imaginative writing that departs from conventional narrative to explore the fantastic and the irrational. They can identify an author’s attitudes or beliefs and gain understanding of a character’s viewpoint from a range of authorial choices (e.g. writing style, setting of scene, vocabulary).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Focus on author’s purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Students can infer an author’s intention from what is explicit in a text. They can identify the most likely character or plot developments and the most likely explanations of behaviour or events. They understand how structure influences interpretation and can analyse how authors use text structures and language features to achieve a purpose. They can gain meaning from complex clauses and use their understanding of phrases and clauses in a text to analyse their relevance. They understand how a word’s meaning changes when it is used in different contexts. They can combine indirectly stated information and writing style to draw conclusions about the roles of characters and events in a narrative.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Focus on evidence for alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Students combine overall understanding with an attention to detail that enables them to focus on subtleties and consider alternative implications of words and texts. They can identify words and phrases that support different sides of an argument and make use of formal definitions and technical language to consider alternative meanings. They are able to hold in mind detailed information from different parts of a text while weighing up evidence. They can identify different levels of meaning in a text.</td>
</tr>
</tbody>
</table>

---

**Figure 4.6: Range of levels in Q4 for Year 5 and Year 6 (T1)**

**Student engagement with the tests:** The total time taken to complete the RC test was used as a measure of student engagement with the tests. Analysis of the time taken to complete the ARCTS RC tests found that there was no significant difference between students in Year 5 and those in Year 6. This suggested that students in Year 5 and those in Year 6 were similarly engaged with the tests and that the results were not affected by diverse student behaviour in taking the tests. Further evidence that the tests were similarly engaged with and completed by the students across both year levels was found and reported in section 4.6. **Test contribution to growth differences.**
4.2.2 Discussion

The RC results observed at Q4 in Year 6 are concerning. Given that the literature review found that reading expectations of students as they move from learning to read to reading to learn begins at Year 4, the effects of a less than smooth transition in reading instruction (from learning to read to reading to learn (J. S. Chall, 1983)) may be more prominent at Year 6. Transition between primary and more complex and sophisticated secondary reading curriculum is occurring more often at more sophisticated levels and having a greater impact on higher ability students. In Year 5 there were fewer students at the higher reading levels than were observed in Year 6 where over a quarter of students were in the top two levels. A more detailed investigation of class RC curriculum content and scope relative to student RC performance levels was not a focus of the study and therefore remains largely speculation. Curriculum content details in upper primary classrooms should be considered for future research. However, the study did find a difference in the spread of students across the reading levels which may shed light on the differences in growth trends between Year 5 and Year 6 for Q4. Possible explanations for the differences between Year 5 and Year 6 Q4 growth trends and for the decline in growth at Year 6 include teacher content knowledge or teaching practices for higher levels of RC.

The difference in RC progress between Year 5 and Year 6 Q4 students may be attributed, in part, to Primary School teachers having limited expertise in teaching the complex, abstract, and sophisticated skills in the higher RC levels. Insufficient content knowledge about RC contribute to a teaching and learning ceiling effect caused by not extending the curriculum beyond what is perceived as content for Primary School classes due to lack of teacher knowledge about what is perceived as Secondary content.

Not only is a high level of content knowledge required of the teacher to support students in the upper reading levels, teacher RC skills and knowledge is expected to be higher than that of their students. Teacher RC content knowledge can be seen as one requirement for scaffolding student learning at the higher RC levels, and for finding resources to provide students with opportunity to learn, and for scaffolding learning at the student’s ZPD (Heritage, 2010). In a teacher-centered classroom, the HC students in the study may have been limited by the content knowledge of their teacher which in turn could have limited their opportunity to learn and the scope for growth. Teacher content knowledge is explored in the subsequent
analysis of teacher and student RC assessment data that compared teacher and student RC performance. These findings (see also section 4.3 Teacher content knowledge) indicated that level of teacher content knowledge impacts on the progress of students with the highest RC results.

As expected, the mean score for RC at the start of the school year for Q4 students was higher at Year 6 than at Year 5. However, after a teaching period of six months, Year 5 students caught up to the Year 6 students, highlighting the difference in progress between the two groups of students. Further, there was no decline in growth observed at Year 5, suggesting that in general, all Year 5 students were progressing at a similar rate regardless of their RC ability. Given that there were more Year 6 students at the highest two reading levels in the T1 assessment, the difficulty of the content and the targeting of teaching to student levels and needs may explain the difference in growth trends. This includes ineffective scaffolding for student learning. The difference in growth between Year 5 and Year 6 may be due to differences in classroom practices such as in the use of assessment or in providing non-teacher centered resources for giving HC students access to higher ability peers or adults (e.g., by networking with other schools/classes or bringing in experts).

As progress continues higher up the progression for RC development, reading skills become more sophisticated and there is a shift in learning focus from the functional elements of reading, to the higher-order, more nuanced and sophisticated application of RC skills. The difference in growth trends between Year 6 and Year 5 students for Q4 may be explained by the shift in teaching and learning required at the higher levels of RC in the Progression for Reading Development. A shift in focus and purpose for RC and the RC skills required to accommodate more sophisticated learning necessitates a shift in how these skills are taught in the classroom and an understanding of the skills beyond those already acquired by the students.

The comparison of teacher and student assessment results was used to explore the links between student RC growth outcomes and teacher RC assessment results. The teachers’ RC assessment results were used as a measure of teacher content knowledge.
4.3 Teacher content knowledge (TCK)

Not surprisingly, the effect of teachers on student learning and achievement features in the categories included on Hattie’s list of influences and effect sizes related to student achievement (Hattie, 2012; Killian, 2017). The various ways in which the teacher impacts teaching and learning in the classroom were discussed in the literature review where Teacher Content Knowledge (TCK) was viewed as a contributing factor (section 2.1). Teacher results for the T1 ARCOTS RC assessments describe the level of TCK. This section investigates the relationship between TCK and HC students’ growth outcomes in RC. Through analysis of inter Q4 growth trends, the section further explores the contention that some students outperform their teachers in the RC assessment and this impacts student RC growth outcomes for these students differently to other students. There was no differentiation for student Year Level in this type of analysis; ranking of Qs was by class as described in Chapter 3 section 3.12, ‘Preparing and using the data’, because the impact under investigation is that of the teacher on the students in his/her class.

4.3.1 Results

Teachers completed the Aqua ARCOTS RC test (refer to section 3.8 Comparing teacher and RC). Teachers have greater experience and accumulated knowledge than Year 5/6 students which no doubt gives teachers an advantage for at least some of the items in the Aqua test. Therefore, some items advantage teachers over students at this age. This factor must be noted when exploring whether there are students who outperformed their teacher. Given a more even playing field, where students and teacher life experiences and exposure to texts are more evenly matched, there may be more students who outperform their teacher than are detected using the ARCOTS assessment.

Assessing student and Teacher RC: Students who completed each of the coloured tests at T1 and T2 are shown in Table 4.3. There were three students who completed the top two (Blue and Purple) tests at T1 (column 4); however, for unknown reasons, these students completed the Aqua test at T2.

The range of difficulty of the items in the test, as described in the levels in the Progression for Reading Development (Appendix C), is shown in column 3 of Table 4.3. For example, the Lime
test includes items that on average suit most students in Year 5/6 and covers levels F to K on the ARCOTS Progression for Reading Development.

Table 4.3: Student Test Completion Rates (n = 789)

<table>
<thead>
<tr>
<th>Order of test difficulty</th>
<th>Test completed T1</th>
<th>range of levels covered</th>
<th>number of students for T1 test</th>
<th>Test completed at end of year</th>
<th>number of students for T2 test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Purple</td>
<td>J-M</td>
<td>1</td>
<td>Purple</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>I-M</td>
<td>2</td>
<td>Blue</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Aqua</td>
<td>H-M</td>
<td>9</td>
<td>Aqua</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>G-L</td>
<td>91</td>
<td>Green</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>Lime</td>
<td>F-K</td>
<td>408</td>
<td>Lime</td>
<td>355</td>
</tr>
<tr>
<td></td>
<td>Yellow</td>
<td>E-J</td>
<td>137</td>
<td>Yellow</td>
<td>136</td>
</tr>
<tr>
<td>Lowest</td>
<td>Orange</td>
<td>D-I</td>
<td>96</td>
<td>Orange</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>C-H</td>
<td>45</td>
<td>Red</td>
<td>53</td>
</tr>
</tbody>
</table>

Students in Q4 who completed each of the tests are shown in Table 4.4. As expected, a higher percentage of Q4 students completed the Aqua, Green, or Lime test than in any other Q. At T1 and T2, 79% and 80% of Q4 students respectively completed an Aqua, Green, or Lime test (circled in Table 4.4.); the difficulty levels for these tests are H-M, G-L and F-K respectively. The data confirm that there was overlap between skills assessed for Q4 students in the tests completed by these students and those tested in the Aqua test competed by the teachers.

Table 4.4: Student Test Completion Rates for Q4

<table>
<thead>
<tr>
<th>Order of test difficulty</th>
<th>Test completed T1</th>
<th>range of levels covered</th>
<th>number of students for T1 test</th>
<th>Test completed at end of year</th>
<th>number of students for T2 test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest</td>
<td>Purple</td>
<td>J-M</td>
<td>0</td>
<td>Purple</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>I-M</td>
<td>1</td>
<td>Blue</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Aqua</td>
<td>H-M</td>
<td>5</td>
<td>Aqua</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>G-L</td>
<td>48</td>
<td>Green</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Lime</td>
<td>F-K</td>
<td>108</td>
<td>Lime</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>Yellow</td>
<td>E-J</td>
<td>20</td>
<td>Yellow</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Orange</td>
<td>D-I</td>
<td>11</td>
<td>Orange</td>
<td>18</td>
</tr>
<tr>
<td>Lowest</td>
<td>Red</td>
<td>C-H</td>
<td>2</td>
<td>Red</td>
<td>0</td>
</tr>
</tbody>
</table>
Comparing teacher and student RC content knowledge. It was important to determine if the assessment used covered the ability range of the teachers assessed. The raw scores were analysed to ensure that the ability of the teachers did not exceed the difficulty of the assessments. The total RC raw score results for any teacher did not exceed 35 from a possible 40 items, indicating that no teacher correctly completed all items in the test used. This indicates that there was no ceiling effect when measuring RC ability when using the ARCOTS test. At T1, 20 teachers completed the Aqua RC test, resulting in 423 students to which teacher RC score could be compared. There were 29 students with equal or greater RC performance than their teacher at T1. These 29 students were distributed across 10 classes; therefore 26% of the classes in the study had students who outperformed their teacher in the ARCOTS RC assessment at T1. In Figure 4.7 (a) the histogram including the distribution curve for student T1 RC data is overlaid with that of the teacher’s RC data. The Y-axis shows the density of teachers and students in percentages and the x-axis shows the standardised ARCOTS RC scores. The area shaded in the darkest purple highlights the overlap between teacher and student RC results.

The RC results for students in the overlap in Figure 4.7 (a) are compared to the RC data six months later. At T2, 48 students outperformed their teacher and these students were distributed across 15 classes; 38% of classes had at least one student who performed better than the teacher did. In Figure 4.7 (b), the histogram and distribution curve for student T2 RC data is overlaid with that of the teachers’ RC data. The Y-axis shows the density of teachers and students in percentages and the x-axis shows the standardised ARCOTS RC scores. The area shaded in the darkest purple highlights the overlap between teacher and student RC results. The overlapping and darkest shaded area in Figure 4.7 (b) is larger than the overlapping area in Figure 4.7 (a), which shows that more students were outperforming their teacher after six months (at T2). It would be expected that even more students outperform the teacher after an additional three months or at the end of the year (T3); however, students were only assessed at T1 and T2 and this could not be confirmed. The study was able to explore the differences in the RC growth for students in the overlap observed Figure 4.7 (a) and for students in the overlap in Figure 4.7 (b).
Figure 4.7: Teacher and student RC scores at T1 and T2
Teacher performance in the RC assessment was compared with RC growth of students whose RC score at T2 was higher than that of their teacher (the students in the darkest shaded area in Figure 4.7 (b)). This sample is referred to as ‘students who outperformed their teacher’. The scatterplot in Figure 4.8 shows a correlation ($r = 0.56$) between the RC growth of students who outperformed their teacher at T2 (on the vertical axis) and the RC result for their teacher (on the horizontal axis). Growth outcomes for students who outperformed their teacher at T2 increased as teacher results increased. In addition to this correlation, analysis of the data using Pearson’s $r$ correlation coefficient confirmed a significant relationship between teacher RC score and student RC growth in this sample ($p < 0.05$). No statistically significant relationship was found between RC growth outcomes of students who did not outperform their teacher (the students in the pale pink shaded area in Figure 4.7 (b)) and the RC performance of their teacher.

$n = 48$ students; $n = 15$ teachers

Figure 4.8: Teacher RC and student RC growth - students who outperformed their teacher at T2
The mean growth for students who outperformed their teacher at T1 (the students in the darkest shaded area in Figure 4.7 (a)) was compared to the mean growth of students who did not outperform the teacher at T1 (the students in the pale pink shaded area in Figure 4.7 (a)) and the results are shown in the bar graph in Figure 4.9. The mean growth scores are shown in the vertical axis. The right bar represents the group of students who outperformed their teacher and the left bar represents the group of students who did not outperform their teacher at T1. The mean growth of Q4 students who outperform their teacher was significantly less ($p<0.05$) than that of students who did not outperform their teacher (the bar on the left in the graph in Figure 4.9).

\[ *p<0.05 \text{ for Students who did not outperform the teacher} \]

*Figure 4.9: Mean growth scores of Q4 students who did and did not outperform the teacher at T1*

The difference in growth between Q4 students who outperformed their teacher and Q4 students who do not outperform their teacher suggests that Q4 students with greater content knowledge than their teacher made less progress than Q4 students who did not outperform their teacher.
ARCOTS RC levels: students and teacher. The differences between the growth trends of Q4 students who outperform their teacher and those who do not can be understood in terms of levels of reading skills and knowledge. The importance of these differences and implications for HC students can be found by analysing the content of the levels in the ARCOTS Progression for Reading Development (for a description of the ARCOTS reading progression refer to Chapter 3, section 3.7 ‘The ARCOTS RC assessment tool’). The data from the teacher RC assessment indicated that 40% of the teachers were at Level J and 60% at Level K. Reading levels for students in Q4 ranged from H to K with 17% of Year 5/6 Q4 students in Level J or K. A possible explanation for the decline in mean growth at Q4 could be related to teachers lacking the required content knowledge or expertise to scaffold learning for students with abilities in the higher reading levels. The study found 40% of teachers performed at level J and 28% of Year 6 Q4 students performed at or above that level at T1; 60% of teachers assessed performed at level K, which is the same level as the 6 highest performing students. At Year 6, teachers performed at only one reading level above the reading level of 58% of Q4 students.

4.3.2 Discussion

To the best of the author’s knowledge this is the first study to look at the impact of teacher content knowledge relative to student content knowledge on student RC growth outcomes. The findings comparing teacher and student content knowledge and student RC outcomes are original findings that are important for exploring reasons for the decline in RC growth observed in Q4 students. The findings challenge widely held assumptions and expectations about teacher expertise and the role of the teacher, as were discussed in the literature review (See especially Chapter 2 sections 2.1 and 2.5).

It is generally assumed that the teacher has at least the RC content knowledge required to target teaching at every level of ZPD in the classroom. It is certainly a widely held assumption that teachers outperform students in RC at primary school. In Teacher knowledge and expertise about RC in section 2.1 in the Chapter 2 literature review, it is argued that although at the primary school level it is assumed that the teacher has a higher level of RC ability than the students in their class, this is not always the case; the study found evidence to support this argument. However, review of the literature found less certainty about the impact of TCK
(including knowledge about language and reading) on student outcomes, with conflicting findings reported between studies (Garet et al., 2008; Love et al., 2015; Metzler & Woessmann, 2012). The analysis of the data in this study found evidence to support the argument that lower TCK relative to student content knowledge significantly impacts student RC growth rate of progress when students in Q4 outperformed their teacher.

The ARCOTS assessment was used to assess teachers for the skills and knowledge included on the J/K level descriptions (Figure 4.10). The levels in the PRD describe a progression of skills from level to level. Complexity, sophistication, and nuanced synthesis and application of knowledge increases as the difficulty of the levels increase; each level underpins the next. When teaching students at their ZPD, teachers include foreshadowing learning at higher levels. This is not likely if teachers do not have the skills and knowledge inherent in those higher levels. An example is highlighted in Figure 4.10, where the progression of skills in Levels H to L is described. The levels shown are H to K, which is the range of levels for students in Q4, plus the next highest Level, Level L. The developmental progression of related skills is highlighted as an example in Figure 4.10. This example shows how skills and knowledge build over levels and the importance of teacher knowledge of the subsequent levels and the order of development. Development of one set of skills to those in the next stage of development supports the assertion that teaching for development along the progression implies, if not necessitates, a RC level of the teacher at least higher to that of their student; this includes that there be sufficient knowledge of the relevant skill development in levels beyond the level identified as the ZPD of the student. Low TCK has been associated with ineffective targeting of teaching which manifests in decreased RC gains in HC students (Metzler & Woessmann, 2012). However, in addition to TCK, there are other teacher related factors that impact student outcomes.
ADDRESSING GROWTH IN READING COMPREHENSION FOR HIGH CAPACITY STUDENTS

Difficulty increases as level increases

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Focus on critical review</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Students can identify an untrustworthy or unreliable narrator, understand an author’s purpose in presenting conflicting information to the reader, and detect false statements or misleading reasoning. When reading persuasive or argumentative text they can distinguish necessary from sufficient conditions and are able to follow logical arguments and identify the absence of a sound basis for a conclusion. They can evaluate the relevance of information in a text to determine the strength of a main message or hypothesis. They can analyse and synthesise information from a range of different texts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Focus on indeterminate meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Students are able to combine knowledge of writing conventions with general knowledge to draw probable inferences when no conclusive evidence is provided in a text. They can identify unsubstantiated claims or arguments that are masked by rhetorical devices. They can postulate likely explanations of character behaviour when motivations are not explicitly stated. They demonstrate understanding of the difference between empirical evidence and theory, supposition or anecdote. They can follow complex arguments or detailed instructions while accommodating ambiguity and incompleteness. They draw on personal experience and imagination in their interpretation of texts by taking different perspectives to achieve understanding. They can understand unusual, nuanced or creative language in fiction, and technical terminology or jargon in non-fiction. They are able to imagine and speculate about underlying reasons for choices of subject matter and style that may be problematic or indeterminate.</td>
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</tbody>
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<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Focus on distinguishing the conventional and the unconventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>Students demonstrate an awareness of social and narrative conventions and a capacity to accommodate the unexpected or unconventional, both in form and in content. They are able to comprehend perspectives, experiences and uses of language that do not conform to predictable patterns. They can offer reasons for the use of different writing styles. They can connect parts of speech not presented in the usual order, analyse detailed text to discover embedded rules or patterns, and identify inconsistencies. They demonstrate understanding of the conventions of rational argument and the social norms of conversation as presented in dialogue. They can engage with imaginative writing that departs from conventional narrative to explore the fantastic and the irrational. They can identify an author’s attitudes or beliefs and gain understanding of a character’s viewpoint from a range of authorial choices (e.g. writing style, setting of scene, vocabulary).</td>
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<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Focus on author’s purpose</th>
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<tbody>
<tr>
<td>I</td>
<td>Students can infer an author’s intention from what is explicit in a text. They can identify the most likely character or plot developments and the most likely explanations of behaviour or events. They understand how structure influences interpretation and can analyse how authors use text structures and language features to achieve a purpose. They can gain meaning from complex clauses and use their understanding of phrases and clauses in a text to analyse their relevance. They understand how a word’s meaning changes when it is used in different contexts. They can combine indirectly stated information and writing style to draw conclusions about the roles of characters and events in a narrative.</td>
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<th>LEVEL</th>
<th>Focus on evidence for alternatives</th>
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<tbody>
<tr>
<td>H</td>
<td>Students combine overall understanding with an attention to detail that enables them to focus on subtleties and consider alternative implications of words and texts. They can identify words and phrases that support different sides of an argument and make use of formal definitions and technical language to consider alternative meanings. They are able to hold in mind detailed information from different parts of a text while weighing up evidence. They can identify different levels of meaning in a text.</td>
</tr>
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There may be a misalignment of teaching, student ZPD, and learning progression content at and beyond level I that is impacting the progress made by HC students in the higher RC levels. Developing RC skills requires building on prior knowledge and developing skills that support and often anticipate the next level of skills. Therefore, teaching RC assumes knowledge and understanding of the RC learning progression and the levels beyond those of the student ZPD.
(Tomlinson, 2005). The data for teacher RC found teachers performed at or below the level at which their Q4 students performed. Teacher reading performance and knowledge about the higher reading levels may be limiting student access to the necessary scaffolding for progress to levels beyond their ZPD.

It may not be the Year Level or even the student rank order per se, but the actual reading level of the student that is impacting student RC growth outcomes. There appeared to be critical points in the RC developmental progression that teachers found difficult to navigate; and at which student progress slowed. Participant numbers were too low to confirm statistical significance, but findings did point to a decline in progress as RC difficulty increased. Whether due to TCK or the specific difficulties and rate of progress associated with learning more complex and sophisticated RC skills, this important area requires further research in future studies.

The implications of not teaching the more advanced RC skills required at the higher levels in the reading progression are proving to be critical for HC students. The intended and implemented curriculum divide (Van den Akker, 2004; G. Willis & Marsh, 2003) between Primary School and Secondary School may also be contributing to the lack of targeted teaching. Primary and Secondary teachers generally undergo their graduate or postgraduate qualifications separately; although in some tertiary institutions, there may be a few classes that overlap. Some teachers at Year 5/6 may not have the content or pedagogical knowledge required to teach higher up the progression where students have reached curriculum traditionally considered to be in the Secondary domain and for which Primary teachers have not been trained. The fact that the decline in student gains in Q4 is specifically found at Year 6 implies that the overall decreasing progress of academic results observed at Year 7 and 8 is not only as a result of student transition from Year 6 to Year 7 (Hopwood, Hay, & Dyment; Towns, 2017), at which time most students change schools and are well into puberty. These findings indicate that the problem precedes transition and is significant for HC students at Year 6. The issue may be related to student access to curriculum content and lack of targeted teaching. It would be interesting to compare results for students who need to move to different schools to continue into secondary education, and those who did not because they attended schools that accommodated primary and secondary levels. There were two schools
in the study in which this was the case, but the within school data for growth for the classes in these schools were too disparate to make a meaningful comparison.

TCK, how teachers use that knowledge, and how they apply pedagogical strategies for reading have measurable impact on student outcomes (Hattie, 2012; Metzler & Woessmann, 2012; Rivkin, Hanushek, & Kain, 2005; Wayne & Youngs, 2003). Results in this study that compare teacher and student performance in the given RC assessment agree with Metzler and Woessmann’s findings that teacher subject knowledge has an observable effect on student achievement (Metzler & Woessmann, 2012). The comparison between teacher and student content knowledge undertaken in the study marks an original approach in understanding the implications and effects of TCK on teaching RC. The importance of teacher knowledge about the content they are teaching is especially shown as a significant factor for the continuing development of RC for our high capacity students who have reached levels of performance similar to or greater than the RC level of their teacher.

The findings emphasise the need to monitor TCK and provide professional learning support for teachers with low content knowledge so that they have the RC expertise to plan for and support the range of abilities in the classroom. This includes encouraging school networks, supporting staff mentoring, and collaboration where teachers can share resources and knowledge and build on content knowledge and expertise in teaching HC students at higher RC levels. However, TCK is not the only resource for supporting student learning.

The literature review contends that scaffolding students at their ZPD and providing opportunity to learn does not rely solely on TCK (section 2.3 Targeted teaching: opportunity to learn and academic growth). Other resources and strategies for scaffolding HC students’ learning include teacher pedagogical knowledge, targeted teaching, using assessment, and planning to explicitly target the ability and learning needs of HC students. The student’s ability to monitor and regulate learning strategies (i.e., their ability to self-regulate learning) is also an important factor.

It is important to recognise that the number of participants at this level of analysis imposes limits on the parametric analysis that can be reliably applied to the data. It is recommended that further studies with greater numbers of teachers and students be undertaken to confirm these tentative findings for students who outperform their teacher. In addition, the data provide limited insight into the relationship between teacher pedagogical knowledge and
student growth and the relationships between teacher pedagogical and/or content knowledge relative to levels of RC. Other non-content specific considerations include the relationship between teacher and student and how RC is developed in other school contexts, for example in other subject areas.

In some Victorian schools, students are taught RC by multiple teachers in multiple contexts/lessons that are not specifically designed as reading lessons. Investigation of the impact of these variables is important but beyond the scope of this study and therefore recommended for further research. The findings emphasise the importance of targeted teaching and the ability of teachers to target teaching strategies for RC toward the ZPD of their students. They also emphasise the importance of communication and collaboration between teachers, including across Primary and Secondary schools, and a shared understanding of the RC construct and stages of development that not only straddle the Primary-Secondary divide, but that define the current and future ZPD of especially HC Year 5/6 students.

**Reading assessment and the Progression for Reading Development (PRD).** The ARCOTS Reading tests are designed for students up to Year 10 in the Victorian education system. Although the results found that the calibrated tests were suitable in the assessment of RC for students and teachers, they were not designed for and do not consider a teacher audience. Teachers have the greater reading experience and prior knowledge compared with students who are between the ages of approximately of 10 to 12 years. It can be argued, therefore, that the teacher had an advantage and it is expected that they do much better than their students. In this context, the results of the teacher assessments can be viewed as even more disconcerting as the clear gap expected between teacher achievement and student achievement was not realised. As mentioned previously, teachers did not perform as well as anticipated; suggesting that teacher professional development in RC content is an urgent issue, as is the monitoring of comprehension skills and content knowledge in individual teachers.

Schools need to consider many factors in addition to student ability and teacher expertise when planning classes. These factors include student individual needs and the logistics involved when dealing with limited resources related to specific numbers of students and staff, and the context and organizational requirements in any given school. The learning philosophies and number of students and teachers at any given school impacts the allocation
of students into classes on a practical level. Participating classes included classes in which there were only Year 5 or only Year 6 students (referred to as one Year Level classes) as well as classes in which there were both Year 5 and Year 6 students, and classes with both Year 4 and Year 5 students (referred to as composite classes, or classes with two Year Levels). Having identified differences in growth outcomes directly related to Year level and TCK, the study explored links between Class Type (classes with one or two Year Levels) and growth trends for groups of Year 5/6, Year 5, and Year 6 students.

4.4 Class type

In the study, class composition regarding the Year Level of students differs between classes; this is referred to as Class Type. The study explored whether Class Type had an impact on growth for HC students in Year 5 and Year 6.

4.4.1 Results

The Class Types in which Year 5 and 6 students are placed for RC lessons in this study were:

- Type 1 - Year 5 student in a classroom with Year 4/5 students
- Type 2 - Year 5 student in a classroom with Year 5 students only
- Type 3 - Year 5 student in a classroom with Year 5/6 students
- Type 4 - Year 6 student in a classroom with Year 5/6 students
- Type 5 - Year 6 student in a classroom with Year 6 students only

The results for Type 1 class were disregarded as there were insufficient students (n=12) in the Type 1 class to perform reliable analysis.

The bar graph in Figure 4.11 illustrates mean growth (vertical axis) for each class type (horizontal axis). No statistically significant difference for growth between Class Types was found ($p>0.05$). Similarly, no statistically significant differences were observed when comparing class type and growth per Q separately at Year 5 and then Year 6. The bars in Figure 4.12 represent the mean growth for Year 5 and Year 6 students separately, for each Class Type (listed on the horizontal axis) and then for each Q (listed on the right vertical axis).
The results were confirmed using one-way between subjects ANOVA analysis to compare the effect of class type on mean growth scores for each of the year levels. At $p > 0.05$ there was no significant difference between growth results and Class Type [$F(619, 169) = 0.747, p<0.05$].

$n$ students in Class Type 2 = 181; $n$ students in Class Type 3 = 145
$n$ students in Class Type 4 = 168; $n$ students in Class Type 5 = 283

Figure 4.11: Growth Means and Class Type (Year 5/6)

Figure 4.12: Mean RC Growth and Class Type at Year 5 and Year 6 for Q4 by Year Level
4.4.2 Discussion

In the study, Class Type (one or two Year levels in a class) did not impact student growth, suggesting that the configuration or number of students of different or same Year levels in the one class had no significant effect on RC growth outcomes at Q1, Q2, Q3, or Q4. This has implications at school level for the organisation of classes and related policies. It implies that students can be evenly distributed between classes or that classes can be ability grouped across Year 5/6 to reduce the range of abilities in any one class.

Having looked at the RC growth differences between Q’s, Year Levels, teacher RC content knowledge relative to student RC content knowledge, and Class Type, the study extended the research to school and class membership.

4.5 School and class membership

Individual schools have individual cultures, policies, and philosophies for learning as well as different styles of leadership administered by different Principals and school leaders who are responsible for instructional leadership and for defining teaching and learning in their school. While it was not within the scope of the study to analyse all school variables, the study did explore the level of socio-educational advantage between schools, as a measure for determining whether the school a student attended explained the difference in growth at Q4.

If there was a link between the school attended and growth trends, there should have been some consistency between classes from the same school and perhaps differences between schools with different levels of socio-educational advantage.

4.5.1 Results

**Comparing school results.** The Index of Community Socio-Educational Advantage (ICSEA) values for schools participating in the study were described in 3.2 ‘Study participants’. These values were used to differentiate between schools based on socio-educational advantage. Figure 4.13 shows the mean growth measured per school (left vertical axis) and the ICSEA value for that school (right vertical axis). Exploring the data at the school level revealed that 11 of the 12 participating schools were generally homogenous for mean growth scores, with one outlier school (school 3) with significantly lower mean growth compared with four of the
other schools ($p < 0.05$ for School 3 and each of School 5, 6, 10 and 11). The ICSEA value for the outlier school (School 3) does not explain this anomaly as school 3 is ranked fifth in order of lowest to highest for ICSEA for schools in the study. All schools were ‘close to’ or ‘above’, similar schools for community socio-educational advantage which suggests that growth is not associated with School in this study.

**Figure 4.13**: Growth Means, school and ICSEA values

There were differences within and between schools for mean growth for classes at all Quartiles. Although in some classes, mean score for growth at Q4 was lower compared to scores for other Quartiles, there are classes in which growth at Q4 is like the rest of the class. For example, Figure 4.14 shows mean growth (vertical axis) per Q (horizontal axis) for classes in School 4. In class 4_26 (Figure 4.14 (a)), there is no significant difference for growth between Qs; however, in class 4_37 (Figure 4.14 (b)) growth at Q4 is significantly lower compared to Q1 and Q2 (circled in Figure 4.14 (b)).
When the data were analysed at the class level, there were classes in which the number of students per Q was too small for reliable parametric analysis. Therefore, to be able to compare Qs by growth across all classes the data were viewed as ordinal. Relative ranking and non-parametric analysis were applied to conduct a finer grained analysis of outcomes and associated classroom practices. The focus of this study was HC (Q4) students; therefore, it was necessary to determine in which classes theses students performed better than others did so that the relevant variables could be compared.

Classes were ranked in order of mean growth at Q4 and then mean class growth; where 39 is the lowest rank for Q4 mean score and 1 the highest. Significant difference between quartiles is indicated in Figure 4.15 (explained in more detail below) where * = \( p < 0.05 \). While variation is observed between quartiles for all classes, parametric significance is observed in 7 of the 39 classes.

The graph in Figure 4.15 shows the within class, mean RC growth per Q per class and compares the results between classes. Mean growth is measured on the vertical axis and class on the horizontal axis. In addition, each class is divided into Quartiles and bar colour represents the same Q in each class: red = Q1, yellow = Q2, blue = Q3 and black = Q4. Classes are ranked lowest to highest (left to right) per Q4 mean growth. Accordingly, the high-performing (HP)
classes are identified and circled in Figure 4.15. The selection criteria for identifying the HP classes were:

• mean growth score in Q4 is ranked in the top 6 of all 39 classes for which growth scores are available in this study

When the top six classes were identified, they were found to have other properties in common:

• there is no significant difference between quartiles for mean growth scores
• RC gain is greater than ½ standard deviation, where 5 points = ½ standard deviation (i.e., an increase of greater than approximately 17%)
ADDRESSING GROWTH IN READING COMPREHENSION FOR HIGH CAPACITY STUDENTS

High-performing (HP) classes for mean growth scores at Q4

* p<0.05 for mean growth scores between Q

Schools are ranked in highest to lowest order of mean growth at Q4 (1-39)

Low Q4 growth

High Q4 growth

Figure 4.15: Mean growth per quarter per class
To explain the findings depicted in Figure 4.15 in more detail, the classes from school 10 (outlined in purple in Figure 4.15) have been reproduced in Figure 4.16 to feature classes from school 10 for closer analysis. There are four classes from school 10 and each class is taught by a different teacher: 10_10, 10_1, 10_21 and 10_41. Class 10_41 has the highest mean growth calculated for Q4 (black bar) in school 10 and class 10_10 (the red bar) has the lowest. In contrast, class 10_10 has the highest mean for Q1 (red bar) compared to the other classes from school 10. Although the highest performing class at School 10, when all 39 classes in the study are ranked by Q4 means growth, class 10_41 is the 15th highest overall. Therefore, while teachers in the other classes in School 10 could presumably consult the teacher of class 10_41 for strategies for supporting HC students, the teacher from 10_41 could consult the teachers of classes from schools to the right in Figure 4.16, where growth at Q4 is greater than in class 10_41 (for example, School 5, classes 5_45, 5_36 and 5_14).

*Figure 4.16: Growth in Q between classes in School 10 (zoom in from Figure 4.15)*
There are similar differences observed between classes in school 5 (outlined in green in Figure 4.17). School 5 is of interest because three of the classes in this school are ranked in the top 6 for highest growth measured in Q4. The other two classes from school 5 are ranked 23rd (class 5_35) and 28th (5_13). School 5 is the subject of the case study discussed in Chapter 8.

Classes whose HC students are achieving like, or above, other Q are dispersed across schools rather than occurring within the same school (as shown in Figure 4.15). This supports the contention that the school is not the discriminating variable for growth in RC but that it is the class and more likely the teacher that teaches that class who affects student growth outcomes in RC.

**Growth for all students, across all quartiles.** The study aimed to identify practices that support growth in HC students; however, these practices should not be at the expense of growth in any of the other Qs. The most effective teachers overall were those of classes where the mean score for Q4 was not only among the highest compared to other classes, but in which there was no significant difference between Q for mean growth. In these classes, high
growth is measured across the class, irrespective of Q. This suggests that teachers of classes with uniform growth across Qs were effectively targeting teaching across ability levels. As shown in Figure 4.15, there are classes in some schools with significant difference between at least one Q and other Qs, suggesting that some teachers may be targeting one or more Q (including the range of abilities and RC levels in that Q) more successfully than for other Qs. In the classes identified in the top six best performing classes, there was no significant difference in RC growth between Q1, Q2, Q3, or Q4; these classes had the greatest overall class growth when compared to the other 33 classes as well as the greatest mean growth in Q4. For ease of comparison, classes not ranked in the top six for Q4 mean growth (that is, not the HP classes), are referred to as the Non-High-performing (NHP) classes.

**Class Type.** It was shown that there were no observed growth trends associated with Class Type (i.e. whether the class consists of students from one or two Year Levels). This finding was further confirmed when each class was listed per Class Type in Table 4.5 where the highlighted HP classes were found to be distributed evenly across Class Types.
Differences between growth in Q4 and other Quartiles where Q4 had the least growth in the class, was most frequent. The top 2 classes, 4_46 and 5_14 were the only classes for which Q4 mean growth was greater than the mean growth of the other Qs in the class.

### 4.5.2 Discussion

Comparing results between schools and between individual classes further highlighted the importance and impact of individual teachers on student growth outcomes. The ICSEA values and NAPLAN results for the participating schools found them to be similar for 2016 socio-educational advantages and reading for Year 5 students. The study found that, except for one outlier school, there was no significant difference detected between schools for mean whole school growth in RC (as discussed in sections 3.2 ‘Study participants’ and 4.5 ‘School and class membership’). HC students made the least progress in all classes except for class 4_46 and
class 5_14 (Figure 4.15). However, when comparing the growth of each Q in one class with those in other classes in the same school, the results were inconsistent. For example, Q1 students in class 6_9 made the most progress, while class 6_33 (in the same school) the most progress was made by students in Q2. This could suggest that teaching practices within schools differ as well as those between schools, and that some teachers may be more effective teaching students at one RC level than at others. It also suggests that there is limited collaboration between teachers working in the same school, including at the same Year Level. Therefore, the findings suggest that the teacher, rather than the school had the greater impact on student academic growth, and that some teachers teach for growth across the whole class while in other classes growth is achieved unevenly between Qs. In classes where similar mean growth across Qs was observed, teachers effectively targeted the ZPD and needs of students in the range of abilities present in that class. However, although the ICSEA values indicated that the schools were similar for those specific characteristics, it must be acknowledged that there are other differences between schools that were not measured in this study, and that could account for differences in growth. These include individual school culture and policies.

The variety for growth between classes at the same school lends support to the contention that there may be a link between teachers sharing successful strategies for teaching HC students with other teachers at their school and equitable growth across Year 5/6 classes, irrespective of the class the student is in at the school. When data about growth between classes were combined with the responses to the teacher questionnaires (analysed later in the study), a link between low RC and lack of teacher collaboration was found. Collaboration between teachers within schools appeared to be inconsistent and may explain the inequitable opportunities within the same school for HC students to learn, resulting in inequitable growth outcomes. This was explored in greater detail in the analysis of the teacher questionnaires in Chapter 7. Another factor for investigation was the test contribution to growth trends.

4.6 Test contribution to growth differences

It was discussed in Chapter 3, that RC was measured using the ARCOTS RC assessment instrument. This section investigates whether the results reflect similar patterns for engagement with the tests across all groups of students for all the ARCOTS RC tests.
administered. It is also important to ascertain if the range of items in the tests allowed students to demonstrate the extent of their ability; that is, that students did not top the test. Raw scores are the number of items students answered correctly in a test and as suggested in the name - these have not been scaled. The raw scores were used as a measure of student engagement with the tests and to determine the appropriateness of the tests at T1 and T2 and for each Q.

In 3.7 (‘The ARCOTS RC assessment tool’) it was explained that the ARCOTS RC assessment is designed to be targeted at individual student ability such that there are items for each student that are below their skill level, at their skill level, and above their skill level. Ideally, when targeted correctly, students are expected to be able to answer 50% of the items correctly and student ZPD can be established and reported accordingly. Therefore, the number of items answered correctly can be used as a measure of whether the tests were targeted and therefore administered correctly and whether students were appropriately engaged with the tests because the items were selected for student level of ability.

It is important to note that, although the colour and difficulty of the test is the same at T1/T2, the tests included different items, so students are not sitting the exact same test twice and the pre and post tests were equated using common items. The maximum number of items available per test was 40 (including the additional 10 items when students correctly completed the first 30 items).

4.6.1 Results

To investigate if students topped the test and that the ability of the students did not exceed the item difficulty of all the items available to assess their ability, the individual raw scores for each student were analysed

**Targeting the test - item difficulty compared with student ability.** The data included in the study were for students for whom an ARCOTS RC level could be calculated (as described in 3.7 ‘The ARCOTS RC tool’) and therefore the number of items answered correctly did not exceed 40. The most items answered correctly in any colour test at T1 were 33 and the most items answered correctly in any colour test at T2 was 36. It was possible to calculate a RC level for every student, which indicates that tests were appropriately targeted.
Each colour test is designed to identify the ZPD of the student as described by the levels in the PRD (Appendix C). The histogram in Figure 4.18 depicts the T1 RC levels on the Progression for Reading Development (PRD) for all students at Q4 (for PRD details, refer to 3.6 ‘Administration of tests’). The vertical axis shows the frequency for students for each ARCOTS RC level (on the horizontal axis). The range of levels for Q4 is level G to level L. The distribution depicted in the graph in Figure 4.18 reflects a normal distribution of students between the lowest and highest level where 17% of Q4 students are in the two highest levels (K or L) and 7% in the two lowest levels (G or H).

![Histogram](image)

**Figure 4.18: Q4 (T2) Student levels in the progression of reading development**

4.6.2 Discussion

It was found that the ability of the students did not exceed the difficulty of the test and therefore there was no ceiling effect. In addition, test results followed expected patterns: the number of items correctly completed increased as Q increased; more items were correctly completed at T2 than at T1 and number of students at RC levels reflects normal distribution. Therefore, the ARCOTS RC assessment instrument used in this study was suitable for measuring the reading ability of students who participated in this study. The assessment tool
used to measure student RC was not found to contribute to the growth trends observed in the study.

4.7 Summary of reading comprehension growth trends

Chapter 4 addressed the first of the research questions: ‘What are the differences in RC gains for Year 5/6 high capacity students compared with class peers?’ The results from the RC assessments were analysed for teachers and students. A summary of the findings is listed below.

- There is a growth flat line at Q4 for Year 5/6 students where there is lower mean growth at Q4 when compared with Q1, Q2, or Q3.
- At T1, RC mean for Year 5 students is lower than for Year 6 students.
- The mean growth at Q4 for Year 5 is three times greater at Q4 than for Year 6 students.
- After six months, the mean growth calculated at Year 5 and Year 6 showed that Q 4 in Year 5 caught up with Q4 in Year 6 such that there was no significant difference for RC performance between Year 5 and Year 6 at T2.
- The mean growth of Q4 students who outperformed their teacher in RC at T1 is lower than the mean growth of Q4 students who did not outperform their teacher at T1.
- Class Type is not a predictor for RC growth.
- School is not a predictor for growth; no correlation was found between school and student mean growth in Q4.
- Class/teacher is a predictor for mean growth for Q4.

In the Chapter 2 section 2.7 ‘The importance of self-regulated learning for the development of RC’, it was argued that student competence in self-regulated learning (SRL) impacts RC development and RC growth outcomes. The case was made that students with higher SRL competence make greater progress compared with students with lower SRL competence. The aim of the study’s second research question was to explore the link between SRL and RC gains for Year 5/6 HC students. Chapter 5 presents and discusses the findings of the analysis of student assessments for SRL.
Chapter 5: Self-regulated learning and reading comprehension

Chapter 4 described and discussed differences in RC performance and growth measures. It was found that mean growth in RC at Q4 was significantly less compared with Q1, Q2, and Q3. This chapter explores to what extent cognitive, meta-cognitive, and motivational processes and strategies impact the development of skills in RC (Dermitzaki, 2008). Cognitive, meta-cognitive, and motivational processes and strategies are embedded in the SRL construct defined in the literature review (2.1 Developing a definition and construct for self-regulated learning) and used in the study. Therefore, the REAP instrument for measuring SRL was used to measure the SRL competence (in scaled WLE scores) of students and compare this to the RC data. The contents of Chapter 5 address the second research question: ‘To what extent is self-regulated learning associated with RC gains for Year 5/6 high capacity students?’.

5.1 Correlation between Year 5/6 reading comprehension and self-regulated learning

Student RC and SRL assessment data were compared to investigate the extent to which SRL impacts and/or is a predictor of RC outcomes for Year 5/6 students. There were 531 students who completed the T1 and T2 ARCOTS RC assessments and the REAP online SRL assessment (see Table 3.6, in the Chapter 3 section 3.2 ‘Study Participants’). Details about the REAP online SRL assessment and the method for assessing SRL were discussed in the Chapter 3 section, 3.9 ‘The REAP self-regulated learning assessment tool’.

The weighted likelihood estimates (WLE scores) for SRL were scaled such that the mean was 50 and the standard deviation (SD) was 10 (this is explained in the Chapter 3 section, 3.12 ‘Preparing the data’. Unless otherwise stated, scaled scores are used in the analysis reported in this study.

5.1.1 Results

The relationship between Year 5/6 student RC and SRL at T1 is shown in a scatterplot graph. Figure 5.1 shows the results for T1 RC (vertical axis) and SRL (horizontal axis). A ‘fit line at total’ found a small correlation (0.14) between mean student RC at T1 and student SRL ($p<0.05$, $R^2=0.02$, $n=531$) which indicates that as RC increased, SRL increased.
The assessment data for the Year 5/6 students combined was analysed using Pearson’s $r$ correlation coefficient. The Pearson’s $r$ correlation analysis for SRL and RC growth found that there is a weak but not significant correlation between SRL score and RC growth (at $p > 0.05$).

Figure 5.1: Year 5/6 Student RC and SRL Score at T1 ($n=531$)

The histogram, which includes the distribution curve in Figure 5.2, shows the range of SRL for Year 5/6 students. The range of individual SRL scores is measured against the horizontal axis and the frequency, or number of students at each SRL level, is measured against the vertical axis. The results for SRL were spread across the seven levels of the SRL developmental progression where the levels range from A to G. The figure shows that a normal distribution curve fits the results.
5.1.2 Discussion

The correlation between SRL and growth in RC was weak. This was not expected given the emphasis placed on role of SRL in education in the literature (Section 2.7 The importance of self-regulated learning for the development of reading comprehension). The first and simplest explanation is that there just wasn’t a difference, or a simple and unmediated difference, between SRL and students with high or low RC growth. This suggests lack of support for research that posited a direct connection between RC and SRL (as discussed in 1.19 ‘The importance of self-regulated learning for the development of reading comprehension). A more likely reason is that it is not simply SRL that drives RC growth, but that there are many other variables impacting RC outcomes and that the effect is due to a combination of these factors. For example, in some classes students may be encouraged to act independently and to apply their SRL skills, while in other classes students may not have similar opportunities. Whether students have high SRL or not is one factor, whether they have the opportunity to apply these skills to their learning is another.
Another explanation for the low correlation between SRL and growth scores for Year 5/6 students is that the short period (six months) between T1 and T2 may not be sufficient for an accurate correlation to be detected. SRL is a complex construct that includes 16 different capabilities, each with its own set of indicators (Chapter 2, Figure 2.13; therefore, the questionnaire could be seen as a blunt instrument for such a sophisticated construct and a sharper instrument including more items or multiple questionnaires, with more items per capability, may be required to assess individual and more nuanced and sophisticated indicators of SRL capabilities. However, the item reliability and person separation reliability of the REAP SRL Questionnaire used to assess SRL indicated that the instrument used aptly assessed the SRL construct it was designed to assess (Chapter 3, 3.9 ‘The REAP self-regulated learning assessment tool’, Validating the self-regulated learning assessment instrument).

Yet another possible explanation for the weak correlation between SRL and RC is that SRL impacts RC differently for different groups of students and that these effects are masked when these variables are confounded in the single group analysis. Chapter 4 found that effects on growth outcomes were different when Year Level and Quartile variables were specified. There is a range of SRL and RC ability in the Year 5/6 students in the study and there are two year levels; these may have contributed to the findings, particularly when all the data were analysed without differentiating between these factors. To address these possible confounding variables, the study analysed the impact of SRL on RC by Quartile and by Year level.

5.2 Self-regulated learning and reading comprehension by Quartile and Year Level

HC students in Year 5/6 are the focus of the study, so analysis of the SRL/RC data were conducted at Q and Year level to explore RC outcomes of Q4 students and compare Q4 with Q1, Q2, and Q3 in same and different Year levels.

5.2.1 Results

Self-regulated learning analysed by Quartile. In Figure 5.3, the mean results per Q for SRL are indicated on the left vertical axis (the height of the bars). The reading ability quartiles increase from left to right on the horizontal axis. The SRL mean per Q increases as Q (and
therefore reading ability) increases; this indicates that HC students have higher SRL skills than students with lower RC in their class. Although there is no significant difference between Q for mean SRL (p>0.05), this suggests a link between RC and SRL and that student RC scores may be a predictor of SRL competency in RC and/or vice versa. This is an important and original finding not previously noted in the literature about RC and SRL.

**Figure 5.3: Mean SRL and RC by Q** These results suggest that as Q4 students have higher levels of SRL, they have higher learning skills than their peers and therefore it might be expected that RC gains at Q4 students are higher than at Q1; this was not found to be the case when mean RC growth and mean SRL results were analysed by class.

In Figure 5.4, the mean student SRL is referenced on left vertical axis by the height of the bars and RC mean growth is on the right vertical axis in the green line, for each Q on the horizontal axis. The graph shows that the mean growth for RC for each Q declines as Q increases; the green line on the graph moves from left to right in a downward direction, indicating that as mean growth in RC by Q decreases, mean SRL scores increase. This is contrary to expectations that RC gains improves with higher levels of SRL. However, it does align with the findings linking RC with SRL, and RC with RC progress: RC growth decreased as RC/SRL increased. That is, the Quartiles with the lowest SRL were found to have the highest RC mean growth. Although HC students have the highest SRL and RC scores compared to their classmates, they were found to have made significantly lower RC gains. This could suggest that Q4 students are not being challenged and do not have opportunity for growth equal to their peers and although they have high levels of SRL, they are not applying these skills in their RC learning.
Conversely, the lowest performing students for RC were found to have the lowest competence in SRL, and to have made the most gains in RC when the data for Year 5 and Year 6 student were analysed together. This may be due to that most teachers and schools allocating more time and resources to their lowest performing students than they do to their highest performing students and may be encouraging and explicitly instructing lower performing students in the use of RC and SRL. The disproportionate allocation of school resources according to student ability was discussed in section 2.14 ‘Differences in growth trends in reading comprehension and the flat line phenomenon’.

Findings in section 4.2 ‘Comparing RC outcomes by Year level quartiles’ describe difference in mean growth for RC when Year 5 and Year 6 students were analysed separately. Similarly, data was analysed according to Year Level to explore the relationship between SRL and RC growth for Year 5 and 6 students separately.

**Self-regulated learning analysed by Year Level.** Almost all students move through the education system according to their assigned Year Level. To investigate the effects of Year Level on the relationship between SRL and RC, students assessed for SRL ability were first grouped into Year Level and then ranked by ability into quartiles (Q) in Year 5 and then Year
6. Students were ranked and grouped as HC relative to their Year Level peers rather than their class peers. The mean SRL and RC growth scores for Q1, Q2, Q3, and Q4 for Year 5 and Year 6 are shown in separate graphs in Figure 5.5; the Year Level is indicated on the far left. In both graphs, the green line and the right vertical axis shows the SRL mean and the bars and left vertical axis show the RC mean growth for each Q (on the horizontal axis). The top graph in Figure 5.5 is calculated using Year 5 students for which there are also SRL measures (n=229) and the bottom graph in the figure using Year 6 students for which there are also SRL measures (n=302). Although the difference between Q for RC growth is the same for statistical significance when compared with results using all Year 5 students (refer to Figure 4.5), in the sample which excludes students who did not complete the SRL assessment, the greatest growth is observed at Q2, rather than at Q1 (Figure 5.5). Results for RC growth trends for all Year 6 students (refer to Figure 4.4) mirror those for Year 6 students who completed the SRL assessment (Figure 5.5); there is significant difference in growth in RC between Q4 and each of the other three Q’s at Year 6.
Although the mean growth for at Q4 for Year 5 students who completed both the RC and SRL assessments was lower than in other quartiles this was not statistically significant ($p > 0.05$). In this sample, difference between Qs for mean growth and the SRL mean is highest at Q2 and lowest at Q4. In contrast, The Year 6 graph shows a steady rise in mean SRL scores from
Q1 to Q3, but then a decrease at Q4 (Figure 5.5). In each instance, growth in RC declines and is lowest at Q4.

Separate linear regression analysis was conducted for Year 5 and Year 6 students who completed all assessments (RC and SRL). RC growth was used as the dependent variable and the predictor variable was SRL. The results supported findings that there were differences in Q4 for Year 5 and Year 6 students for correlation between mean SRL, mean RC growth scores. When the participants were grouped by Year Level, a weak correlation between SRL and growth was observed at Year 5 ($r = 0.143$), indicating that at Year 5 the greater the student ability to self-regulate their learning, the greater the improvement in RC. When a linear regression was calculated to predict the growth based on SRL score at Year 5, a statistically significant relationship was found. The adjusted $R^2$ value (0.016) indicates SRL scores were weak predictors of growth outcomes (Muijs, 2010); however, in real terms this is an important finding for the relatively short six months period over which growth was measured, and when compared to Year 6 results where no statistically significant relationship was observed. The Year 5 results for SRL mean scores were not only higher than those for Year 6 students; they were predictors of growth in RC. This is an important finding given that at T1 the Q4 mean score for RC at Year 6 was significantly higher than at Year 5 ($p<0.05$), but not at T2 ($p>0.05$), and given there was a decline in RC gains at Year 6.

5.2.2 Discussion

A review of the literature found support for an emergent need for students to develop lifelong learning skills for supporting student capabilities in self-regulation, as a strategy for improving student outcomes (Aleandri & Girotti, 2012; OECD., 2016). However, it is unclear in the literature whether overall student ability to self-regulate learning is linked to improved student outcomes in the specific area of RC or if and how students successfully tailor and apply SRL learnings to RC lessons (Boekarts, 2005; Greene et al., 2015). The study provides one piece of evidence the SRL can contribute to RC development and supports the case for instruction and practice of SRL skills in RC classrooms and the inclusion of SRL strategies in RC pedagogy and teacher professional development.

There are many possible factors impeding or impacting the effects of student SRL on RC that are beyond the scope of the data collected in this study. There was limited data for teaching
practices and the classroom environment in which student SRL skills were measured, therefore the consistency of these across classes are unknown. For example, teachers participating in the REAP project had access to the SRL Modules which recommend and include strategies for teaching SRL in reading lessons; these were highlighted to teachers at the start of the REAP project, thereby emphasising the importance of SRL. There is limited data for whether and which teachers included SRL teaching strategies and the impact of this on student levels of SRL at the time of the study or in years previous to the study. This is relevant to establishing if and how the student SRL skills assessed reflect those been built up over their education and if and how they are appliedmiscellaneously or specifically in subjects. In addition, there may be students with high SRL skills who are not encouraged or given the opportunity to apply those skills in their reading classes. For example, in one class, students may be encouraged to select and examine multiple ways of tackling an activity, while in other classes the activity and method is set by the teacher. In fact, other results show that some teachers discuss student results with their students, while others do not (see 7.3 Teacher use of Assessment). Additional data about the use of SRL in the classroom would be useful in identifying the impact of not only student SRL, but also the ability to use SRL in the classroom and the impact of a rich SRL environment on student RC gains.

The difference in the correlation between SRL and RC growth in Year 5 and Year 6 is interesting. One explanation is the difference in Primary and Secondary teaching strategies, subject content, and level of student motivation. The transition from traditionally Year 6 teaching strategies, content, and motivations to secondary ones may be occurring earlier at Year 6 for HC students. In Chapter 4, section 4.3 ‘Comparing teacher and student content knowledge’, it was discussed that Primary teachers’ content knowledge relative to that of their students is problematic for student progress in upper primary years. There appears to be a lack of expertise in the higher RC levels that are traditionally thought of as secondary content (see also Chapter 1, section 1.5 ‘The importance of RC’ and the next section in this chapter, 5.3 ‘SRL and students who outperformed their teacher’). Transition from Primary to Secondary schooling and the effects of adolescence at Year 7 have previously been found to have negative impact on student academic results as well as on engagement, motivation, and other SRL associated capabilities (Mackenzie, McMaugh, & O’Sullivan, 2012; McGee et al., 2004). The differences between the Year 5 and Year 6 results support the assertion that both
a decline in SRL and growth in RC scores for HC students are beginning or occurring earlier than previously thought, at Year 6. However, the effect of academic and developmental transition from Year 5 to Year 6/7 and onset of adolescence was beyond the scope of this study and remains an important field that is recommended for future research.

Given that different learning strategies are required in different content areas and individuals have different levels of skill, interest, and motivation within each of these, it is reasonable to assume that application of SRL capabilities, in a multitude of contexts, is important for continued learning, formal education, and workplace training. This study was limited to teaching and learning RC in a specified ‘reading lesson’ context; however, RC is not limited to this specific context. The links between RC and SRL in other subject areas may also impact RC development and introduce new variables that are important but not explored in the study. For example, the content and SRL skills required in a science, music, or art lesson and the application of SRL skills by individual students in these specific areas are likely to impact on the development of RC. The scope and requirements of RC are varied, while the study’s focus is specific which limits the scope of the analysis that was performed.

A review of the literature found a lack of definitive, evidence-based support linking SRL to RC growth outcomes. While the study found a weak positive correlation between RC and SRL mean growth scores at Q4 in Year 5, no such correlation was found in Year 6 suggesting that more research is needed into the links between SRL and RC growth outcomes. A more varied sample in terms of socio-educational advantage and taking into account other variables such as languages other than English spoken by students/parents, may shed further light on the links between SRL and RC. In addition, certain SRL skills may be more prevalent in different students and/or more relevant at different stages of the development of RC; in addition, students have varied opportunities to develop and/or practice these in the classroom. It is also feasible that teachers may have allowed their HC Year 6 students to coast along and these students were not being challenged, perhaps because their teachers did not know how to challenge them. In these classrooms, students may not have needed to exercise their SRL skills because they were already meeting expectations.

The rising prevalence of and requirement for individual and collaborative online learning necessarily includes SRL capabilities, multiple-literacies, and the need to able to filter and discern from a wide variety of text-type and content, for a wide variety of purposes. In
addition, the needs of HC students differ from those of their peers by virtue of the level of RC they possess relative not only to their classmates, but also to their teacher.

The decline in mean SRL at Q4 compared with the decline in RC at Year 6 may explain the decline in progress at Q4. A second assessment for SRL after six months (as was done with the RC assessment) is necessary to calculate growth in SRL and therefore compare RC growth and SRL growth trends. The study did attempt to administer the SRL assessment a second time; however, the response was limited and sporadic and not enough data could be collected for enough classes for meaningful analysis. Therefore, the data were excluded from the study. However, the SRL analysis that was possible point to an important difference between Year 5 and Year 6 students and their cognitive, metacognitive, and motivational development and the effect this has on their RC acquisition.

The SRL results may explain, in part, the decline in RC progress at Year 6 and the lower results when compared to Year 5; however, it is uncertain whether the differences can be explained by student SRL competence or the increasing difficulty in RC as students move up the developmental progression. Other factors such as individual classroom practices or teacher content knowledge are also important variables for consideration. The next section explores the impact of students’ SRL and TCK on RC outcomes.

5.3 SRL and students who outperform their teacher

The differences in RC growth between Q4 students who outperformed their teacher in the T1 RC assessment and those who did not were discussed in Chapter 4, section 4.3 ‘Teacher content knowledge’. The following analysis explored the links between SRL and RC growth outcomes for students who outperformed their teacher. This analysis is especially important for addressing the second research question: To what extent is self-regulated learning associated with RC gains for Year 5/6 HC students and for the highest performing HC students.

5.3.1 Results

The mean SRL scores for students who outperformed their teacher in RC and those who did not were compared. A positive correlation was found between SRL and RC growth scores for students who outperform their teacher \((r = 0.56)\) indicating that, for this group of students,
the higher the SRL the better the gains in RC over a period of six months. At the first assessment (T1), 29 students outperformed their teacher; however, only ten of these students showed an improvement on their initial score when re-assessed six months later, while for the remaining 19 students their results declined. There were 48 students who outperformed their teacher at the second assessment (T2); 38 of these students did not outperform their teacher when assessed at T1 and all 38 students made gains over the six-month period. A possible explanation for the greater gains made by some students is that they had higher levels of SRL.

The study found that students with the highest reading scores when assessed at T2 were also the 38 students who did not outperform their teacher when assessed at T1; in addition, these students had the highest SRL scores of all students who outperformed their teacher at T2. Although the sample is small, this suggests a link between SRL and RC gains. The SRL score for each of the 38 students who made gains and outperformed their teacher at T2, but not at T1, ranged from 50.91 to 66.79, which is at or above the mean of the whole SRL student sample ($\bar{x}=50.42$). In contrast, the ten students who did not make gains ranged from 33.81 to 49.55 and had SRL scores at or below the sample mean.

5.3.2 Discussion

These results tentatively suggest that the difference between students who outperformed their teacher and made gains and those who did not make gains is that those who made gains had higher SRL skills. These students were able to regulate cognitive, metacognitive, and motivational processes more skilfully than the students who did not make gains in RC. The higher level of SRL may have moderated or overcome the effect of low teacher content knowledge. It should be noted that the 38 students who outperformed their teacher at T2, but not T1, had access to teachers with greater content knowledge for at least some time between their initial test and the final test at which time they had exceeded their teachers’ T1 RC performance.

The results emphasise both the importance of SRL and teacher content knowledge for the highest achieving HC students in the classroom, especially those students who outperform their teacher. Where teachers performed better than their students, teachers had the content knowledge to support their students and positively impact RC development. Where
students outperformed their teacher, student’s SRL ability appeared to impact on their RC outcomes. However, the need for further research with larger sample sizes is emphasised.

The findings have implications for teacher professional development in RC content knowledge and for both assessing and teaching RC and SRL. Given the results linking SRL to RC outcomes, the study researched classroom practices regarding SRL. Teacher questionnaires were used to gather information about SRL in reading classrooms and the results are analysed and discussed in Chapter 6.
Chapter 6: Self-regulated learning in the classroom

Analysis of the SRL assessments found correlations between SRL and reading scores as well as SRL and growth scores in certain subsets of data. Given the relationship of SRL to student RC outcomes, the next step in the study was to explore SRL in RC classrooms by surveying teaching strategies and classroom practices. To that end, teachers were asked to describe their practices in and thoughts about planning and implementing SRL in reading classrooms. This analysis further addressed the second research question, ‘To what extent is self-regulated learning associated with RC gains for Year 5/6 high capacity students’.

6.1.1 Results

Details of the teacher questionnaires were discussed in Chapter 3 and, as indicated in Chapter 3 section 3.12 ‘Preparing and using the data’, although the teachers of the top six performing classes for mean growth in HC students responded to all the questions, not all of the other teachers in the study responded to all of the items in the teachers’ questionnaires. The method for comparing and defining high (HP) and non-high-performing (NHP) classes was explained in that chapter and in the Chapter 4 section 4.2 ‘Comparing RC outcomes by Year Level and Year Level Q4’. The results are given as percentages and number of respondents for NHP classes are indicated by ‘respondents from NHP classes =’.

**Pre-module questions - student progress and classroom planning.** The four questions shown in Table 6.1 were administered before teachers engaged with the REAP professional learning modules about SRL. The REAP modules were described in Chapter 3 section 3.11 ‘Teacher modules and questionnaires’. The results for questions about the links between SRL and student progress and classroom planning for SRL are shown in Table 6.1.
Table 6.1: SRL and student progress and classroom planning for SRL

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>%HP</th>
<th>% NHP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you think a students’ ability to self-regulate learning their impacts academic growth?</td>
<td>Yes</td>
<td>100</td>
<td>89</td>
</tr>
<tr>
<td>2. Do you think that students with higher competence in self-regulated learning show greater progress than students who have lower competence in self-regulated learning?</td>
<td>Yes</td>
<td>100</td>
<td>86</td>
</tr>
<tr>
<td>3. Do you feel confident that you can identify levels of self-regulated learning skills in your students?</td>
<td>Yes</td>
<td>67</td>
<td>61</td>
</tr>
<tr>
<td>4. This item is about classroom planning. Please select the options that best apply to you:</td>
<td>It is important to plan for teaching self-regulated learning</td>
<td>83</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>I specifically include elements of self-regulated learning when planning lessons</td>
<td>33</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Self-regulated learning is included in team planning at my school</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>I do not plan for the teaching of elements of self-regulated learning</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Invalid/no response</td>
<td>0</td>
<td>11</td>
</tr>
</tbody>
</table>

Note. respondents from the NHP classes = 28

Although there was a small difference between HP and NHP in the results for the first question in Table 6.1, almost all teachers of HP (100%) and NHP (89%) said that skills in SRL are important for student learning. The difference between HP and NHP classes was similar in question 2 where the results were: 100% HP and 86% NHP said that students with the greater competence in SRL show greater progress than those with lower competence in SRL.

Question 3 in Table 6.1 explores the level of confidence teachers felt in identifying student levels of SRL. Most teachers said that they felt confident identifying levels of skills in SRL in their students: 67% of teachers of HP and 61% of NHP. Presumably, for the teachers who did not feel confident, assessing, planning for, and targeting teaching of SRL capabilities is problematic.
Question 4 asked about the importance of and strategies for planning teaching of SRL. 83% of teachers of HP classes said that it is important to plan for teaching SRL and, 33% of these teachers specifically included SRL when planning lessons. In comparison, fewer teachers in NHP classes report that planning for SRL is important (64%); however more teachers in NHP classes (43%) specifically included SRL planning in lessons than of HP classes. The results for whether SRL learning is included in team planning revealed that most teachers reported that SRL is not included in team planning: 89% for teachers in HP classes and 83% of teachers in NHP classes said that SRL is not included in team planning. However, the majority of teachers said that they did plan for the teaching of elements of SRL: 83% teachers in HP and 89% teachers in NHP. It can be inferred from these results that teachers plan for teaching SRL individually rather than collaborating in teams.

Post-module questions - planning for teaching self-regulated learning. It is important to note that questions about SRL in the classroom referred to in this section were administered to teachers after completion of Module 4: Understanding Self-Regulated Learning and Module 5: Self-Regulated Learning in the Classroom. The modules contained information and resources (including the developmental progression for SRL and planning templates) that could be used by teachers for planning. Also, at the time the questions were administered, the developmental progression for SRL and student SRL reports were available to teachers via the online REAP platform. Teachers were asked about their planning strategies at the time but were not asked to explain their intention to use the resources in future planning. This is an important question given teachers may not have had the opportunity to incorporate the contents of the modules into their teaching practices when the questions were administered. The question below asked teachers to select from a list of strategies about how they incorporated SRL when planning for teaching in RC. The results for how teachers planned for teaching SRL skills in RC are shown in Figure 6.1.

Figure 6.1: Planning for teaching SRL skills in RCWhen planning lessons, 17% of teachers of the HP classes (indicated by the light bar in Figure 6.1) and 23% of teachers in NHP classes (indicated by the darker bar in Figure 6.1) used the SRL developmental progression to inform their planning. Fewer teachers (0% for teachers in HP classes and 9% in NHP classes) said that
they included a plan for assessing SRL. This is in direct contrast to educational research arguing for the use of assessment (including formative) and learning progressions as crucial strategies for planning and implementing the teaching of academic constructs (A. L. Bailey & Heritage, 2014; Black, Wilson, & Yao, 2011; Heritage, 2012) It can therefore be inferred that it is likely that targeted teaching of SRL at student ZPD was limited at best.

Half the teachers in HP classes reported planning for teaching SRL in RC lessons and 32% of teachers in NHP classes selected this as a practice (Figure 6.1). Some teachers said that they planned for SRL for groups of students per the level of SRL of the groups; almost twice as many teachers in NHP classes (17%) selected this response than teachers in the HP classes (36%) as shown in Figure 6.1. Unfortunately, there were no follow up questions to determine which SRL capabilities were included and why.

Modules 4 and 5 included teacher resources, such as templates that can be used for determining which SRL skills to plan for and for including planning for teaching SRL while planning RC lessons. Few teachers in the NHP classes (19%) and no teacher in the HP classes used the templates included in modules 4 and 5 (Figure 6.1). This result was surprising because most teachers agreed that planning for SRL was important, but fewer said that they included SRL when planning (Table 6.1, question 4). It was reasonable to expect that if lack of resources was responsible for lack of SRL included in planning, engaging with the modules and giving teachers access to resources would encourage them to use those resources and increase their planning for SRL in the classroom. There was no follow up question asking why this did not occur; however, one reason may be that there was not sufficient time between access to the Modules and administration of the questions for teachers to have the opportunity to put the contents of the modules into practice. It would have been useful to re-administer this question at least in the school term following engagement with the modules.

**Working in partnership with students.** Teachers were asked about their practices for working in partnership with students to develop student awareness and responsibility for SRL. Sharing student results and engaging students in discussion about expectations and the descriptions of the SRL levels in the developmental progression are crucial to supporting student awareness and responsibility for SRL. This point was discussed in detail in Chapter 1; section 1.7 ‘Identifying outcomes and measuring student progresses. However, when asked: **Have you discussed the progression of self-regulated learning with your students?**, 50% of the
teachers from the HP classes said that they did in contrast to 39% of teachers of the NHP classes (respondents from NHP classes = 28). Similarly, when asked if teachers shared individual levels of the progression of student self-regulated learning with students the results were that no teachers of the HP classes shared SRL results with their students and 35% of teachers of the NHP did. This is ironic given the SRL construct is based on the individual’s self-awareness and insight about their learning to foster motivation and independence.

6.1.2 Discussion

Although almost all teachers acknowledged that SRL impacts academic growth, the study identified contradictions in classroom practices in the planning and inclusion of SRL in reading classes. These included contradictions particularly in HP classes which were the classes in which HC students achieved the highest scores for SRL and RC over a six-month period.

Several important capabilities for the development of SRL include goal setting, self-evaluation, and an awareness of abilities and gaps in ability. The importance of including students in the assessment and evaluation process is underestimated in the reading classrooms that participated in the study. Essential to the development of SRL and RC is the role of the student in gathering and using evidence of learning for self-evaluation, self-motivation, and self-management (Heritage, 2012, p. 12). Although sharing learning progressions with students and discussing the student’s place on that progression are important strategies for targeting development of these SRL skills and facilitating personal responsibility for learning, they are not strategies widely used in the classes in this study. Even though most teachers reported they felt confident they could identify levels of SRL of most students, almost no teacher said that they included the teaching of SRL in individual or team planning. This could be due to a lack of knowledge for and resources for integrating teaching of SRL skills with RC curriculum and other elements of lesson planning. Resources were made available through the REAP project, but their effectiveness remains uncertain due to the limitations of the study emerging from the lack of follow up questions.

Few teachers said that they plan to teach and/or assess levels of SRL, which suggests that few teachers explicitly or formally teach or assess SRL in the classroom. This lack of instruction and active inclusion of SRL in classroom teaching supports the idea that the decline in growth observed in RC at Q4 may also be occurring in SRL. Chung (2000) found that students
‘exhibited some tendency for the development of self-regulated learning according to grade level’ and that SRL skills do not develop with age independently or continuously without instruction (Chung, 2000, p. 56). Chung further contends that the development of skills in SRL is impacted by what occurs in the classroom and whether the skills are explicitly taught and supported in the classroom or not. Chung (2000), Paris and Newman (1990), Zimmerman and Martinez-Pons (1990), and Boekaert and Corno (2005), among others, agreed that Years 5 and 6 are included in the years critical for the development of SRL. It appears that, in Year 5/6 classes, the critical period for supporting the development of SRL skills is being missed and lack of support for the development and use of SRL is having a detrimental impact on academic growth for HC students and as RC levels increase.
Chapter 7: Classroom practices and targeting teaching

In Chapters 4, 5, and 6, RC and SRL assessment data were used to describe the growth trends for students at Year 5/6. Links were explored between RC mean growth scores and class, Q (ranked ability), Year Level, Class Type, teacher RC scores, and student SRL scores. The remaining sections analyse the results for teacher questions about their classroom practices and about how teachers target teaching to student ability in RC. The research question explored in this chapter is the third question: ‘How do teachers effectively support Year 5/6 high capacity students to achieve gains in RC commensurate with class peers?’

Teacher content knowledge and types of tasks given to students are important for targeting teaching at the ZPD of HC students. The teacher questionnaires used in this study provided insight into teacher and classroom variables that may be impacting student RC outcomes. In addition to how SRL is included in classroom practices, other variables include how students are grouped for learning, teacher use of assessment results, targeting teaching toward HC students, and the inclusion of higher-order thinking skills.

The literature review argued that, in the context of contemporary learning theories based on Vygotsky’s work (1978), targeted teaching is important for improving student outcomes, and that teacher content knowledge, classroom environment (including grouping practices), and use of assessment contribute to targeting teaching to student needs. Results in this study have indicated that HC students show different mean growth to other Qs of students, where the rate of growth at Q4 is lower in comparison to Q1, Q2, and Q3. Given that students in Q4 are at a higher level for RC than their classroom peers, it is important to explore whether teachers are effectively targeting instruction and resources to the ZPD of students at these higher levels. This brings the study to effective targeted teaching. In 2.6 ‘Learning in schools’ it was discussed that the following impact on student achievement and/or effective targeted teaching:

- Teacher subject content knowledge
- How students are grouped
- Types of tasks given to students
- Teacher use of assessment
- Targeting HC students and higher-order thinking/skills
The results and discussion for the analysis of teacher and student ARCOTS reading levels, referred to in the first dot point, is in Chapter 4 in section 4.3 ‘Teacher content knowledge’.

Having identified and analysed patterns of growth using quantitative student and teacher assessment data, the study turned to teacher self-report questionnaires about practices used for targeting teaching in RC lessons. The benefits of and reasons for using questionnaires in online surveys as a method for collecting data were discussed in Chapter 3 and align with those proposed by Cohen, Manion, and Morrison (2013).

In the investigation of the data in the following sections there is differentiation between the six classes identified with the greatest mean growth at Q4 (the High-performing (HP) classes) and the rest of the participating classes referred to as the Non-High-performing classes (NHP). The HP classes were the six classes with the highest mean growth in Q4 as well as the highest class mean growth. Classes/teachers were grouped in this way to explore the strategies associated with the most growth for HC students. It is also important that the highest growth means for Q4 students were in the classes with highest man growth for all students in the class, indicating that other students were not disadvantaged by progress made by students in Q4. The method for grouping the results into HP and NHP classes was described in the Chapter 3 section 3.12, ‘Teacher questionnaires’, and the ranking of classes was described in the Chapter 4, 4.2 ‘Comparing RC outcomes by Year Level and Year Level Q4’ and is shown in Figure 4.11.

### 7.1 How students are grouped

Teachers were asked how students in their class were grouped for learning. The question was administered at the start of the REAP project and before engagement with any other part of the project. These responses revealed an important issue regarding whether reading scores can be attributed to one teacher or if several teachers are involved in teaching students from the one class.

#### 7.1.1 Results

Teachers selected one or more options from a list of strategies for grouping students:
• Students are sometimes grouped by ability and sometimes grouped for interest/friendship groupings for activities/tasks
• Students are grouped based on ability, but I teach all the groups
• Students are grouped in mixed ability or for interest/friendship groupings
• Students are grouped across classes according to ability, some groups from my class are taught by teachers other than me

Teachers in all 39 classes said that students were grouped across classes per ability, therefore it is logical to infer that teachers did not teach all or only the students in the class identified for that teacher. Further, almost a quarter (23%) teachers reported cross class ability grouping and that some of their students were taught by another teacher. However, only half (51%) of teachers reported that they grouped per ability within their class and taught all these groups in their classroom. This implies that half of the teachers do not teach all their students when the students are ability grouped. This ratio is similar for HP classes when the data is grouped into HP and NHP classes. 50% of teachers in the HP classes report that they teach all ability-based groups in their classroom and 50% that they do not. However, fewer NHP teachers (40%) report teaching all students when they are grouped per ability in their classroom. Regrettably, there were no questions to determine who teaches the students RC when the class teacher does not, and nor were there questions about the amount of time and for which activities students spent away from their teacher. Time spent away from the classroom teacher is an important and recommended focus for future research.

When HP classes were compared with the NHP classes for student grouping, there was one response that stood out: Students are sometimes grouped by ability and sometimes grouped for interest/friendship groupings for activities/tasks. Only 17% of teachers of HP classes chose this option compared to 73% of teachers of the NHP classes. Grouping students within the class by ability is the preferred option of the teachers in the HP classes whereas, in the NHP classes, the preferred option is a combination of ability and interest/friendship-based grouping. There is no information collected for time spent on or for which activities students worked on in specific groups. There is only data for whether students were grouped by ability or grouped by interest/friendship. The least selected response for grouping students was: in mixed ability or for interest/friendship groupings: 17% and 18% for HP and NHP classes respectively.
7.1.2 Discussion
It was difficult to identify the effect different grouping strategies had on RC outcomes in this study because the questions did not adequately differentiate between the grouping practices used by the teachers and the responses conflated grouping practices with who taught the groups. Teachers reported using mixed ability, single ability, student friendships, and student interest groups in their reading classes. There was no information gathered for when or why students were grouped in any specific way. However, the study did identify an issue with associating an individual teacher with student reading outcomes as some students were taught by more than one teacher on at least more than one occasion. This area of the study needs follow-up questions and research focused on grouping strategies which include why, when, and how teachers group students and how grouping practices impact learning in RC.

Having explored the types of grouping practices used by teachers in the classes, teachers were asked about the types of tasks their students were given.

7.2 Types of tasks given to students
Teachers were asked to select the type and usage of tasks in RC lessons. Teachers were asked to select from three types of tasks (respondents from NHP classes=33):

- Task type 1: Students are all given the same tasks; the tasks cater for the range of abilities within my classroom as students of all abilities can engage in the task, including a stretch for the most proficient
- Task type 2: Students work on different tasks based on their ability
- Task type 3: Students work on tasks that increase in difficulty so that the more students complete of the task, the harder the task becomes

7.2.1 Results
By far the least chosen option was the task that increases in difficulty as the student works through it, with none of the teachers in the top classes selecting this type of task and only 3% from the NHP classes. Almost all the teachers in the HP classes (83%) indicated that students were given different tasks per their ability, in contrast with 42% of teachers of the NHP
classes. At 55%, the preferred option for teachers in the NHP class category was the same task that caters for all abilities. These results are visually compared in Figure 7.1.

![Bar chart showing types of tasks given to students]

**Figure 7.1: Types of tasks given to students**

The type of task is identified on the vertical axis. The bars indicate the percentage of teachers who selected this response; teachers could select one or more from the list. The light-coloured bars are the responses from the teachers in the HP classes and the dark bars represent the teachers from the NHP classes. The comparisons in Figure 7.1 show that there are differences between HP and NHP class teachers for the type of task given in the class.

### 7.2.2 Discussion

It can be inferred from the questionnaire data that almost all teachers in HP classes use Task type 2: *students are given different tasks based on their ability*, these teachers targeted tasks specifically to student ability. Less than half the teachers in NHP classes (42%) selected this type of task; therefore, teachers in the NHP classes are less likely to have targeted student ability. NHP teachers provided tasks designed to cater for a range of abilities, but it is unclear how students engaged, or were encouraged to engage, with the task relative to their ability because no follow up questions were asked. Student ability in SRL is a greater factor when
students are expected to and are relied upon to independently engage with multi-level tasks at the appropriate level.

More than three times the number of teachers in NHP classes selected Task type 1 than did teachers in HP classes. It is possible student ability to self-regulate learning may be a factor in the level at which a student engages with a task in classes where teachers selected this type of task. In contrast, the level of engagement required, or at least expected, is pre-set by the teacher by the difficulty of the task assigned to the student for Task type 2 where students were given different tasks based on their ability. There appears a link between the type of task selected and student outcomes because twice as many teachers in the HP classes selected Task type 2 than those in the NHP classes where mean growth for HC students was lower. In fact, only one of the six HP teachers did not select this option, indicating that targeting the task to student ability is associated with the HP classes more prevalently than the NHP classes in which most teachers did not select this type of task.

More data are needed to explore the nature of tasks and task usage more thoroughly than was possible in this study. Such research would involve questions detailing the nature of tasks and the application of tasks and include the collection of sample tasks and possibly classroom observations. In addition to researching the tasks, another important factor is how teachers assess and made use of assessment data about how students engage with tasks and their strategies and processes for learning.

7.3 Teacher use of assessment

This section examines how teachers use student assessment data. Teacher use of assessment in HP classes was compared with how teachers use assessment in NHP. This data were collected via the teacher module questionnaires which were made available on the REAP online platform intermittently throughout the project. While there are responses for all the questions from all the teachers in the HP classes, not all the remaining 33 teachers (i.e. the NHP category) responded to all the questions, so the number of respondents in this category varies from question to question. The number of NHP respondents is indicated for each of the questions as ‘respondents from NHP classes =’ and percentages are calculated to reflect the
number of responses for each question. The focus was on comparing the responses of the teachers in HP and NHP classes.

7.3.1 Results

Teachers were asked questions about their assessment practices, including sharing assessment results with students and using evidence in collaboration with other teachers.

**Student access to assessment reports.** When asked if the information from the ARCOTS RC reports was given to students, 33% of teachers in HP and in NHP classes answered in the affirmative. This is can be compared to 0% HP class teachers who said that they shared individual levels of the progression of student self-regulated learning with students and similar to the 35% of teachers in NHP classes who said they shared individual levels of the progression of student self-regulated learning with students. **Use of evidence and collaboration with other teachers.** The most noticeable differences for use of assessment between teachers in HP and NHP were in the responses related to modifying teaching for individual students, selection of tasks, and provision of resources for students. Figure 7.2 shows the responses selected for the question stem: Did you use the information from the ARCOTS reports to... The options provided are on the vertical axis and the percentage of teachers that chose this option is shown by the dark grey bar for NHP classes and the lighter bar for the HP classes.
Teachers in HP cases clearly used assessment to target teaching with 100% reporting that assessment informed their modifications for individual students, and 83% for both the selection of tasks and resources for students. Far fewer teachers in the NHP classes used assessment to modify tasks for individual students (36%), select tasks (15%), or select resources (6%).

This is interesting given the results for teacher collection and use of evidence of student learning. Figure 7.3 shows the results when teachers were asked about their use of evidence in collaboration with colleagues. Teachers were asked to select as many of the strategies listed on the vertical axis as applied to their teaching. The percentages for teachers from the HP classes are indicated by the light grey bar and the percentage for teachers from the NHP class in the dark grey bar.

Almost all teachers reported collecting evidence of learning and using evidence of learning to select interventions for students. 100% and 91% of teachers in HP and NHP classes respectively, said that they collected evidence of learning; 83% of teachers in HP and in NHP classes used evidence to select interventions for students (Figure 7.3). More HP teachers (83%) reported using evidence to identify student ZPD while slightly fewer (76%) NHP classes used evidence to select resources for students.
teachers did. Most teachers said that they use evidence to identify the ZPD of individual students although more teachers in HP classes (83%) than in NHP classes (76%) said that evidence was used to identify student ZPD. An overview of all these findings supports an emerging trend: when compared to teachers in NHP classes, teachers in the HP classes use more strategies more often for targeting teaching to student needs.

The differences between teachers in HP and NHP classes for collaborative practices are shown in Figure 7.3. While 83% of teachers in HP classes said that they teach collaborative learning skills, fewer said that they worked collaboratively with colleagues to develop assessments (50%), to evaluate assessments (33%), or decide on interventions (17%). In comparison with teachers in HP classes, fewer teachers in NHP classes teach collaborative learning skills but more work collaboratively with colleagues; 48% of NHP class teachers saying that they teach collaborative learning skills but more NHP teachers (67%) said that they work collaboratively with colleagues to develop assessments and to evaluate assessments (61%). Over half NHP teachers (55%) collaborate with colleagues to decide on interventions compared with 17% teachers in HP classes.

Only about one third of teachers said that they evaluated the impact of their interventions with slightly fewer teachers in HP (33%) than NHP (39%) classes selecting this option (Figure 7.3).
Identifying HC students. The teacher professional development modules, accessed online by the teachers in the study, contained a module about HC students. ‘Module 3: High Capacity Students’ contained information and resources for identifying and teaching HC students. This information included a definition of High Capacity (HC) students which aligned with that used in the study. The following section includes the results when teachers were asked if and how they identified the HC students in their class. Figure 7.4 shows the responses selected for the question stem: *Have you identified the top 25% of students in your subject area*. The options provided are on the vertical axis and the percentage of teachers that chose this option is shown by the dark grey bar for NHP classes and the lighter bar for the HP classes.
Figure 7.4: Identifying HC students

All the teachers in the HP classes said that they identified the HC students in their class, compared with 93% of teachers in the NHP classes. This is not surprising given that the same teachers were participating in the REAP project where the focus was on improving outcomes for HC students. Overall, the teachers who identified the HC students for reading ability reported using observation and/or assessment as a strategy for identifying the HC students in their class; similar numbers (67% in HP and 69% in NHP classes) reported using ARCOTS and other assessments/observations to identify students in the top 25% for reading ability. Far fewer used either my own assessments and observations or just ARCOTS to identify HC students, as is shown in Figure 7.4.

7.3.2 Discussion

Overall, teachers did not share student assessment results or discussed learning progression with their students, with the exception that a third of the teachers in the highest performing classes for growth for HC students said that they gave information from the ARCOTS RC reports to students. This is an interesting finding that may be related to the issue of how the development of student skills in self-regulated learning is supported in the classroom that was discussed in the previous ‘Self-regulated learning in the classroom’ section. An important skill in the self-regulation of learning is awareness of ability and developing skills in areas such
as setting goals, monitoring progress, reflecting on and evaluating achievements, and understanding motivation and the importance of self-belief. Access to and discussion of individual results is important to the development of these skills and appears to be lacking in the classrooms in this study.

The strategies necessary for targeted teaching that were discussed in 2.3 ‘Targeted teaching: opportunity to learn and academic growth’, include assessing student level of performance in relation the construct and that the teacher interpret the varied and various student responses to interventions and can then adapt practical strategies for addressing those responses. Overall, the teachers of the HP classes used evidence of learning and assessment for selection of tasks, provision of resources for students, and modifying tasks for individual students. This indicates that teaching and learning was planned for the ZPD of HC students and the result for growth for HC students was commensurate with growth of classmates. In addition, the overall growth of students in these classes was ranked the highest. Teachers in the NHP classes used fewer strategies less often for targeting teaching and students in these classes did not make as much progress. The use of evidence to target and plan for student learning and for designing and modifying tasks which scaffold student learning at students’ ZPD is important. Developing processes and policies for gathering evidence of learning, including standardised and formative assessment practices, can support teacher use of evidence to target teaching. These findings point to a need to improve teacher professional development in, and resources for, gathering, recording, and analysing student data for informing instructional practices that target teaching of RC to the needs of HC students; of course, this also applies to other students.

The findings for teacher collaboration with colleagues is concerning. While there are teachers who effectively use assessment strategies, these are not being shared with other teachers. The case study described in Chapter 8 and the findings discussed in 4.5 ‘School and class membership’ (illustrated in Figure 4.15, Figure 4.16 and Figure 4.17), support the assertion that low rates of teacher collaboration is impacting student growth outcomes from class to class within and between schools. Collaborating with teachers that are having greater success with HC students’ RC is a powerful strategy for professional development. This also applies for other quartiles and levels of RC. In addition to building teacher capacity, sharing resources and strategies increases variety and reduces teacher workloads. The scheduling of
professional meetings within and between schools can support networking and encourage collaboration between teachers. Setting up a website or other place for sharing/storing strategies and resources for teaching HC students is also a way for teachers to work smarter rather than harder. This type of collaboration between Primary and Secondary schools, Year 5/6 and Year 7/8 teachers of RC and English, is especially useful for teachers of HC students with limited content and pedagogical knowledge at these higher RC levels.

7.4 Targeting HC students and higher order thinking skills

The importance of higher-order thinking skills for the development of RC was discussed in the literature review section, 2.12 ‘Higher-order thinking skills in RC’. This section investigates teachers’ responses to questions about practices for teaching high capacity students and higher-order thinking skills.

7.4.1 Results

Meeting the needs of HC students. The responses shown in Figure 7.5 are those selected by the teachers to the question stem: Which of the following needs of high capacity students are you currently meeting? The options provided are on the vertical axis and the percentage of teachers that chose this option is shown by the dark grey bar for NHP classes and the lighter bar for the HP classes. Regarding meeting the needs of HC students, there were few differences between teachers of HP classes and teachers of NHP (Figure 7.5). Approximately over half of all teachers indicated that they challenged their HC students (50% and 59% respectively for teachers in HP and NHP classes) and provided access to interaction with intellectual peers (50% and 52% respectively for HP and NHP classes). More teachers in the HP classes provided opportunities for HC students to develop advanced higher-order thinking than those in NHP classes (67% and 55% respectively for HP and NHP classes) (Figure 7.5). Given that findings in the previous sections support the contention that teachers in the HP classes have more targeted teaching practices than those in the NHP classes, it is surprising that fewer teachers in HP classes report that appropriate goals are based on student capacity (33%) compared to teachers of NHP classes (48%) (Figure 7.5).
Figure 7.5: Meeting the needs of High Capacity students

Three months into the REAP project and after completing Module 3: High Capacity Students, teachers were asked about their strategies for teaching high capacity students. Teachers could select one or more strategies from a list of options as well as supplying strategies that were not listed, via a comment box. Figure 7.6 shows the responses selected for the question stem: Which of the following strategies are you using for your high capacity students? The options provided are on the vertical axis and the percentage of teachers who chose this option is shown by the dark grey bar for NHP classes and the lighter bar for the HP classes.

By far the most used strategy for teaching HC students (83%) in both groups related to creating a safe learning environment. Options B, D, F, and I identified supporting a positive classroom culture and personal learning as popular strategies for teaching HC students (Figure 7.6). Interestingly, the selected responses appear to be contradictory for teachers in the HP classes. While most teachers in HP classes encourage students to take risks in their learning (67%) and include teaching self-regulated learning skills (67%), only 17% provide more choice for students in terms of learning. This suggests limited opportunities for students to practice these skills in the classroom. In teachers’ NHP classes, approximately half the teachers indicated that they encourage students to take risks in their learning (52%) and promote individual learning (41%), while far fewer (24%) include teaching self-regulated learning skills and even fewer provide more choice for HC students in terms of learning (10%) (Figure 7.6).
Although only one third (33%) of teachers in HP classes report evaluating the impact of interventions used in the whole of the classroom (Figure 7.3), twice that number (67%) reported evaluating the impact of interventions in reference to HC students (Figure 7.6). In contrast, the number of teachers evaluating the impact of interventions in NHP classes decreased from 39% for whole class interventions (Figure 7.3) to 14% in for interventions for HC students (Figure 7.6). This difference between the two groups of classes is consistent with previous finding that suggest teachers in the HP classes target the needs of students more, and more consistently, than teachers in the other classes.

**Figure 7.6: Strategies used for supporting high capacity students**
Only three teachers indicated “other” and reported strategies not listed in the questionnaire. A teacher from a HP class commented:

I currently accommodate for high capacity learners in the area of RC by providing differentiated learning tasks.

There were two comments from teachers of NHP classes:

I am the Gifted & Talented Coordinator and have a PLC who meets a couple of times per term to direct this area of the school. We are still developing strategies.

and

I use curiosity to engage students.

Planning for HC students. The next two items are about practices for planning for HC students in RC classes. Figure 7.7 shows the responses selected for the question stem: Has a plan been created for supporting high capacity students? The options provided are on the vertical axis and the percentage of teachers who chose this option is shown by the dark grey bar for NHP classes and the lighter bar for the HP classes. No HP class teacher reported a whole school plan for supporting HC students or planning in learning area teams. This infers a lack of support at the school level both in guidance through school policy and organisationally through non-allocation of official collegial meeting time for planning for HC students. 83% of teachers of HP classes plan for HC students in individual classrooms, and, surprisingly, one teacher selected that he/she does not plan for HC students specifically as a group (Figure 7.7). Similarly, in NHP classes almost two thirds of the teachers planned for HC students in individual classrooms, with only 14% reporting a whole school or learning area team planning. In NHP classes, 7% of teachers did not plan for HC students specifically as a group (Figure 7.7). What is clear from these responses is that teachers independently planned for teaching the most able readers in their classroom with no school policy or learning area guidance or supports informing that planning, but that this planning is shared neither with colleagues or likely to be consistent across classrooms. The responses also signal inefficient use of resources, given that teachers seem not to be sharing their practices.
ADDRESSING GROWTH IN READING COMPREHENSION FOR HIGH CAPACITY STUDENTS

19. Has a plan been created for supporting high capacity students?

A. In individual classrooms
   - HP: 64%
   - NHP: 14%
   - Total: 83%

B. In learning area or year level teams
   - HP: 14%
   - NHP: 14%
   - Total: 28%

C. As a whole school policy
   - HP: 17%
   - NHP: 7%
   - Total: 24%

D. No
   - HP: 7%
   - NHP: 83%
   - Total: 90%

HP: High-performing classes (6 classes identified with the greatest mean growth at Q4)
NHP: Non high-performing classes (classes not ranked in the top 6 for mean growth at Q4)

respondents from NHP classes = 29

Figure 7.7: Planning for High Capacity students

Figure 7.8 shows the responses selected for the question stem: Consider how you plan for higher-order skills in RC. Select the practices that best describe your planning methods. The options provided are on the vertical axis and the percentage of teachers who chose this option is shown by the dark grey bar for NHP classes and the lighter bar for the HP classes.

Given teachers in these schools report against Australian/Victorian curriculum guidelines, it was surprising to find that only 33% of teachers in HP classes and 30% in teachers of NHP classes used these as a guide for planning for higher skills in RC (Figure 7.8). Unfortunately, there are no follow up questions to ascertain how teachers selected content, skills, and skill levels for classroom teaching or which learning progressions they use for planning and for assessing students.

In line with previous findings, teachers of HP classes target planning of higher-order skills to student ability levels. None of these teachers specifically include(s) higher-order skills in my lesson plan whereas all of them report that they plan for higher-order skills in student groups according to the group’s level of skill (Figure 7.8). 50% of teachers of HP classes indicate that they plan for higher-order skills using individual student plans (Figure 7.8). Therefore, while higher-order skills are not included when planning lessons, they are included when planning for individual students, a finding that appears to be incongruous for HP classes. In contrast, less targeted planning is reported by teachers of NHP classes, with 57% targeting planning of higher-order skills to group ability level and 30% to individual students (Figure 7.8). Less
teachers from both groups report assessing higher-order skills: 17% for HP and 26% for NHP classes. Few teachers of NHP classes (26%) and even fewer of HP classes (17%) plan to assess higher-order skills (Figure 7.8). Given that higher-order skills are not assessed, one possible inference is that higher-order skills are not appropriately targeted for students in these classes.

<table>
<thead>
<tr>
<th>Practice</th>
<th>HP 26%</th>
<th>NHP 17%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I plan for higher order skills as a whole class</td>
<td>17%</td>
<td>26%</td>
</tr>
<tr>
<td>B. I plan for higher order skills in student groups according to the group’s level of skill</td>
<td>57%</td>
<td>100%</td>
</tr>
<tr>
<td>C. I plan for higher order skills using individual student plans</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>D. I include a plan for assessing higher order skills</td>
<td>17%</td>
<td>26%</td>
</tr>
<tr>
<td>E. I do not specifically include higher order skills in my lesson plan</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>F. The Australian/AusVELs curriculum is my guide for planning lessons</td>
<td>33%</td>
<td>30%</td>
</tr>
<tr>
<td>G. Invalid/no response</td>
<td>13%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 7.8: Planning for higher-order skills

After engaging with Module 3 High Capacity Students, teachers were asked to describe class and school plans and/or practices for supporting HC students. The response required typing text in to a comment box. Of the 39 teachers in this study, 20 teachers in NHP classes and all the 6 HP class teachers responded to this question.

In the NHP, 58% of the teachers who responded to this question indicated that their school had either no plans or strategies for supporting HC students or that the school is working on a plan. Of the remaining teachers, the following two school strategies were indicated: the school facilitates ability peer interaction through ability grouping within and across classes (0% of HP teachers and 21% NHP teachers); explicit teaching of learning strategies that...
include ‘problem solving’ and/or ‘critical thinking’ and/or ‘deeper comprehension’ (50% of teachers in HP and 13% in NHP classes). Considerably more teachers in HP classes said that they included explicit teaching of learning strategies that include ‘problem solving’ and/or ‘critical thinking’ and/or ‘deeper comprehension’.

At the end of the REAP project and after completing all the professional development modules, teachers were again asked to comment about the strategies used for supporting HC students. An aggregate of the comments is shown in Figure 7.9. In Figure 7.9, teacher comments were grouped into four groups: involvement in the REAP project, using ability grouping, using student led learning, and including SRL strategies. The comment is shown on the vertical axis and the percentage of teachers who chose this option is shown by the dark grey bar for NHP classes and the lighter bar for the HP classes.

In comparison to strategies reported before engagement with the modules, the strategies reported in the comments at the end of the REAP project, increased in both variety and frequency. The only strategy that is mentioned before and after exposure to the modules is ability grouping. Teacher engagement with the SRL modules, in particular, appears to have affected teaching practice for supporting HC students. Given that the skills required for student led learning are also SRL skills, the most prominent strategy selected at the end of the project is the inclusion of SRL. There were two standout differences between teachers in HP and NHP classes (Figure 7.9). The first is that, in HP classes, more teachers (67%) cited: *Involvement in the REAP project* than in NHP classes (25%). The second standout difference is that all the teachers in HP classes commented that they used *student led learning* whereas 42% of teachers in NHP class included this strategy. In both HP and NHP classes, 67% of teachers commented that SRL strategies are included in their classroom practices. More HP class teachers use ability grouping than in NHP classes (50% and 33% respectively).
Figure 7.9: Strategies for supporting HC students after REAP modules are completed.

Addressing HC students’ decline in growth. In the final questionnaire at the end of the project, teachers were asked: *What actions have you taken to address the issue of the flat line of the high capacity students?* All 39 teachers in the study entered text in the text box provided. The teacher comments were grouped into the various actions undertaken by teachers. Figure 7.10 shows the aggregated comments for the question: *What actions have you taken to address the issue of the flat line of the high capacity students?* The comments are on the vertical axis and the percentage of teachers who chose this option is shown by the dark grey bar for NHP classes and the lighter bar for the HP classes.

A higher percentage of the teachers in HP classes listed more actions for supporting HC students. There were some marked differences between teachers of HP classes and NHP classes for this item. All the teachers in HP classes identified the HC students in their classroom, differentiated tasks, and learning and grouping students according to ability for RC, and 83% differentiated for HC students specifically. In comparison, 61% of teachers in NHP classes identified the HC students in their classroom, 27% differentiated tasks and
learning and grouping students according to ability students for RC and 9% differentiated for HC students specifically (Figure 7.10).

In Figure 7.10, 83% of teachers in HP commented that they specifically used SRL as a learning strategy compared to 39% of teachers in NHP classes. More teachers of HP classes also specifically stated the following as actions taken to address the HC flat line: participation in the REAP project (67% HP compared with 6% NHP), improving questioning and open-ended tasks (67% HP compared with 0% NHP), and including investigation/project work (67% HP compared with 6% NHP) (Figure 7.10).

In the comments for this item, reference to ‘differentiation’ is made 15 times. To collect more detailed information about how teachers differentiated in general and specifically for HC students, they were asked to: Give examples of strategies for differentiation that you use in your classroom and all teachers commented. The responses for general class differentiation were collated into five main categories:

- individual goal setting
- individual student to teacher reading conferences
- providing open-ended tasks
- use of assessment to: group students and target activities to group ability; group students for focused teaching (e.g., in guided reading); differentiate tasks
- inquiry based learning where students can negotiate topics

Teachers included differentiation strategies specifically for low ability students or students with learning difficulties. These comments were collated into four main categories:

- specialised literacy intervention program (up to ten hours per week is cited)
- ensuring the teacher regularly has all students in a focus group in the daily literacy blocks up to 4-5 times per week is cited
- extra time given to students who are 6-12 months or more ‘below level’
- extra guidance for students of low ability in project work (by teacher or mentor)

No teacher referred to strategies used specifically for differentiation for HC students in response to this question, although low ability students were mentioned. There were no discernible differences between teachers in HP and NHP classes in the comments given for this question.
### Actions undertaken to address the HC flat line

<table>
<thead>
<tr>
<th>Activity</th>
<th>HP</th>
<th>NHP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify HC students</td>
<td>61%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Differentiation of tasks/learning and ability grouping (within and across subjects) as a general class strategy</td>
<td>27%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>SRL</td>
<td>39%</td>
<td>83%</td>
<td>83%</td>
</tr>
<tr>
<td>Differentiation of tasks/learning and ability grouping (within and across subjects) especially for HC/gifted students</td>
<td>9%</td>
<td>83%</td>
<td>83%</td>
</tr>
<tr>
<td>Participation in the REAP project (explicitly stated)</td>
<td>6%</td>
<td>67%</td>
<td>67%</td>
</tr>
<tr>
<td>Investigation/project work (such as Inquiry Based Learning)</td>
<td>6%</td>
<td>67%</td>
<td>67%</td>
</tr>
<tr>
<td>Improve questioning strategies and more open ended tasks</td>
<td>0%</td>
<td>67%</td>
<td>67%</td>
</tr>
<tr>
<td>Match expert RC teachers with HC students - may include networking with secondary schools</td>
<td>6%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Use the curriculum/reading continuum/developmental progression</td>
<td>6%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Policy for managing assessment data (all teacher and from year to year access) includes improving and sharing rubrics</td>
<td>6%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>Team discussion includes HC students</td>
<td>6%</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>n/a</td>
<td>6%</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>Review/update our Gifted &amp; Talented policy</td>
<td>0%</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Create team/identify who is responsible for: identifying HC students and interventions, assessing effectiveness, professional development for teachers</td>
<td>0%</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Nominate a “highly abled student coordinator”</td>
<td>0%</td>
<td>6%</td>
<td>6%</td>
</tr>
</tbody>
</table>

**Figure 7.10: Actions undertaken to address the HC flat line**

- **HP:** High-performing classes (6 classes identified with the greatest mean growth at Q4)
- **NHP:** Non high-performing classes (classes not ranked in the top 6 for mean growth at Q4) respondents from NHP classes = 33
The importance of SRL in improving student outcomes was clearly acknowledged by 100 of teachers who responded. When asked the following two questions, all respondents selected “Yes”:

- Do you think a student’s ability to self-regulate learning impacts their academic progress?
- Do you think that students with higher competence in self-regulated learning show greater progress than students who have lower competence in self-regulated learning?

Teachers within the same school responded differently to the questionnaires. A case study of a school that was found to have among the highest results for RC growth in HC students, was used to investigate strategies utilised in these classes.

**School 5: A case study**

Findings for school 5 were of particular interest. The school had the fourth highest ICSEA value with NAPLAN results above similar schools (Table 3.4). All classes in School 5 were single Year Level classes: two Year 5 classes and three Year 6 classes.

Three of the five classes at school 5 were in the top six highest performing classes for RC growth both at Q4 and for whole class mean growth (Figure 4.15). The other two classes at school 5 ranked in the bottom half when compared to the other 39 classes. It is interesting to note that the two classes that performed the lowest for growth at this school were Year 6 classes and the class that performed the best in the study overall was the third Year 6 class. Each of the Year 5 classes was ranked in one of the top six classes for growth in the study. The only teacher at School 5 that indicated collaboration with colleagues to develop or evaluate assessment, or to plan or evaluate interventions in reading classes, was a Year 5 teacher. The teachers at this school plan in grade/Year levels (the classes are configured in single Year Levels); there is no sharing of formal or informal students’ assessment data across the Year Levels. The results for growth observed at this school further supports the idea that lack of collaboration between teachers prevents consistent growth patterns across schools within the same school. There is collaboration between the Year 5 teachers and these classes performed similarly; there is no collaboration between Year 6 teachers and these classes performed disparately for growth. Teachers whose classes are not performing as well as
others in the school would benefit from regular multi-Year Level meetings in which teachers can collaborate and share information across Year Levels and across reading levels. This is especially true given the questionnaire results indicated teachers lacked access to resources and strategies for teaching HC students in the reading classrooms. The study has limited information about the types of tasks and strategies used to support HC students as few teachers provided this information in the questionnaire comments. More research is required to identify strategies for teaching HC students that explain the differences between the classes that are high-performing for growth at Q4 and those with lower growth in comparison. Indeed, comparing strategies used in classes that achieve relatively higher growth in any of the Quartiles as well as across Quartiles would help in identifying strategies that not only support HC students, but all students to progress in RC to their fullest potential.

7.4.2 Discussion

The reading assessments showed the growth outcomes for students for a six-month period during which teachers used a variety of strategies in their classroom. It is difficult to ascertain reasons for these strategies from the closed responses and limited text collected from the teacher questionnaires. It is also recognised that no one strategy operates in isolation and that there are many other factors involved when teaching RC to Year 5/6 students in Victorian classrooms. These include teacher-student relationships, pedagogical expertise in teaching RC, and specific classroom environment. These limitations aside, it was possible to profile certain strategies or groups of strategies that were associated with greater growth in classes for RC than others were. These include strategies for grouping students, the nature of tasks given to students, teacher use of assessment and evidence of learning, inclusion and support of SRL and strategies for targeted teaching.

In the best performing (or High-performing, HP) classrooms, there is a flexible approach to grouping with students generally grouped in mixed ability or for interest/friendship groupings. Half of teachers reported teaching all students in their class while the other half reports that not all students are taught by the classroom teacher. This revealed an important issue regarding linking teacher to student achievement when multiple teachers have responsibility for students. This is also important for differentiating between tasks offered to students given that teachers reported that they give different tasks per student ability as well
as giving all students the same task that covers a range of abilities. There were no follow up questions for why and when students were grouped in certain ways. Consequently, it is not possible to ascertain any link between grouping and type of task and student outcomes.

Collecting evidence of student learning is widespread. All teachers of the HP classes report collecting evidence of learning and most use evidence (including ARCOTS reports) to select interventions and modify teaching and tasks for individual students. Evidence is also used to identify student ZPD including identifying the HC students in the classroom. These teachers use formal and informal assessment to target teaching to student ability and for planning and evaluating classroom interventions thereby effectively completing the teaching cycle illustrated in Figure 7.11.

![Teaching cycle diagram](image)

*Figure 7.11: Teaching cycle*

In this study, teachers try to meet the needs of HC students by ensuring that these students are challenged, have access to intellectual peers and opportunities to develop advanced higher-order thinking skills. Teachers of HP classes plan for HC students in individual classrooms and evaluate the impact of learning interventions for HC students specifically. Half the teachers in classrooms that achieve the greatest growth over a six-month period, plan to teach higher-order skills to the entire class rather than targeting HC students directly. This suggests a classroom environment that includes metacognitive challenges and constant striving for higher metacognitive skills. Coupled with targeting student ZPD, this encourages students to both identify and work towards higher-order skills, thereby facilitating access to the next level whatever the student zone of actual development (level of ability) may be.
Ironically, while teaching collaborative learning skills to their class, teachers of HP classes report that they do not work collaboratively with colleagues to develop or evaluate assessments, or to decide on or evaluate interventions for the HC students in their class or at their school. This could explain why there is variation between classes within the same schools for growth, and specifically between Q4 and the other three Quartiles (as illustrated by Figures 3.10, 3.11, and 3.12). This points to lack of effective professional planning opportunities where resources and expertise can be shared and where student outcomes can be compared, and assessment moderated between classes. Official planning time is not set aside for collaboration on teaching HC students and collaboration does not occur informally, therefore teachers do not have the opportunity to share or access resources and strategies from other teachers. The lack of collaborative planning opportunities may be due to meeting structures that do not include opportunities for teachers to meet across year levels for formal discussion and planning for HC students. Teacher collaboration increases the pool of ideas so that the teacher has more strategies to draw from as he/she strives to meet the individual needs of the students in the class. It also encourages multiple perspectives and discussions that result in strategies that are more refined and readier for use prior to implementation and more feedback and expertise to evaluate the success of those strategies across the school. Collaboration with teachers of HP classes give all teachers access to successful strategies for teaching HC students, therefore benefiting all students in the school, not just the HC students in individual classes. Lack of collaboration between teachers is one explanation for the inconsistent student outcomes between classes in the same school where growth in RC is associated with which teacher teaches the class, rather than the teaching resources available at the school.

Contrary to providing increasing opportunities for students to take responsibility for their learning and thereby practice positive self-regulated learning strategies, teachers of students in lower performing classes for growth at Q4 do not promote SRL to individual HC students. Given that, by definition, HC students are in the minority, it is expected that there are times when they would be working in the classroom at a level of ability at which there are fewer students to provide support; this results in increased need for independent motivation and discussion of metacognitive content. HC students have less choice in terms of mentors or intellectual peer discussion, therefore SRL becomes increasingly important (the importance
of access to intellectual peers is emphasised in the forthcoming discussion about Vygotsky’s learning theory. Two thirds of the teachers in the highest performing classes teach SRL skills to HC students. This suggests an important link between SRL skills and RC growth at Q4. However, although HC students are being taught these skills, they have less opportunity to practice them because they have limited choices regarding their learning. This may explain why, even though HC students have higher SRL skills, they may not have the relevant opportunities to exercise these skills to improve their learning outcomes. Development of SRL skills not only requires practice and the opportunity to keep improving SRL competence, but also feedback about performance. In this study, teachers do not share SRL assessment with their students or individually discuss their SRL ZPD using an SRL learning progressions; this limits valuable feedback students can use to improve their skills in SRL and improve RC learning strategies and processes. Similarly, reading assessment results are not discussed or shared with students, directly affecting student ability to apply a range of SRL skills to develop their RC skills.

Included in the lack of general collaboration between teachers, planning for HC students occurs by the teacher in individual classrooms with no such planning taking place at either team or school levels. While there may be extracurricular academic activities such as book or chess clubs offered to all upper primary school students, there is generally no whole school approach to meeting the needs of the HC students with teachers reporting that they have little time or support to meet the needs of these students. Teacher comments indicate that most of their focus is on students with challenging behaviours or at the lower or lowest levels of academic ability. Informal discussions with teachers and teaching teams reveal a sense of urgency to ensure a minimum level of RC, especially before students in Year 6 move to larger schools to transition to Year 7. In informal conversations, teachers communicate a reluctance to include content that may be taught in Year 7 for fear of the student having to repeat content the following year and ‘spoiling their Year 7 experience’.

To summarise teaching practices thus far, the greater majority of teachers from the HP classes work alone and employ more targeted teaching strategies more frequently than the teachers of NHP classes did. SRL skills are taught equally to all students in the class, while opportunities for students to exercise these are limited. Evidence of learning is used to inform and evaluate
teaching practices; however, these are not shared with students or colleagues, even though goal setting features prominently in the teachers’ responses.

In addition to difference in growth trends between Q4 and the other Quartiles, the study found differences between groups of students within Q4. Reading assessments revealed that HC students not only outperform most of their classroom peers, but some HC students also outperformed their teachers. Given Vygotsky’s learning theory regarding student zone of proximal development (ZPD) (Vygotsky, 1978a) and Tharp and Gallimore’s 4 stages of Vygotsky’s model (Tharp & Gallimore, 1991) teacher content knowledge may be affecting student RC progress where students are outperforming their teacher and all, if not most, classroom peers. The lack of access to a more knowledgeable other can limit access to resources for scaffolding learning at the students’ ZPD. It is not clear from the data collected in this study if and how pedagogical practices are adapted to meet the needs of HC students in this context and whether these students have access to others with higher RC. Given the findings for teacher collaboration, it is unlikely that teachers are turning to colleagues who may have greater RC or expertise in teaching HC students.

Collegiality, support, and communication between teachers and school support of the teacher and individual teacher/student circumstances are crucial to facilitating continual and equitable progress for students of all abilities. The teacher questionnaires revealed that teachers in the classes that achieved the greatest mean growth had low levels of collaboration for sharing information about teaching HC students with other teachers. Teacher comments in the questionnaires and anecdotally infer that school/professional learning teams focus on lower and/or middle reading levels as a priority and there is limited time for planning and discussion in already full meeting agendas in which HC students come at the end if at all. HC students are considered to be ‘Ok’ and ‘doing fine on their own’. Specific and formal inclusion of items about HC students in regular meeting agendas and professional discussions facilitates and improves teacher collaboration that will no doubt inform teaching HC students and benefit student outcomes. This collaboration should also be extended between schools which would increase the resources available to teachers of HC students as well as to HC students; such collaborations benefit all students and not just HC students. Although few Primary teachers said that they consulted with Secondary teachers about teaching HC students, there was no indication of collaboration between Primary schools.
7.5 The impact of the REAP project and professional development modules

The REAP study, from which all the data for this study were collected, was intended as a non-experimental study. However, there is no doubt that the teacher professional development modules did impact teacher perspectives, knowledge, and practices. This is especially evident after engagement with the two Self-regulated learning modules. At the end of the 2016 project, teachers reported that their practices for teaching both HC students and SRL improved in areas that aligned with improved targeted teaching. The module questionnaires were administered after teachers had engaged with the modules and most of the questions. Consequently, the teacher responses to the items in the questionnaires are subject to the Hawthorne effect (Mayo, 2004) especially in cases where the question related directly to content from the module that is recommended classroom practice. All classes and teachers received the same treatment in the REAP project and there were no control groups; therefore, it was not possible to separate the effects of the participants involvement in the study from other variables impacting outcomes in RC and in SRL. This presents important limitations.

The 2016 timeline was prohibitive to exploring the impact of the modules on student outcomes; however, anecdotal responses from the teachers (in the form of emails to the REAP team) indicate they provide convenient and useful resources for teachers in the use of assessment and for teaching HC students and SRL skills in Victorian classrooms. Given the limited time teachers had to reflect on and incorporate the content of especially the later modules, it would be valuable to follow up on these teachers in a longer study to investigate the effect of the REAP project on their teaching practices and student growth trends beyond 2016. This is especially relevant to support the recommendation of online professional development modules as an effective design for teacher professional development and as effective recommendations for strategies that support the development of RC for HC students in Year 5/6 classrooms.
Chapter 8: Case study: School 5

The findings for School 5 were of interest due to the range of results for RC growth. There were five classes that participated in the study from School 5 and three of these classes were in the top six highest performing classes for RC growth both at Q4 and across Qs; the other two classes at school 5 ranked in the bottom half. The RC and SRL assessment results for students and teachers and the responses to the teacher questionnaires for School 5 were compared between classes and Year levels and similarities and differences were found. The case study contributes to the third research question: ‘How do teachers effectively support Year 5/6 high capacity students to achieve gains in RC commensurate with class peers?’

Comparing assessment results. All classes in School 5 were single Year Level classes. There were two Year 5 classes and three Year 6 classes. It is interesting to note that the two classes that performed the lowest for growth at this school were Year 6. Each of the Year 5 classes was identified as one of the top six classes for growth and the class that performed the best in the study overall was a Year 6 class. The ranking of classes in School 5 and assessment results are shown in Table 8.1. The two classes that performed in the lowest 50% overall are shaded to clearly differentiate between these classes and the top performing classes. The SRL mean for School 5 is 51.66. The range of ARCOTS performance levels for the RC assessment at T1 for all Year 5/6 students ranges from Level D to K. The one student in Level K was in the Year 5 class with the lowest performance for growth in the school (class 5_35). This student’s T2 performance increased by 15.05% when compared to T1. The teacher of class 5_35 had the equal lowest score for RC with the teacher of the highest performing class (5_14). Unfortunately, the student at level K did not complete the SRL assessment so a comparison between SRL and RC gains could not be made. The number of reading levels in individual classes ranges from four to seven. Class performance decreased as the range of levels increased suggesting that teachers find it more difficult or are less effective in teaching classes where there is a wider range of student RC ability.
Table 8.1: School 5 assessment results

<table>
<thead>
<tr>
<th>Rank: highest to lowest for growth</th>
<th>Class/teacher</th>
<th>Year Level</th>
<th>Teacher RC</th>
<th>AR</th>
<th>ARCOTS reading level range of at T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within School 5 for all 39 classes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td>1st</td>
<td>5_14</td>
<td>6</td>
<td>63.75</td>
<td>*51.26</td>
</tr>
<tr>
<td>2nd</td>
<td>3rd</td>
<td>5_36</td>
<td>5</td>
<td>69.31</td>
<td>**49.82</td>
</tr>
<tr>
<td>3rd</td>
<td>5th</td>
<td>5_45</td>
<td>5</td>
<td>67.33</td>
<td>55.04</td>
</tr>
<tr>
<td>4th</td>
<td>23rd</td>
<td>5_13</td>
<td>6</td>
<td>71.48</td>
<td>50.75</td>
</tr>
<tr>
<td>5th</td>
<td>28th</td>
<td>5_35</td>
<td>6</td>
<td>63.75</td>
<td>50.90</td>
</tr>
</tbody>
</table>

Note.  
Total n Year 5/6=101; the mean number of students per class = 20  
*only 50% of the class completed the SRL questionnaire  
** n=17

The lowest performing class had seven levels for RC and the next two lowest performing classes for growth had six RC levels each. Although both 5_45 and 5_13 had the same range of RC, the teacher who performed the highest in the RC assessment was the teacher with the lower performing class (Table 8.1). Each of these two classes had one student at the lowest level. However, the higher performing of the two classes (5_45) had the higher mean SRL. In fact, 5_45 had the highest class mean for SRL at School 5 and the second highest class mean SRL of all 39 classes in the study. This tends to support the assertion that high SRL ability is linked to more progress in RC. This finding is echoed in the comparison between 5_45 and 5_13 where the highest performing class had the lower teacher RC, but a higher SRL mean; however, this finding is not consistent across all classes. As indicated, only half of the students in the highest performing class (5_14) were administered the SRL questionnaire; therefore, it is not possible to ascertain an accurate mean of student ability to SRL in this class.
Consequently, there is no definitive finding for the extent to which SRL or teacher RC, or SRL and teacher RC impact on RC outcomes in School 5.

**Collegial collaboration.** The teachers at this school said that they plan in Grade/Year Levels (the classes are configured in single Year Levels) and that there is no sharing of formal or informal student assessment data across the Year Levels. The only teachers at School 5 who indicated collaboration with colleagues to develop or evaluate assessment, or to plan or evaluate interventions in reading classes, were the two teachers at Year 5 and these two classes performed similarly (2\(^{nd}\) and 3\(^{rd}\) for class mean growth compared to the other classes at the school). The results for growth observed at this school support the idea that lack of collaboration between teachers prevents consistent growth patterns across classes within the same school. There is collaboration between the Year 5 teachers and these classes performed similarly; there is no collaboration between Year 6 teachers (or between Year 5 and Year 6 teachers) and these classes performed disparately for student progress in RC. There are implications here for the organisation of professional learning teams. In School 5, lesson-planning teams consist only of teachers from a single year level rather than including meetings between teachers from different year levels. Although teachers are free to collaborate outside of formal meetings, in the busy routine of schools, teachers often limit to formal meeting times or sporadic, chance encounters. The similar results for student growth in RC at Year 5 and the teacher responses to the relevant questionnaires suggest effective collaboration between Year 5 teachers at School 5. There is no such collaboration between the Year 6 teachers whose classes did not perform as well.

Over two thirds of all the teachers in the study (68%) plan for HC students in individual classrooms Figure 7.7, including all five teachers at School 5. The most successful teachers are not formally sharing their expertise, strategies, and/or resources with other teachers in the school. Expanding professional learning teams and extending collaboration beyond the single Year Level would provide opportunities for access to and exchanges of successful teaching strategies and processes across the school for teachers of other Year Levels. It would also emphasis a learning continuum that extends beyond any one grade and support exchange of resources beyond the lower and upper levels in any individual class. In effect, the school becomes one large class with multiple teachers who have a range of expertise, strategies, and resources for targeting and supporting a range of student abilities. In such a school, the
increased combined instructional efficacy of teachers discourages individual student disadvantage due to teacher limitation and encourages consistency across classes. This is especially relevant given that, in the teacher questionnaires, teachers indicated they lacked resources and strategies for teaching HC students in the reading classroom. (Figure 7.5, Figure 7.6).

**Use of assessment and targeted teaching.** The teachers in the three highest performing classes at School 5 said that they used information from the ARCOTS reports to modify teaching for individual students, modify the tasks given to students, and provide resources for students (Figure 7.2). These finding can be used as a measure of the extent to which these teachers targeted student ZPD when planning and implementing lessons. In addition, these teachers selected the option, ‘use evidence to identify student zone of proximal development for individual students’ when asked to select from a list of teaching practices (Figure 7.3). In contrast, only one teacher of the lowest performing classes selected this option. No teacher of the lowest performing classes said that they used information from the ARCOTS report to modify teaching for individual students, modify the tasks given to students, and provide resources for students (Figure 7.2). Another important difference between the highest performing classes and other classes is that the teachers in the highest performing classes use evidence of learning to target student needs more often. Although both teachers of the lower performing 5_13 and 5_35 said that they meet the needs of HC students by setting appropriate goals based on their capacity and ensured that the students were challenged, neither of them said that they provided opportunity for these students to develop higher-order thinking skills (Figure 7.5). In contrast, teachers of 5_45, 5_36 and 5_14 included all these strategies for meeting the needs of HC students. Furthermore, all teachers in the higher performing classes said that they plan for higher-order thinking skills in student groups according to the group’s level of skill, and two of these teachers include higher-order thinking skills in individual learning plans (Figure 7.8).

**SRL School 5 classrooms.** There were fewer differences in teaching practices for SRL between classes in School 5. The results for SRL in the classroom for school 5 aligned with those for the general study population reported in ‘Chapter 6 Self-regulated learning in the classroom’. Each of the five teachers from School 5 agreed that ‘a students’ ability to self-regulate learning impacts their academic growth’ and that ‘students with higher competence in self-regulated
learning show greater progress than students who have lower competence in self-regulated learning’. Teachers in 5_14, 5_45 and 5_35 said that it is ‘important to plan for teaching self-regulated learning’, although only 5_14 and 5_35 ‘specifically include elements of self-regulated learning when planning lessons’. Interestingly, the two teachers who plan for SRL had the highest class mean for SRL in the school (Table 8.1). The teacher of class 5_36 neither planned for SRL nor said that it was important to plan for SRL and this class had the lowest mean SRL in School 5. Although the sample is small, the findings suggest that students whose teachers plan for SRL when planning for their class perform better in SRL than students of teachers who do not. Class 5_45. The high result for class mean for SRL is consistent with the responses given by the teacher about their classroom practices in SRL. Not only did the teacher of 5_45 plan for SRL, he/she also included ‘elements of SRL when planning lessons’, planned for SRL ‘according to the group’s level of SRL’, used the SRL developmental progression, and discussed the SRL developmental progression with students. In this class, including strategies for teaching SRL is associated with higher levels of student SRL. The top performing classes at School 5: 5_14, 5_36 and 5_45. There were other similarities between the teachers of the classes that had the highest RC growth. At the end of the REAP project, teachers were asked to ‘briefly describe strategies you use for supporting high capacity students’. The comments from these three teachers are given in Table 8.2. What the responses have in common is that they are all strategies for targeting teaching to the individual needs of the students, which includes the RC ability of the students. Setting goals and giving students some control over their learning is also a feature of these classrooms, as is the use of questions to raise the level of thinking and difficulty of tasks. In contrast, the teachers of classes 5_13 and 5_35 did not offer any strategies for supporting HC students. The teacher of 5_13 commented that ‘this is why I joined the REAP project’, and the teacher of 5_35 made no comment.
At the end of the REAP project, teachers were also asked: ‘What actions have you taken to address the issue of the flat line of the high capacity students?’ The comments from the top performing classes in the school are compared with those from the other two classes. In Table 8.3, the responses from the three high-performing classes are compared with those from the non-high-performing classes. The comments from the teachers of the high-performing classes focus on assessment; targeting teaching toward student learning needs, including ZPD; and SRL skills such as self-reflection, goal setting, attention focusing, task interest, and self-
evaluation. In contrast, the comments from the teachers of the non-high-performing classes are non-specific, and refer generally to ‘differentiation’, ‘strategies’, and ‘scaffolding’. There is a clear lack of practical understanding about the needs of HC students and lack of knowledge about strategies that can be used to address the growth decline in HC students. These comments can be linked to the low class and Q4 mean growth in both these classes; in fact, Q4 in class 5_35 the mean growth indicated that the RC performance of these students was lower at T2 than at T1 (Figure 4.17, Chapter 4). What is also evident from the comments is that there is no communication or collaboration between the teachers of high and low-performing classes; teachers of low-performing classes appear to be still looking for strategies, while teachers of high-performing classes are implementing strategies.

Table 8.3: Actions taken to address the issue of the flat line of high capacity students: Comparing high and low-performing classes for mean growth at Q4

<table>
<thead>
<tr>
<th>High-performing classes: 5_14, 5_36, 5_45</th>
<th>Low-performing classes 5_13, 5_35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowing students to inquire/ self-direct their learning by selecting what they want to know more about and further developing skills by further inquiring into concepts of interest</td>
<td>Differentiated groups</td>
</tr>
<tr>
<td>Be more aware of my questioning strategies and teaching them to</td>
<td>Differentiation of the curriculum to provide more challenging content and Learning tasks</td>
</tr>
<tr>
<td>Regulate their own learning</td>
<td>Learning about and implementing strategies</td>
</tr>
<tr>
<td>Set individual learning goals and discussion around self-regulated learning</td>
<td>Open ended Scaffolding</td>
</tr>
<tr>
<td>Continuing to find opportunities to extend student</td>
<td></td>
</tr>
<tr>
<td>Facilitating students with identifying: their goals, if those goals are realistic, and pathways to achieve their goals - ways of evaluating when they thought they were on track or not, and what to do to when they were not on track their results compared to their goal and evaluating what they could do in the future to achieve their goal</td>
<td></td>
</tr>
<tr>
<td>Work is based on students’ needs and determined by pre/post tests</td>
<td></td>
</tr>
<tr>
<td>Teacher focus groups to extend/ support students</td>
<td></td>
</tr>
</tbody>
</table>
The School 5 teacher responses to the questionnaire suggest that there are teachers with expertise and range of strategies for effectively targeting teaching toward RC levels in Q4 and the needs of HC students; there is no progress decline compared with the other Quartiles. The growth outcome for HC students in these classes is like those of students of lower ability levels. The lack of expertise and strategies for teaching HC students implied in the comments from the teachers in the non-high-performing classes explains the disparate growth between Quartiles, and especially the decline in growth at Q4.

Although there is no significant difference between the absence of specific strategies for differentiation, supporting the needs of HC students, and targeted teaching is not only reflected in the decline in progress at Q4 compared to other Quartiles in the class, but also the lower mean growth for the class. It should be noted the unit of measure is the ranking position of the class when mean growth for Q4 is compared with the other classes; there was no significant difference between mean class growth for classes in School 5. However, there was a significant difference between 5_14 and 5_35 for RC mean growth for Q4 ($p < 0.05$). Classes 5_14 and 5_35 were both Year 6 classes where all Q4 students performed at Levels I-K and the ARCOTS performance of these two teachers was identical. The differences in growth trends for these two Year 6 classes may be explained by the differences in teaching strategies for supporting HC students as was shown in Table 8.2 and Table 8.3.

8.1.1 Summary

The case study of School 5 showed that there were differences between classes that performed better than other classes for Q4 and class mean growth. The teachers of the three highest performing classes used more strategies for targeting teaching toward student needs and RC ability both for individual students and groups. They included strategies to encourage higher-order thinking and used assessment to target student ZPD.

The classes of teachers who collaborated had similar mean growth outcomes for both HC students and whole class when compared with two of the three classes where teachers did not collaborate. The only class in which SRL was actively planned for was 5_45 and this class had the highest class mean for SRL and was the third highest for Q4, RC mean growth.

The number of ARCOTS Levels assessed at T1 was used to measure the range in RC ability in any given class; it was found that the greater the range of RC ability, the lower the RC growth
for students overall. In the classes at School 5, the mean growth at Q4 decreased as the range of student ability in the class increased.

The teachers in School 5 can be divided into two groups. The first group includes the Year 5 teachers who: collaborated, used assessment of RC to plan for teaching HC students, targeted student ZPD and individual needs, included specific strategies for teaching HC students, and included strategies for preventing a decline in growth outcomes for HC students. And the second group includes the Year 6 teachers who did not do all these things.
Chapter 9: Conclusion

While previous studies (J. Chall & Snow, 1982, p. 8) found that High Capacity (HC) students show statistically less growth in reading comprehension (RC) than other students, this study specifically addressed the RC progress of Year 5/6 students compared to class and year level peers. In addressing growth in RC for HC students, three main themes emerged: the growth patterns for HC students were different to those of other students; student ability to self-regulate learning was linked to RC ability and progress for HC students; classroom and teaching practices were identified in classes where HC students achieved gains in RC at least commensurate with class peers. These findings are directly linked to the three research questions: What are the differences in RC gains for Year 5/6 high capacity students compared with class peers? To what extent is self-regulated learning associated with RC gains for Year 5/6 high capacity students? How do teachers effectively support Year 5/6 high capacity students to achieve gains in RC commensurate with class peers?

This chapter summarises the major findings of the study and discusses some of its limitations. It then discusses implications and future directions.

9.1 Summary of major findings

In addition to anchoring the research, these research questions provide a framework for discussing key findings. Description and comparison of assessment results and RC growth trends make it possible to identify similarities and differences in growth between quartiles for RC achievement and between Year levels.

9.1.1 Differences in growth trends

Progress in RC made by Year 5/6 HC students over approximately six-months was significantly less than for other students. Teaching and learning RC for students with scores at the higher RC levels was less effective than at the lower levels. HC students in Year 5 made better progress that those in Year 6 to the extent that Year 5 students progressed to the same RC levels as the Year 6 students by the second RC assessment. The decline in progress does not bode well given that Year 6 students are on the cusp of transition to secondary schooling
which has been associated with a further ‘significant decline’ in RC achievement scores (Hopwood, Hay, & Dyment, 2017, p. 54).

Given that the growth trends differ relative to student reading level, teaching strategies need also differ. Differentiation in the reading classroom is as important for higher achieving students as it is for lower achieving students (Valiandes, 2015). Teachers in the high performing classes in which high capacity students progresses the most, also employed strategies for differentiation such as using assessment to plan teaching and planning for higher order skills according to the group’s level of skill. However, ability to differentiate and target teaching to student needs assumes teacher knowledge of RC including skills and processes.

9.1.2 Teacher content knowledge and reading comprehension growth

Findings concur with Kelcey’s research using multilevel analysis to assess teachers’ reading knowledge and the effect on student’s achievement: the assessed level of RC for teachers varied (Kelcey, 2011; Kelcey & Carlisle, 2013). The highest performing teachers performed at only one reading level above the reading level of 58% of HC students in Year 6. The gap between teacher and student content knowledge and/or RC performance is troubling given that teachers are viewed as qualified professionals and expected to have RC skills greater than most of their primary aged students. Hattie’s 2017 updated list of factors influencing student achievement measured the effect size of TCK (referred to in the article as ‘subject matter knowledge’) at an very low 0.09 (Killian, 2017). However, the progress for students who outperformed their teacher was significantly less than for those who did not, implying that the effect of TCK is greater on these students. The absence of exposure to someone with greater RC level, be it teacher, other staff or student, is associated with a decline in RC growth. Interestingly, students who made the most progress and outperformed their teachers by the end of the study had the highest levels of self-regulated learning (SRL). Although the sample size was small, and it was not possible to confirm statistical significance, these findings point to important trends that have implications for teacher professional development and classroom practices.

In students who did not outperform their teacher, TCK was not found to be a significant factor. This aligns with previous research asserting that there are other and more influential factors
and teacher content knowledge does not explain student achievement and the differences in RC growth trends between HC students (Boekaerts & Corno, 2005; Coe et al., 2014; Hattie, 2008). What is becoming more emphasised is role of SRL and factors which contribute to student opportunity to learn, classroom practices and culture, and teaching approaches. Direct instruction and providing opportunities for students to practice and develop SRL skills must be supported by class teachers who in turn need to be supported with resources and professional development in pedagogical content knowledge as well as RC content knowledge (Carlisle, Kelcsey, Berebitsky, & Phelps, 2011; Griffith et al., 2015).

9.1.3 Self-regulated learning and reading comprehension

Given the similarities between RC and SRL constructs, it was not surprising that a link was observed between SRL and RC: SRL increased as RC and RC growth increased. Dermitzaki, Andreou and Paraskeva (2008) draw distinct comparisons between capabilities for RC and those for SRL. Goal setting, self-monitoring, regulation of cognitive and metacognitive processes and evaluation of outcome performance are types of behaviours and strategies associated with higher order thinking in RC, as well as in highly self-regulated students (Afflerbach et al., 2015; Dermitzaki et al., 2008). Furthermore, these attributes are found in greater abundance in higher performing students compared to lower performing students (Afflerbach et al., 2015). The differences between high and low achievement in RC and progress made in RC can be understood by examining student ability to regulate learning and successfully apply aspects of SRL to reading tasks. In line with our understanding of RC (see Section 2.1), high performing students can be identified as “skilled, active and self-regulated before, during and after reading, using the repertoire of their skills and strategies to the full” (Dermitzaki et al., 2008, p. 476).

It is not only possible, but important to measure and assess SRL and use this information to support student RC learning and progress (Dermitzaki et al., 2008). In support of Panadera’s findings, the study finds clear indicators of SRL skills and strategies that support achievement in RC (Panadero, 2017). Roll and Winnie (2015) make the astute point that “a learner’s environment constrains the possibility of achieving particular goals and of taking particular steps to approach a goal” and that “interventions are affordances that agentic learners meld with other elements in the context as they perceive it to regulate learning” (Roll & Winne,
2015). In addition to TCK, the teacher’s role in giving instruction and creating and supporting a learning environment conducive to the practice and ongoing development of SRL and RC is crucial (Panadero, 2017).

Students from the lowest RC quartile to the highest RC quartile are at different developmental levels and have varying levels of skills. The decline in RC progress for high capacity students, suggest a lack of opportunity to learn and apply/display RC beyond basic or surface knowledge (Winne, 2018). There are obvious implications for the progress of high capacity students who require support in developing higher order skills and deeper knowledge beyond that which is targeted towards the lower RC levels of their classroom peers. As a method of providing this support, SRL is a critical element in the classroom and a necessary inclusion in classroom and teaching practices.

9.1.4 Classroom and teaching practices

Although all teachers acknowledged the importance of the role of SRL for academic progress, the study revealed inconsistencies and gaps in classroom and teaching practices regarding SRL.

**SRL in the classroom.** Opportunity to learn, practice and develop SRL strategies in the classroom is inconsistent. There is a disjuncture between teacher belief that SRL is important and the specific inclusion of SRL capabilities and planning for teaching SRL. Although, teachers supported the idea that developing SRL improves RC growth outcomes, it is problematic that this belief does not translate into classroom practice.

Zimmerman (2008) and Perry, Phillips, & Hutchinson 2006 emphasise the importance of teacher instruction of SRL and the need to mentor teachers in this area. The study also concurs with Panadero who found that teachers need training to teach SRL and for how to teach SRL at ‘different educational levels’ (Panadero, 2017), p. 23).

**Grouping students.** Teachers used a variety of strategies for grouping students, however it was not clear when and for what purpose these were employed. Grouping students sometimes by ability and sometimes by interest/friendships was the strategy most associated with RC growth for HC students. HC students in these classes had the opportunity to work with like ability students and like-minded peers giving them the benefit of both types of
grouping. It was also found that students were grouped within and across classes in schools, so teachers did not teach all the students in their class all the time, making it difficult in these cases to determine the effect of the individual teacher on student outcomes.

Although the study found a variety of grouping strategies, evidence of the effect of these strategies on student learning is limited. Hattie’s effect size for ability grouping (0.12), within class grouping (0.18), and ability grouping for gifted students (0.3) are low and below average where > 0.4 is important for educational research (Hattie, 2012; Killian, 2017). According to Hattie, small group learning has the highest effect size for grouping strategies (0.47); however, this type of grouping was not given as an option in the teacher questionnaire and nor was it mentioned by the teachers in the study.

Grouping strategies that may or may not benefit HC students should not be to the detriment to other students. At best, the research regarding grouping indicates some benefit of ability grouping for gifted students while negative effects are indicated for lower achieving students (Francis et al., 2017; Wood, 2017). Any recommendation for grouping practices and related school policy must be informed by evidence and take into account the impact on students of all abilities. Furthermore, the link between research and practice is crucial. Disturbingly, Francis et al’s (2017) research into the effects of grouping practices show a lack of impact of research on ability grouping on classroom practices and grouping policy in England, a trend we do not want to follow in Australian schools.

**Types of tasks.** Almost all the teachers of the highest performing classes said that they allocated tasks based on student ability. The link between this strategy and student progress is supported in the literature.

Selection of text and type of task to target teaching in RC classes is a complex process. This process is informed by many variables including the classroom environment, ability of students, available resources and teacher expertise (Fisher & Frey, 2015). Classes for which teachers gave students different tasks based on their ability performed better overall. The targeting of tasks to student ability was an effective strategy for HC students. The selection of tasks is at the core of differentiated instruction in mixed ability classrooms (Valiandes, 2015). Selection and allocation of appropriately targeted tasks prevents teaching to the middle thereby limiting student opportunity to learn to the average ability of the class, rather than the actual ability of the student (S. Willis & Mann, 2000). This strategy gives students
access to resources that encourage and supports them to make progress in RC at a levels beyond the average ability of the class; Tomlinson (2015) refers to this as “teaching up” (Tomlinson, 2015, p. 3), where students are both challenged and supported.

**Targeted teaching.** Overall, teachers of the highest performing classes reported using more strategies more often to target teaching toward the RC learning needs of HC students. The strategies employed included use of assessment and evidence of student learning, planning strategies, and inclusion of higher order thinking skills. Using a variety of strategies aligns with practices associated with targeted teaching which involves different strategies for supporting the needs of individual students and the variety of student zone of proximal development in any given classroom (Goss & Hunter, 2015).

**Teacher collaboration.** Professional collaboration, including in teacher professional development, is critical for individual and consistent whole school change in practice (Butler, Lauscher, Jarvis-Selinger, & Beckingham, 2004). Although more teachers in the high-performing classes included teaching collaborative skills, teachers were less likely to collaborate with colleagues, including colleagues in the lower performing classes. This had implications for the range of class results and results for HC students between classes. Although collaboration between teachers was higher for teachers of the lower performing classes, fewer teachers in the highest six performing classes collaborated to develop assessments, evaluate assessments, decide on interventions, or evaluate interventions. This was ironic given that almost all these teachers taught collaborative learning skills compared to half of the teachers of the classes with the lowest growth for HC students. This placed SRL outside usual practices for teaching rather than incorporating SRL across all teaching and emphasises the need for teacher professional development in this area (Panadero, 2017).

One reason for the lack of collaboration between teachers might be in the structure of the professional meetings reported. If teachers met in Year Level teams only, there was less opportunity for them to collaborate across Year Levels. Therefore, any development in knowledge and expertise of teachers in each of the Year Levels was limited by that of other teachers in that Year Level. Unfortunately, teachers were not asked about the structure of school meeting schedules. Given that teachers were already under pressure for time, it is unlikely that collaboration with other teachers would occur unless meetings were formalized.
However, these meetings need not always be face to face; collaboration between teachers could be facilitated by technology such as FaceTime, Zoom Video Conferencing or Skype, where parties can meet virtually. The allocation of a staff member to arrange such meetings would also support collaboration between teachers. HC students could collaborate with intellectual peers in the same way.

**Challenging HC students.** Given the importance of targeted teaching, it is problematic that approximately half of the teachers in this study said that they challenge their HC students, include opportunities to develop higher order thinking skills, or target higher order thinking skills in their teaching. All six teachers of the highest performing classes for growth, however, planned for higher order thinking skills per the level of skill of the group of students. Although only half of these teachers used individual student plans for planning for higher order thinking skills, these findings align with previous research that recommend modifying and challenging students to support and accelerate growth in reading through higher order thinking (Peterson & Taylor, 2012).

Few teachers overall had a plan for assessing higher order skills which implies that these skills are insufficiently measured and monitored. Similarly, there was no indication regarding the success of teaching strategies implemented for supporting higher order thinking as these skills were not sufficiently assessed.

**What appears to be working and some challenges.** The highest performing classes used multiple strategies for targeting teaching of RC towards individual and group ability. There was also a link between planning for teaching SRL and student SRL levels with high student SRL levels linked to teachers who reported planning for teaching SRL in some Year 5 classes.

The classes with the widest range of RC levels had the lowest growth for HC students and for all other students. This reflects the difficulty many teachers report in teaching across a wide range of ability including the challenges they face when attempting to translate their belief in differentiated teaching into teaching practice (S. Willis & Mann, 2000)

Other strategies reported by some of the Year 5 teachers in classes in which there was RC growth at least comparable to other students, included collaboration with other teachers, use of assessment of RC to plan teaching for HC students, targeting student ZPD, and including specific strategies for teaching HC students. In contrast, more of the Year 6 teachers did not
use these strategies. Year 5 HC students made substantially greater progress than those in Year 6 which suggests that there might be issues with teaching at the higher levels in the RC progression. This may be due to teacher level of content and/or pedagogical knowledge at RC levels beyond traditionally upper primary RC levels.

9.2 Strengths and limitations

The study incorporated qualitative and quantitative data, self-report, criterion referenced interpretation of RC and SRL assessments (Griffin, 2014). The collection of data was large scale and largely dependent on the wider project, Realising the Potential of Australia’s High Capacity Students (REAP) (see 1.2 ‘Back ground to the study’).

The REAP Project. The fact that this study emerged from the larger REAP project had implications for the design, methodology and findings. The project began in 2015 and ended in 2018; data for this study were collected in 2016. Although there were time limitations in relation to the writing of the thesis, the overall project time frame included potential for monitoring growth over a number or years. However, this was not possible under the conditions of the study: most teachers who participated in the project in 2016 did not chose to be involved in subsequent years and given that teachers taught different students and, in some cases, different grade levels from year to year, it was not be possible to track individual student growth beyond a six-month period in any given year of the project.

Although the project was never intended to be experimental, it would have been useful to have included a control group in which teachers did not have access to the online professional development modules to monitor the impact of the modules on student outcomes throughout or beyond involvement in project. Tracking students over several years and with the same and different teachers would have supported a focus on teacher and student effect respectively, rather than confounding these variables. In future research, it is recommended that the effects of the professional development modules be monitored by using a control group and teacher questionnaires that include questions about changes in practice throughout the year. In addition, more time between pre and post assessments would allow for implementation of module content – for example, testing in early February and again in December.
Measuring SRL. The student, self-report SRL questionnaire was designed to measure overall SRL competence in the specific context it is administered. The context was the class in which students typically underwent the respective subject area lessons. In the RC context, half the number of students completed the SRL assessment as did the RC assessments which meant that there was less data about student competency in SRL. Asking teachers to administer the RC and SRL assessments back to back, in addition to what was already planned, could have been too onerous. Although the first RC and SRL assessments were one month apart there may have been ‘assessment overload’; especially as other classroom assessments are routinely administered in the first term. In addition, many schools routinely spend time preparing Year 5 students for the National Assessment Program – Literacy and Numeracy (NAPLAN) prior to the early May NAPLAN testing period. Giving more advanced notice of the testing and information about the RC ARCOTS reading test and developmental progression would prevent duplicating RC assessments so that the only ‘additional’ assessment would be the SRL questionnaire. Recruiting teachers in the year prior to participation in the project would allow teachers to include the REAP assessments and professional development in planning for the school year, rather than having teachers accommodate the project in an already busy school year. This may relieve some of the assessment overload and improve completion numbers for the SRL assessment and participation in the Modules and teacher questionnaires.

Evidence linking SRL to growth in RC proved to be complex. There are many interlacing factors impacting student SRL proficiency and the opportunity to exercise SRL skills in the classroom. The limited time line and reach of this study were not sufficient for identifying and confirming the impact of SRL on growth in RC in the various and varied conditions under which Year 5/6 students are taught. A two-time assessment of SRL, at least, is essential for research about SRL growth trends and the long-term impact of impact of SRL on RC.

The impact of professional development. Teachers had access to professional development modules about HC students, assessment, SRL, and classroom practices for SRL which meant that there was an element of intervention. However, there was no control group or time for teachers to apply these strategies and for the study to monitor changes in practices. The study was not designed to determine the impact of these modules on teaching and classroom practices.
The study did not follow up on the teachers beyond completion of the modules and data were not collected about their inclusion of SRL once they had engaged with professional learning in this area. It was not possible to ascertain whether there was an increase in classroom practices and whether this resulted in an increase in student levels of SRL and/or RC growth. Follow-up assessment of students’ SRL to monitor progress, evaluate interventions and inform future planning is crucial. There was limited time for the reflection required for students (and teachers) to improve their SRL skills. The study did not allow for monitoring changes in the implementation of SRL practices in RC lessons. Furthermore, it was not possible to assess, monitor and evaluate the effects of the professional learning on the development of and inclusion of SRL in the classroom and therefore subsequent effect on HC student RC outcomes.

9.3 Implications and future directions

The classes where the most progress was made by HC students included progress for students in the higher RC levels progressed similar to that of students in the other RC levels. This suggests that it is reasonable to expect that RC growth for Year 5/6 students in the higher levels— the HC students—be consistent with that of students in lower RC levels—students in Q1, Q2, and Q3. The study found some teachers were more effective in teaching RC to HC students than others and that some teachers were most effective in a specific range of RC levels, or for a Quartile, compared to other levels/Quartiles. This has implications for how teachers target different levels of ability.

**Targeting student ability.** Teachers who used assessment and strategies for planning and targeting teaching directly at student level of ability were the most effective; as were teachers who targeted higher order thinking skills. In the classes of these teachers, progress made by HC students was similar to that of class peers and the students in these classes generally made greater progress than in other classes, overall.

The findings support the need for teacher professional development in how to teach and support HC students at the higher levels of RC and specifically in the skills described in Levels I, J and K which describe the skills of most Year 5/6 HC students.
There is also a need for professional development for teaching across a wide range of RC abilities. The range of abilities for students in the study was Level C to Level K (typically Years 2/3 to beyond Year 10), which aligns with the Grattan Institute report about targeted teaching where the range of levels in a class are suggested to be anywhere from six to eight levels. The report highlights the difficulties in teaching across a wide range of abilities (Goss & Hunter, 2015). Teachers need better data to target teaching and professional development in how to effectively use evidence of learning to target teaching to each of the levels (Goss & Hunter, 2015). The study found that RC growth outcomes were better in classes where teachers used more assessment strategies to target teaching. This finding supports the Grattan Institute recommendations about the use of assessment to target teaching.

**Teacher content knowledge.** An important recommendation for addressing the growth decline for HC students is monitoring and developing teacher content knowledge. The fact that primary aged students outperform their teacher is especially concerning and requires attention. At a basic level, assessing teacher competency might include teachers assessing their performance using the tests they administer to their students. This is of benefit on several levels as it focuses the teacher on the intended learning and can inform planning and implementation of interventions, as well as highlighting more difficult skills. At the very least, there is a need to work with teachers and suggest resources for monitoring their content knowledge (P. T. Jones & H. Chen, 2012). RC assessments used by teachers, such as the ARCOTS RC assessment, must include clear developmental progressions and link professional development resources with the teacher ZPD that is assessed.

**Self-regulated learning.** Most HC students reached reading levels that include more nuanced and sophisticated skills than their classroom peers have. More complex and deeper levels of introspection and independent thought processes are required at these higher levels of comprehension. Although generally higher at Year 6 than Year 5, skills in SRL may not be developing in concert with these requirements. Lack of opportunity for higher ability students to learn the more sophisticated SRL skills, and limited opportunity to practice these skills in the classroom, may explain the finding that students with the highest SRL achieved the least rather than the greatest amount of growth in RC over the same period.

The close relationship and similarities between strategies and processes for developing RC and SRL capabilities emphasise the importance of SRL in RC (Massey, 2014). The cumulative
requirements associated with developing RC and SRL capabilities impact progress over a lifetime. In constantly changing learning and working environments, which include the use of digital technology, the importance of RC and the demands that learning has on RC is emphasised. Given the cumulative nature and interdependence of RC and SRL development and research into the links between engagement and motivation and the development of RC (Coiro, 2017; Komiyama, 2018), it is not surprising those students who have scored the highest in RC are those who are the most motivated and persistent and therefore the most likely to perform well. It might be expected that, because Q4 students score the highest in RC and SRL, they also have the highest growth scores. However, the results were the reverse. The teacher questionnaires suggested that this discrepancy may be caused by the fact that, although these students have high SRL scores, classroom practices are not conducive to students exercising their SRL capabilities to the level at which they might impact reading development.

Although RC and SRL were found to be linked and the decline in growth for the highest performing HC students was ameliorated by higher student competency in SRL, the explicit teaching of SRL skills was limited. The results from the teacher questionnaires indicated that SRL is not sufficiently planned for or included in classroom practices. The fact that links were found between SRL and RC, and SRL and RC and RC development, supports the need for teacher ability to identify and teach SRL skills. This is especially important for the more sophisticated SRL skills essential for the development of RC skills at the higher reading levels; these are the levels at which teachers were least effective in this study. Although the study did not have access to SRL growth measures, the recursive relationship between SRL and RC is an important finding and supports the contention that, in addition to the decline in growth for RC, a Year 5/6 flat line in SRL and growth in SRL is feasible.

The study did not evaluate the impact of the REAP professional development modules; however, the convenience of the online format and the inclusion of practical examples, templates, and suggestions for assessing, monitoring, and targeting student SRL make the modules an excellent set of resources for giving teachers access to content about, and tools for, planning and implementing classroom strategies for supporting the development of SRL. Routine inclusion of SRL in classroom practices can be supported by the inclusion of SRL capabilities as a set feature in the planning of lessons and units of work in all learning areas,
as RC is required and developed in all learning areas. The study supports Panadero’s emphasis on a developmental approach to teaching SRL in the classroom, where SRL skills develop over time and are assessed and monitored as per other skill sets (Panadero, 2017). This approach reflects the SRL construct used in the study in the design of the Progression for Self-Regulated Learning and assessment tool used to measure student SRL.

**Collaboration.** The School 5 case study found that teachers who collaborated were more effective in supporting growth in HC students than teachers who did not. This supports the research about the positive effects of teachers’ collaboration on student outcomes (Goddard et al., 2015; Ronfeldt et al., 2015). It is recommended that support be developed for networking and collaboration between Primary and Secondary teachers to support exchanges of teaching strategies and teacher pedagogical and content knowledge of RC. This networking and collaboration should also extend to students who may benefit from access to students at similar levels of ability. This could be facilitated by overcoming the limitations inherent in traditional views of ‘school’ and ‘classroom’ by including face-to-face or online meetings where students/teachers can reach beyond traditional work and teaching environments and collaborate to develop and provide/receive support about teaching and learning for improving the outcomes of HC students.

9.4 Final comments

The idea of knowing can be used as a lens through which research into improving student outcomes can be summarised in terms of the 4K’s: knowing what to learn; knowing how to learn; knowing what teachers know; knowing what students know. These address what society believes is important for our citizens to learn (the curriculum), provision for the individual needs of learners and teachers (in the classroom), and the resources required for effective and continual learning (in the school).

The effective strategies discussed in this dissertation are those that support the development of the 4K’s in relation to HC students so that they can progress in concert with their class peers. The notions of equality expressed in the Melbourne Declaration (Barr et al., 2008) were cited at the very start of this research and give the study its philosophical and moral focus. A fair and equitable education system is one in which all students are given the opportunity to
meet the goals described in the Melbourne Declaration, including ‘equity’ and ‘excellence’ (Barr et al., 2008; Rudd & Smith, 2007). All students, including HC students, require of an education system that it incorporate the 4ks and knows what is to be learned, knows how students learn, knows what teachers know, and knows what students know. This study has shown the importance of the 4K’s for our most able HC students.
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Appendices
Appendix A: Plain language statement and consent

Realising the Potential of Australia’s High Capacity Students

Dear Principal

We would like to invite your school to participate in a research project that is being conducted under the leadership of Emeritus Professor Patrick Griffin of the Melbourne Graduate School of Education at the University of Melbourne. This is a joint project of the University of Melbourne and the Victorian Department of Education and Training, funded by the Australian Research Council and the Victorian Department of Education and Training. This project has been approved by The University of Melbourne Ethics Committee HREC: 1545883.

What are the aims of the study?

Research has shown that there is a ‘flat line’ in the achievement levels of high ability students. While their lower ability peers are making rapid gains, the performances of high ability students are not improving at the same rate. The aim of this study is to work with schools to find teaching strategies to address this problem so that all students can improve their achievement levels. The project will involve a large-scale study, with up to 100 Victorian schools participating, to capture a breadth of practice so trends can be identified across schools and teachers.

What will your school be asked to do?

Your school is invited to participate in the large-scale component of this study. The research will focus on personal and social learning in Years 5-8, RC in Years 5 and 6 classrooms and mathematics in Years 5 - 8 classrooms. Primary schools may choose to participate in RC and/or mathematics.

Schools will be asked to disseminate information about the project to teachers of the appropriate year level/subjects, so each teacher can decide whether to participate.
Participating teachers will be asked to complete questionnaires taking a total time of up to one hour during the year and include specific tests in their regular student assessment schedules. The school will not incur any costs for the use of these tests. The questionnaires will collect information about the diverse starting points of their students’ in the subject/topic, the pedagogical approaches teachers may use to assist students at different starting points and teacher dispositions towards addressing lack of growth for high capacity students.

The tests are:

RC:
- ARCOTS RC tests in March and October

Mathematics:
- ARCOTS RC tests in March and October

Personal and Social Learning (Self-Regulated Learning):
- ARCOTS Characteristics of Learning test

Teachers and Principals will also be asked to complete an example test in the same ARCOTS series as that of the students (participation in this step is voluntary and total confidentiality and security of the results obtained is assured). The purpose of testing teachers as well as testing students is to place the teachers on the same continuum as the students in their classes. The testing data will be used to identify how teachers can be best supported to scaffold the learning of the students with higher abilities. The purpose of testing the principals is so you may demonstrate a willingness to be assessed as good practice and to encourage the participation of the teachers through your own commitment.

The school will be asked to provide background information on the school, including any provisions made for able students outside the regular classroom, planning documents such as curriculum documents and term planners and relevant school policies relating to the
relevant subject/s. It will also be asked to authorise the project team to use de-identified student data from the assessments specified above.

**How will confidentiality be protected?**

The anonymity and confidentiality of your school, student assessment data and teacher data will fully be ensured within the limits of the law. Confidentiality of student assessment data will be preserved using ID codes. Only the staff at your school will know the relationship between the codes and your students’ names. School and teacher data will be de-identified by researchers and subsequent handling of the data will be managed by use of the codes only. We will not name any schools or participants in any report arising from this research. In reports resulting from this study the emphasis will be on summary information. Any references to specific information that might allow someone to guess the identity of schools or teachers will be removed. The data will be kept securely at the University of Melbourne under the University’s guidelines for the management of research data, and destroyed five years after publication of written findings.

Your participation and the participation of your teachers will be used only to help improve teachers’ ability to increase learning outcomes for all students.

**What if I want to withdraw my school from the research?**

Participation in this research is completely voluntary. Should you wish to withdraw your school from the research at any time, or to withdraw unprocessed information that has been collected, you are completely free to do so.

**How will you receive feedback?**

On completion of the research, a summary of findings will be made available to you. It is expected that the results will be presented at workshops for school leaders and teachers, at academic conferences and in research publications.
Where can I get further information?

If you require any further information or have any concerns, please contact Emeritus Professor Patrick Griffin using the details provided above. If you have any concerns about the conduct of the project you are welcome to contact the Manager, Human Research Ethics, Office for Research Ethics and Integrity, The University of Melbourne, ph.: 8344 2073.

How do you agree to participate?

If you would like your school to participate, please indicate that you have read and understood this information by emailing a signed copy of the consent form to the project’s coordinating researcher, Dr Susan-Marie Harding, s.harding@unimelb.edu.au, Assessment Research Centre, Level 8, 100 Leicester St, The University of Melbourne, Parkville 3010. Dr Harding is available to answer questions regarding this project on ph.: 9035 8595.
Realising the Potential of Australia’s High Capacity Students

Name of School Principal: …………………………………………………………………………..

School: ………………………………………………………………………………………………..

Name of Chief Investigator: Emeritus Professor Patrick Griffin

1. I consent to the participation of my school in the above research study, the particulars of which – including details of procedures – have been explained to me in the Plain Language Statement and I have been given a copy of that explanation to keep.

2. I authorize the investigators in the above study to implement the procedures referred to under (1) above.

3. I acknowledge that:

(a) the possible uses of the information arising from the study have been explained to me to my satisfaction;

(b) I have been informed that my school’s participation and the participation of my teachers in this research is voluntary, and that I am free to withdraw my school from the study at any time and to withdraw any unprocessed information that has been supplied;

(c) the study is for the purpose of research and development only;

(d) once signed and returned, a copy of this consent form will be retained by the principal researcher; and

(e) I have been informed that the confidentiality of the information provided by teachers at my school will be safeguarded, subject to any legal requirements (subpoena, freedom of information, mandated reporting), and in the following ways:

- no names or personal details of individual participants will be revealed in any report of the study, and any contextual details that might reveal their identity will be removed;

- only the researchers will have access to the data collected in this study; and

- data will be kept securely at the University of Melbourne under the University’s guidelines for the management of research data, and destroyed five years after publication of written findings.

Principal’s Signature: ……………………………………………………….. Date: ……………..
Realising the Potential of Australia’s High Capacity Students

Dear Teachers,

We would like to invite you to participate in a research project that is being conducted under the leadership of Emeritus Professor Patrick Griffin of the Melbourne Graduate School of Education at the University of Melbourne. This is a joint project of the University of Melbourne and the Victorian Department of Education and Training, funded by the Australian Research Council and the Victorian Department of Education and Training. This project has been approved by The University of Melbourne Ethics Committee HREC: 1545883.

What are the aims of the study?

Research has shown that there is a ‘flat line’ in the achievement levels of high ability students. While their lower ability peers are making rapid gains, the performances of high ability students are not improving at the same rate. The aim of this study is to work with schools to find teaching strategies to address this problem so that all students can improve their achievement levels. The project will involve a large-scale study, with up to 100 Victorian schools participating, in order to capture a breadth of practice so trends can be identified across schools and teachers.

What will you be asked to do?

Your school has been invited to participate in the large-scale component of this study. The research will focus on RC in Years 5 and 6 classrooms and mathematics in Years 5-8 classrooms. Primary schools may choose to participate in RC and/or mathematics. Your principal had indicated that you may like to be involved in this project.

Participating teachers will be asked to complete questionnaires taking a total time of up to one hour. Teachers will also be asked to administer the following tests using ARCOTS:

The tests are:

RC:

- ARCOTS RC tests in March and October
Mathematics:

- ARCOTS RC tests in March and October

Personal and Social Learning (Self-Regulated Learning):

- ARCOTS Characteristics of Learning test

Teachers will also be asked to complete an example test in the same ARCOTS series as that of the students (participation in this step is voluntary and total confidentiality and security of the results obtained is assured). The purpose of testing teachers as well as testing students is to place the teachers on the same scale as the students in their classes. The testing data will be used to identify how teachers can be best supported to scaffold the learning of the students with higher abilities. The principals are also invited to complete the assessment so they may demonstrate a willingness to be assessed as good practice and to encourage the participation of the teachers through their commitment. Teachers participating in the Mathematics portion of the study will also be asked to keep records of the tasks and activities used during a particular topic to be determined at a later date. Selected teachers will be asked to provide copies of these tasks and activities to the research team after the completion of the topic.

The school will be asked to provide background information on the school, including any provisions made for able students outside the regular classroom, planning documents such as curriculum documents and term planners and relevant school policies relating to the relevant subject/s. It will also be asked to authorise the project team to use de-identified student data from the assessments specified above.

**How will confidentiality be protected?**

The anonymity and confidentiality of your school, student assessment data and teacher data will be ensured to the fullest possible extent within the limits of the law. Confidentiality of student assessment data will be preserved by the use of ID codes. Only the staff at your school will know the relationship between the codes and your students’ names. School and teacher data will be de-identified by researchers and subsequent handling of the data will be managed by use of the codes only. We will not name any schools or participants in any report arising
from this research. In reports resulting from this study the emphasis will be on summary information. Any references to specific information that might allow someone to guess the identity of schools or teachers will be removed. The data will be kept securely at the University of Melbourne under the University’s guidelines for the management of research data, and destroyed five years after publication of written findings.

Your participation and the participation of your teachers will be used only to help improve teachers’ ability to increase learning outcomes for all students.

**What if I want to withdraw from the research?**

Participation in this research is completely voluntary. Should you wish to withdraw yourself from the research at any time, or to withdraw unprocessed information that has been collected, you are completely free to do so.

**How will you receive feedback?**

On completion of the research, a summary of findings will be made available to you. It is expected that the results will be presented at workshops for school leaders and teachers, at academic conferences and in research publications.

**Where can I get further information?**

If you require any further information or have any concerns, please contact Emeritus Professor Patrick Griffin using the details provided above. If you have any concerns about the conduct of the project you are welcome to contact the Manager, Human Research Ethics, Office for Research Ethics and Integrity, The University of Melbourne, ph: 8344 2073.

**How do you agree to participate?**

If you would like your school to participate, please indicate that you have read and understood this information by emailing a signed copy of the consent form to the project’s coordinating researcher, Dr Susan-Marie Harding, s.harding@unimelb.edu.au, Assessment Research Centre, Level 8, 100 Leicester St, The University of Melbourne, Parkville 3010. Dr Harding is available to answer questions regarding this project on ph: 9035 8595.
Realising the Potential of Australia’s High Capacity Students

Name of Teacher: ………………………………………………………………………………………
School: ……………………………………………………………………………………………….
Name of Chief Investigator: Emeritus Professor Patrick Griffin

1. I consent to the participation in the above research study, the particulars of which – including details of procedures – have been explained to me in the Plain Language Statement and I have been given a copy of that explanation to keep.

2. I authorize the investigators in the above study to implement the procedures referred to under (1) above.

3. I acknowledge that:
   (a) the possible uses of the information arising from the study have been explained to me to my satisfaction;
   (b) I have been informed that my participation in this research is voluntary, and that I am free to withdraw from the study at any time and to withdraw any unprocessed information that has been supplied;
   (c) the study is for the purpose of research and development only;
   (d) once signed and returned, a copy of this consent form will be retained by the principal researcher; and
   (e) I have been informed that the confidentiality of the information provided by myself will be safeguarded, subject to any legal requirements (subpoena, freedom of information, mandated reporting), and in the following ways:
      • no names or personal details of individual participants will be revealed in any report of the study, and any contextual details that might reveal their identity will be removed;
      • only the researchers will have access to the data collected in this study; and
      • data will be kept securely at the University of Melbourne under the University’s guidelines for the management of research data, and destroyed five years after publication of written findings.

Principal’s Signature: ……………………………………………………….. Date: …………………
Appendix B: Realising the potential of Australia’s high capacity students (REAP): Proposed timeline

This time-line has been amended for the project beginning in 2015 and due to end in 2018.
Appendix C: Progression for reading development (PRD)

<table>
<thead>
<tr>
<th>LEVEL M</th>
<th>Focus on perspectives</th>
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<tbody>
<tr>
<td>Students approach text with an openness that allows them to parenthesise personal experience when considering different perspectives. They can interpret complex thought processes behind a character’s point of view and take into account ethical or moral problems that may influence a character’s perceptions or actions. They allow for the influences of unfamiliar social contexts and the views and values of the time and place in which a text is written or set. They recognise that different interpretations of a text may be embedded in transcriptions to different media, e.g. from novel to film. Their understanding can encompass the deliberate use by an author of words with double or multiple meanings, including meanings that are opposite or inconsistent.</td>
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<tr>
<th>LEVEL L</th>
<th>Focus on critical review</th>
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<td>Students can identify an untrustworthy or unreliable narrator, understand an author’s purpose in presenting conflicting information to the reader, and detect false statements or misleading reasoning. When reading persuasive or argumentative text they can distinguish necessary from sufficient conditions and are able to follow logical arguments and identify the absence of a sound basis for a conclusion. They can evaluate the relevance of information in a text to determine the strength of a main message or hypothesis. They can analyse and synthesise information from a range of different texts.</td>
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<th>LEVEL K</th>
<th>Focus on indeterminate meaning</th>
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<td>Students are able to combine knowledge of writing conventions with general knowledge to draw probable inferences when no conclusive evidence is provided in a text. They can identify unsubstantiated claims or arguments that are masked by rhetorical devices. They can postulate likely explanations of character behaviour when motivations are not explicitly stated. They demonstrate understanding of the difference between empirical evidence and theory, supposition or anecdote. They can follow complex arguments or detailed instructions while accommodating ambiguity and incompleteness. They draw on personal experience and imagination in their interpretation of texts by taking different perspectives to achieve understanding. They can understand unusual, nuanced or creative language in fiction, and technical terminology or jargon in non-fiction. They are able to...</td>
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imagine and speculate about underlying reasons for choices of subject matter and style that may be problematic or indeterminate.

**Focus on distinguishing the conventional and the unconventional**

Students demonstrate an awareness of social and narrative conventions and a capacity to accommodate the unexpected or unconventional, both in form and in content. They are able to comprehend perspectives, experiences and uses of language that do not conform to predictable patterns. They can offer reasons for the use of different writing styles. They can connect parts of speech not presented in the usual order, analyse detailed text to discover embedded rules or patterns, and identify inconsistencies. They demonstrate understanding of the conventions of rational argument and the social norms of conversation as presented in dialogue. They can engage with imaginative writing that departs from conventional narrative to explore the fantastic and the irrational. They can identify an author’s attitudes or beliefs and gain understanding of a character’s viewpoint from a range of authorial choices (e.g. writing style, setting of scene, vocabulary).

**Focus on author’s purpose**

Students can infer an author's intention from what is explicit or implicit in a text. They can identify the most likely character or plot developments and the most likely explanations of behaviour or events. They understand how structure influences interpretation and can analyse how authors use text structures and language features to achieve a purpose. They can gain meaning from complex clauses and use their understanding of phrases and clauses in a text to analyse their relevance. They understand how a word’s meaning changes when it is used in different contexts. They can combine indirectly stated information and writing style to draw conclusions about the roles of characters and events in a narrative.

**Focus on evidence for alternatives**

Students combine overall understanding with an attention to detail that enables them to focus on subtleties and consider alternative implications of words and texts. They can identify words and phrases that support different sides of an argument and make use of formal definitions and technical language to consider alternative meanings. They are able to hold in mind detailed information from different parts of a text while weighing up evidence. They can identify different levels of meaning in a text.

**Focus on synthesis**
Students can synthesise information across a text to determine its overall purpose or draw a conclusion. They understand that words and texts can have non-literal meanings and they can determine the moral of a fable. They can interpret the style and language used to identify different types of text and recognise that similar content can be expressed in different ways. They can also synthesise elements of a story to form an opinion about a character.

**Focus on interconnections**

Students can sequence information according to a story’s timeline and are aware of causal relationships in a connected narrative. They are able to make assumptions based on general knowledge and cues in a text. They can use a wider context (e.g. the general meaning of a sentence or paragraph, or a word’s position in a sentence) as a cue to interpret a word or a phrase. They can visualise locations from descriptions.

**Focus on selecting and combining strategies**

Students make meaning by combining syntax, vocabulary and context. They can identify the main ideas in a text, select information and make predictions based on their understanding of ideas, events and characters. They can also gain understanding of a text by connecting it to their own experience or general knowledge, and are able to suggest reasons for a character’s actions or feelings by connecting explicit information with personal experience.

**Focus on finding information**

Students can recognise written words relatively effortlessly. They also recognise basic narrative conventions, e.g. dialogue, and can link the elements of a story. They can identify a main character’s feelings from explicitly stated actions. They can read back and forward to locate information and understand that similar meanings can be conveyed by different words. They attempt unfamiliar words by sounding out, re-reading and looking through all word parts. In spoken words they are able to manipulate the sounds within words by segmenting and reconstructing the different sounds.

**Focus on story**

Students can identify the narrator of a simple story, describe what the story is about and relate it to their own experience. They can locate information by matching words and can re-tell a story using illustrations in sequence as a guide. They understand the implications of visual layout (e.g. in posters, advertisements or party invitations) for the meaning of texts. Their understanding of text is supported by high frequency sight-words and simple sentence structure. When they cannot easily recognise a
word by one or two letters they may draw on prior knowledge, sentence structure or accompanying illustrations. They use simple punctuation to assist fluency and re-read to correct their own errors.

**Focus on cracking the code**

Students can determine the meaning of texts with the help of repetition, illustrations, and knowledge of familiar topics. They can recall content using picture cues for support. They can understand print conventions such as word spacing and punctuation marks. They can read familiar words with regular blends or spelling patterns and may focus on the initial and final sounds in unfamiliar words. In spoken words, they can identify discrete sounds, discriminate between syllables, and recognise rhyme.

**Focus on print conveying meaning**

Students understand that language can be represented by symbols and that text conveys meaning. Their print knowledge includes holding a text the right way, reading directionality and page-turning. They can identify the sound/symbol correspondence of letters and some common blends. To gain meaning from printed words, they may refer to accompanying pictures, focus on the initial letter, or draw on prior knowledge. In spoken words, they can identify the initial sounds and can discriminate minor vowel and consonant differences.
**Appendix D: Progression for self-regulated learning: Reading development**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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| **Level G** | **Students at this level are self-regulated learners**  
Students at this level have internalised strategies to maximise their learning. When they get a reading task in class they set challenging goals for themselves and regulate all aspects of learning to achieve their goals. They make a plan but can reflect on the plan and adapt to ensure the plan is effective. They submit completed reading tasks and do extra to learn more. When they encounter difficult reading tasks, they use automated regulation processes so they can be successful. When they become distracted, they find ways to refocus. At this level, students value learning in and of itself and understand their own approaches to learning in ways that allow them to take advantage of the learning experience at all times. |
| **Level F** | **Students at this level are becoming systematic in selecting strategies that promote self-regulated learning**  
Students at this level are able to evaluate internal and external feedback to reflect on their learning. When they are given reading tasks, they analyse the reading task to plan the most effective approach. They set high goals for themselves and persist in order to achieve their goals. They know what success looks like and use this image to motivate themselves. If things get difficult they can use self-talk to encourage persistence. They can think beyond the requirements of the reading task that is set and use other strategies that have been successful in the past to maximise their learning. If they do not do well on a reading task, they reflect on why and think of ways to do better next time. When they are not interested in a reading task, they will find ways to make it interesting and do their best to learn. They like to be able to use what they have learnt from outside the class and think that learning is important. |
| **Level E** | **Students at this level are beginning to intentionally select strategies to regulate their learning**  
Students at this level are beginning to reflect on their learning so they can improve. They enjoy learning when they get to investigate something they don’t already know. They plan an approach by using strategies they have developed in the past and can change their plan when they need to. When reading tasks become difficult, they use things that have worked in the past. When given a reading task that they initially think they cannot do properly, they seek strategies to help them do their best. They can apply past experiences of success to try hard and persist. If they do not do well on a reading task, they try to work out what they did wrong. Being interested in a reading task is important because it makes them try |
harder, but even if a reading task is not interesting to them, they will try their best. When they are working on reading tasks, they incorporate feedback to improve.

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<th>Level D</th>
<th>Students at this level are beginning to develop strategies to regulate their learning</th>
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<td>Students at this level want to learn and believe that, with teacher input, they can do well on reading tasks in class. When given reading tasks, they plan an approach and aim to finish what the teacher has given them. When working on reading tasks, they use strategies like repeating teacher instructions, visualising solutions and changing their plan if they are off track. They are motivated by the teacher giving them positive feedback and will elicit feedback from the teacher. They value the teacher’s advice and use it to reflect on and improve their work, and they know when they have done well. When they do not do well on a reading task, they try to work out why and what they can do differently because they want to learn as a result of doing the reading task. They enjoy learning new things and believe they have the ability to do well.</td>
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<th>Level C</th>
<th>Students at this level are beginning to monitor their approach to learning</th>
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<td>Students at this level think it is important to do well at school. They become interested in reading task when they think they can learn. When they respond to a reading task, they hand in their best effort. They know when they are getting distracted and they make an effort to ignore distractions. They are motivated by wanting to learn and get all the answers right. They are more comfortable doing reading tasks that they have done before because they know they can do them well. They value the teacher’s advice and rely on the teacher to give them feedback. If they do not do well on a reading task, they want to improve next time but attribute their lack of success to someone else, like the teacher. They will, however, put in more effort next time.</td>
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<tr>
<th>Level B</th>
<th>Students at this level engage in class tasks if they are interested in the task</th>
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<td>Students at this level will do better if they are interested in the reading task. They are motivated by wanting to get correct answers and having peers think they are clever. They focus only on the information provided and do not look beyond the reading task to the bigger picture. They do not reflect or check their work when they have finished. If they do not do well on a reading task, it is because they allow themselves to get distracted when the reading task becomes too difficult. While doing difficult reading tasks they can recognise the things they are doing that work for them.</td>
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<tr>
<td>Level A</td>
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<tr>
<td><strong>Students at this level are teacher directed</strong></td>
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Students at this level need to be guided by the teacher when they are given a reading task to do in class. If they believe the reading task is too hard for them, they attempt only the parts they know they can do. They hand in work unfinished or it’s finished but not their best effort. Their learning approach is driven by external influences like wanting a good report or wanting to please the teacher. They allow themselves to be distracted when doing reading tasks and rely on other students to model task-focused behaviour for them. Their motivation for doing reading tasks can stem from a desire to save face in front of their peers or to be told by their teacher that they are doing well. They do not elicit feedback but will do what the teacher tells them to do. They enjoy learning when they find reading tasks easy. When they do not do well on a reading task, they do not believe that there is much they can do about it.
Appendix E: Self-regulated learning student questionnaire

Think about what you are most likely to do in class; pick the response that best describes you.

Select one response by circling either a), b), c), d) or e) on the page.

1. When I think about why I want to do well on a task...
   a) I want to learn from doing the task
   b) I want my friends and teacher to think I am clever
   c) I don't think about why I want to do well
   d) I want to get all the answers right

2. When I am working on a task...
   a) I do the task without checking my work
   b) I follow the instructions without thinking about them
   c) I think about the feedback I am given before deciding what to do next
   d) I check my work and/or get feedback about how I am going

3. While I do a task I say to myself...
   a) Nothing
   b) I tell myself to keep going if I find the task gets difficult
   c) I repeat to myself what the teacher said
   d) I encourage myself when I'm struggling
   e) I remind myself to use a process that I know

4. When I have done well on a task...
   a) I need someone else to tell me why I did well
b) I know when I have done well

c) It doesn’t matter how well I did

d) I know which steps I used that made me do well

5. When I do not do well in a task...

a) I don’t care

b) I try to work out what I did wrong

c) I think of ways to do better next time

d) I decide to put more effort in next time

e) I care, but I can’t do much about it

6. When I am distracted from my work...

a) I find ways to help me focus

b) I try to ignore distractions

c) I notice, but I let it happen

d) I don’t notice

7. When my teacher gives me feedback about my work...

a) I value and use the feedback to improve my work

b) I disagree with what my teacher says

c) I show my classmates how it could also help them

d) I just do what the teacher suggests

e) I value the teacher’s advice about my work

8. When I find information for an assignment from a book or on the internet...

a) I copy out information that is linked to my topic
b) I combine ideas and evidence to decide what to write

c) I copy out information that I find interesting

d) I select information based on what I want to say

9. In class I enjoy learning when...

a) I don’t enjoy learning

b) I get to investigate what I don’t know

c) I get to learn something we have done before

d) I get to do an easy activity

10. When I am finished a task...

a) I check new steps to see if they might help in future

b) I ask for feedback on what I did right and wrong

 c) I don’t think about it anymore

 d) I show my classmates how the steps I used helped me

The following questions are about RC and when you are doing reading tasks in class.

11. When I am given a reading task to do in class...

a) I do the task because the teacher tells me to

b) I challenge myself to learn from the task

 c) I decide what to do to complete the task

 d) I only do the things that I need to finish the task

12. When I am about to start a reading task in class...

a) I check how my plan will help me learn

b) I use a plan I know works for me
c) I don’t use any plan
d) I change my plan when I need to

13. When I think about my ability to do a reading task well ...
   a) I don’t think about it
   b) I try different things because I know I can do well
   c) I expect the same as I did last time
   d) I try hard and persist to learn the most I can

14. If I have a choice of reading tasks...
   a) I choose a task that I think I can do
   b) I do the task that will be most challenging for me
   c) I let the teacher choose for me
   d) I choose a task without thinking about it

16. I become interested in reading tasks if...
   a) I see others are interested in doing them
   b) I’m not interested in reading tasks, I do them because we have to
   c) I can use what I’ve learnt from the reading task outside of class
   d) I think the reading task helps me learn

17. I care about doing reading tasks in class...
   a) if the teacher tells me I am doing well
   b) I don’t care about doing reading tasks
   c) if I am sure I am learning something new
18. When I am given a reading task in class...
   a) I want to learn something new
   b) I try to find ways not to have to do it
   c) I want to get all the answers right
   d) I want others to think I am good at reading tasks
   e) I want to set an example for my classmates

19. When I think about the solution or answer to a reading task...
   a) I use what the answer should look like to help me check my answer
   b) I find it hard to think about the answer
   c) I understand why the answer should look a certain way
   d) I know what the answer should look like

20. When I am given a project that has to be handed in...
   a) I don’t do the project
   b) I have to hand it in unfinished
   c) I hand it in finished but it is not my best effort
   d) I hand it in finished and it is my best effort
   e) I hand it in finished, it is my best effort and I do extra to learn more

21. When I am working on a reading task...
   a) I look at what other students are doing to help me on the task
   b) I combine parts of strategies that worked in the past to solve the task
   c) I work out how to solve the task using the information in the question
d) I wait for the teacher to tell me what to do

22. When I’m working on a difficult reading task...
   a) I recognise the things I am doing that are working
   b) I record the things I am doing that are working so I can remember them in the future
   c) I only think about the task I am working on
   d) I use the things I did in the past that worked

23. When I am working on a reading task in class...
   a) I keep in mind what I am trying to achieve and work towards that
   b) I work through the task without thinking about what I’m doing
   c) I change what I am doing when I am off track or see a more effective way to work

24. If I didn’t do well on a reading task...
   a) I try to find out what to do differently next time
   b) I was distracted or the task was too hard
   c) I don’t want to know why
   d) I would have done a good job with better instruction

25. When I find a reading task is not interesting...
   a) even if I’m not interested I finish the task
   b) I find ways to make the task interesting and try my best
   c) I avoid doing the task
   d) even if I’m not interested I try my best

26. When my teacher gives me a reading task that I don’t think I can do properly...
a) I avoid doing the task
b) I find the strategy that will help me do my best
c) I persist to finish the task
d) I only do the parts that I can do well

27. When I do not do well in a reading task...
   a) I care, but I can’t do much about it
   b) I decide to put more effort in next time
   c) I don’t care
   d) I think of ways to do better next time
   e) I try to work out what I did wrong

28. While I do a reading task I say to myself...
   a) I repeat to myself what the teacher said
   b) Nothing
   c) I tell myself to keep going if I find the task gets difficult
   d) I remind myself to use a process that I know
   e) I encourage myself when I’m struggling

29. When I am working on a reading task...
   a) I do the task without checking my work
   b) I think about the feedback I am given before deciding what to do next
   c) I follow the instructions without thinking about them
   d) I check my work and/or get feedback about how I am going

30. Why do you want to learn how to do reading tasks?
a) I think reading is interesting and important to learn

b) I want to get a good report

c) I don’t care if I learn how to do reading tasks

d) I think reading is important to do well in school
Author/s: 
Nibali, Nives

Title: 
Addressing growth in reading comprehension for high capacity students

Date: 
2019

Persistent Link: 
http://hdl.handle.net/11343/221393

File Description: 
PhD Thesis: ADDRESSING GROWTH IN READING COMPREHENSION FOR HIGH CAPACITY STUDENTS

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