Growing minds

Kincoppal-Rose Bay School of the Sacred Heart

Final Report

empowering
independent
education
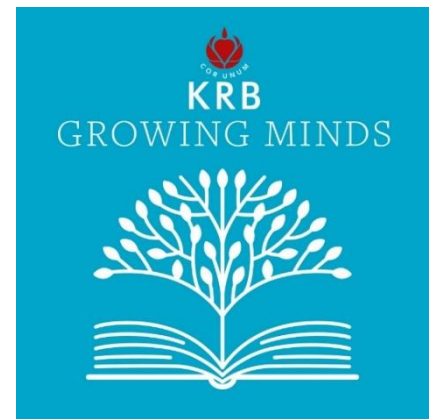
KINCOPPAL – ROSE BAY
SCHOOL OF THE SACRED HEART

School Based Research Project

Growing Minds

Final Report 2018

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GROWING MINDS

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Executive Summary

The overarching purpose of the research is to investigate the integral components to promote a shift in the current practice of recognising student achievement to one which goes beyond achievement and focuses on identifying and monitoring student progress.

Integral to this shift in current practice is the relationship between teaching, assessment and reporting; or more explicitly between curriculum, teaching the implemented curriculum, assessment items and their relationship to the curriculum, the skills embedded in assessment items and the evidence they provide regarding student learning, and how those elements can be aggregated into reports of achievement and progress.

There is an important qualitative component in monitoring student growth provided by teacher judgement through observation, anecdotal feedback, records and examples of work accomplished, and forms of continuous assessment. These collected activities contribute to the creation of an overall image of a student, which builds over time. Coupled with periodic formal assessment tasks, achievement of curriculum-defined outcomes can be confidently reported; however, it is more difficult to provide rigorous evidence of ongoing measured progress for individual students of various and wide-ranging abilities.

To enable confident reporting of progress, teacher experience requires the additional strength of an underpinning measurement to assist in defining key points in a student's learning journey.

The notion of a scale that measures student progress over time is not new and has been utilised in large-scale international and national assessments for decades.

A key focus of this project has been engaging key leaders within the school in the rigour required of valid assessments that enable inferences to be made regarding student achievement and progress. These underpinning principles are tenets of the development of meaningful scales that can be used to monitor individual students, and at the more global level, the development of cohorts over time.

The use of a scale, however, can be more effective at an individual level where specific, timely and well-targeted tasks can be used to pinpoint and, when linked to a defined scale, subsequently describe progress over time.

Sub components of this research study

- train teachers in developing robust assessment instruments through a better understanding of validity and reliability, selecting and designing tasks that appropriately measure specific outcomes,

- develop techniques in item writing, honing skills in estimating ability (and therefore improving targeting) and critically and constructively reviewing and evaluating items and tasks as presented by others,

- understand the purpose of, and develop frameworks and specifications to articulate assessment constructs that provide a structure for building robust and defensible tasks, and

- use and interpret statistical data that provides feedback on the quality of assessment and individual items, and provides information on targeting and the appropriateness of the task for the designated cohort.

Introduction

This research project is important to the School and wider community because it is about reforming assessment and reporting of student achievement, and subsequently, learning and teaching pedagogy. Assessment and reporting have traditionally reported a student's achievement against a set of standards and criteria at one, often unrelated, place in time. Students' performances are often compared and judged against their year-level peers using a grade A-E description. This assigned grade or description provides very little information about student growth in learning.

> "When students' performances are graded against year-level expectations, some less advanced students can receive the same low grade year after year. The feedback these students receive is that they are consistently performing below standard and below other students. A to E grades provide little or no sense of the learning progress that individuals actually make over time. A student who receives a 'D' year after year could be excused for concluding that they are making no progress at all when, in reality, they may be making as much annual improvement as a student who consistently receives an 'A'. And worse, they may conclude that there is something stable about their capacity to learn – that is, they are a 'D student'. Such demotivating messages undermine students' beliefs in the relationship between effort and success and frequently lead to disengagement."
> (Masters, 2013, p.3)

This research project explores how a school might move to a model of assessment and reporting that focuses on a student's growth in learning. It investigates how to put into practice some of the assessment reforms advocated in the Australian Education Review *"Reforming Educational Assessment: Imperatives, principles and challenges"* (Masters, 2013) and subsequently some of the recommendations from the report *"Through Growth to Achievement: Report of the Review to Achieve Educational Excellence in Australian Schools"* (Gonski et al, 2018). It aims to develop an evidenced-based reporting model that reports student learning growth on a scale or continuum.

School Context

Kincoppal-Rose Bay School of the Sacred Heart, Rose Bay, is a Catholic ELC–12 independent school, with a co-educational Early Learning Centre and Junior School, and girls only in day and boarding from Years 7–12. As a Sacred Heart School, it is part of a global network of more than 150 schools in 44 countries. A Sacred Heart (Sacre-Coeur) education focuses on the development of the whole person, both heart and mind, within a personalised community context. Kincoppal-Rose Bay takes a personalised approach to learning, tracking individual student progress to ensure continued intellectual and social development and well-being.

Kincoppal-Rose Bay Teaching and Learning Framework ELC-12

Effective learning and teaching at Kincoppal-Rose Bay enhances the learning outcomes for all students. Effective teaching and learning happens when teachers:

- use research-based pedagogies and evidence-based data to inform practice,

- use knowledge of curriculum and positive education paradigms to create optimal learning environments,

- participate in ongoing professional learning and development and reflect on their practice, and

- Apply the educational philosophy and charism of the Society of the Sacred Heart.

Teaching and learning, innovation, curriculum design and academic care are inextricably linked within the School. The Leadership Team collaborate to drive the learning and teaching agenda ELC-12 across the School. The members of the Leadership Team most closely involved in driving this agenda are the Principal, Head of the Junior School, Director of Teaching and Learning, Director of Students and Director of Mission. They then work closely and collaboratively with the KLA Heads of Department (Senior School Years 7-12), Stage Coordinators (Junior School ELC-6) and Year Coordinators (Senior School Years 7-12).

Background

Over the last few years, professional learning at Kincoppal-Rose Bay has focused on the educational research of John Hattie (Professor of Education and Director of the Melbourne Education Research Institute at the University of Melbourne), Dylan Wiliam (British educationalist and Emeritus Professor of Educational Assessment at the UCL Institute of Education), and Geoff Masters (Chief Executive Officer of the Australian Council for Educational Research). In particular, there has been a focus on improving student learning outcomes by better identifying where a student is at in their learning, where they need to go next and how they are going to get there.

In 2014, at our Staff Professional Learning Conference, Dr Hilary Hollingsworth (Research Fellow, ACER) presented "Assessing student learning: Shifting thinking and practice – why, what and how?" Her presentation was based on the publication *"Reforming Educational Assessment: Imperatives, principles and challenges."* (Masters, 2013). This lead to some interesting professional discussions around reporting student growth in learning and moving away from the traditional A-E grade reporting of student achievement.

Our school advocates and practises a "growth mindset" philosophy and draws upon the work of Carol Dweck (Lewis and Virginia Eaton Professor of Psychology at Stanford University). This can be seen in our interactions with students and the language we use with our students and parents. We use every opportunity to educate and communicate what a "growth mindset" means to our students and parents. A grading system that reports a student's achievement as a "D" in Semester 1 and a "D" in Semester 2, however, does not indicate or reflect the growth in learning that the student may have actually made. It does not provide an incentive for the student to improve in the future if they are always destined to be a "D". Equally, a student who always achieves an "A" on their report, and finds it relatively easy to do so, may not be showing much growth in their learning and might not be challenging or extending themselves.

Scope and Parameters for the Project

This research project was an ambitious endeavour and enormous in its potential scope. For that reason, the scope of the research work conducted was contained to Years 5-8 in the learning domains of English and Mathematics.

The smaller scope of the research work conducted would provide data across four years of learning and allow comparisons to be made between students operating at different levels within these two key learning areas. Variability of students' achievement levels, even within one year level, can be five or six years difference.

> "The most advanced 10% of students typically are between five and six years ahead of the least advanced 10% of students."
>
> (Harlen, 1997; Masters and Forset, 1997; Wiliam 2007)

The focus on English and Mathematics as the two key learning domains aligned with the research ACER has been conducting as part of their Learning Progression Explorer. The Learning Progression Explorer is an online tool developed by ACER to enable education stakeholders to study and explore learning progressions, of which the UNESCO Institute for Statistics (UIS) reporting scales are examples. The Australian Curriculum, Assessment and Reporting Authority (ACARA) also subsequently released the National Literacy and Numeracy Learning Progressions in January 2018,

Literature Review

Assessment and reporting has always served a purpose in schooling. Yet this purpose has shifted throughout its history depending on whether it serves the needs of the individual, society or political agendas. Recently, there has been a push to shift the assessment paradigm due to a growing body of research which demonstrates that the current Australian assessment practices are not serving the needs of learners. It is a push to redefine assessment as a more student-centred tool for personal development, rather than a political or social tool to standardise and rank students against each other.

To begin the literature review for this project, it is important to first explain how the research was organised. Firstly, it is essential to acknowledge that the question this research project asks, carries with it certain values. The answer to this question will differ remarkably depending on where one sits as a stakeholder in education. What 'effective' means and how it can best be determined cannot be entirely reduced to an objective truth. As such, the project first explored the history of grading to consider what has stood for effective practices in the past. Following this, it considered developments in educational and psychology and research, focusing on Carol Dweck's Growth Mindset and Vygotsky's theory of development, to create a foundation for the project's conception of what are 'effective' practices. Subsequently, it reviewed the most recent developments in assessment and reporting practices, with a particular focus on learning progressions in the subject domains of English and Mathematics, to consider what changes to assessment and reporting have become possible with changes in technology and educational policy. Finally, it reviewed research into change management, to determine the best practices in leading educational change through reforming assessment paradigms.

The History of Grading

Assessment and reporting has existed in many forms and held many purposes throughout history. According to the literature, the main influencers that have shaped the Australian schooling system have come from Europe and Northern America (Baumgart, 1989). In Cambridge, England, there is evidence of grading being used as a motivator for students in a competitive format (Searby, 1997). In America, educational reformers such as Horace Mann wanted to move schools away from this competitive model in hopes of developing a collaborative environment and instil intrinsic motivation for learning in students (Shearer 1899). Legislative changes saw rapidly expanding enrolments in K-12

schools occur between 1870 – 1910. This led to the need for a uniform system that was ultimately refined into the current A-E grading system being used in Australia today (Schneider and Hutt, 2013). While there has always been criticism of this reporting style, it was purposeful in its design, and as such, the historical development of it requires consideration before future changes can be made.

The structuring of schools in Australia was historically modelled after the schooling patterns that emerged in England throughout the 1800's. The six colonies prior to Federation (1901) modelled their schooling predominantly on the patterns that had emerged in England (Baumgart, 1989). England also directly intervened in the form of legislation that influenced the nature of schooling through such forms as the Compulsory Schooling Act that occurred in 1870 which resulted in drastic changes to how schools operated in relation to each other in both England and its antipodean colonies (Trethewey, 1997). However, there was also an influence from North American educational pedagogy and practice. Baumgart (1989) notes that, "This might be attributed to the available literature and scholarship as well as to the number of Australian educators who have completed higher degree programmes in the United States" (p. 8).

The concept of grading can be traced back to the 1700's in England where elements of it were introduced as a motivator to encourage student achievement through competition. This was evident in England in the form of the Cambridge Mathematical Tripos examination. This competition would rank contestants prior to participating based on their academic ability, and then strategically distribute them throughout the competition based on their results after each day (Searby, 1997). As students progressed, they would face more difficult questions and contestants. With monetary rewards for first place, this created a highly competitive environment whereby contestants were defined by their ranking (Searby 1997).

The Lancasterian model which was developed in England and adapted by North America in 1806 followed a similar principal. Schools that adapted this system would test and rank students daily and reposition students based on their score. The more capable would move to the front with the less capable at the back (Parker, 1910). Students that excelled would become 'monitors' and even receive a small salary. Thus, making it to the front of the class became a valued position. If one lost their position to their peers they would be driven to win it back. The culture of these schools was highly influenced by the

political climate of the time evolving into a "marketplace of competitive achievement" (Hogan, 1990).

This form of assessing and grading is largely driven by an extrinsic model of motivation which follows a behavioural model of student growth. Grant and Green (2012) discuss the issues that placing extrinsic rewards such as grades can have on intrinsic motivation. "The research concludes that extrinsic and intrinsic motivation are substitutes: students have an intrinsic 'achievement motive' that is weakened by the use of incentives. This diminishes the potency of extrinsic rewards. Furthermore, extrinsic incentives' effects are influenced by student's perceptions of competence and self-efficiency. If these are poor, students adopt a 'performance-avoidance' goal - essentially a maximum objective that tries to moderate bad outcomes rather than strive for good ones. When this happens, incentives' effects are yet further diminished." (Grant and Green, 2012, p. 1566).

Prussia was the first country to introduce compulsorily schooling in 1763, and as such, established their own system to deal with mass education (Soysal and Strang, 1989). The Prussian system organised their students and curriculum into a series of stepped grades that catered to the different learning paces of the students (Schneider, et al. 2013). While this system was developed to create a submissive and obedient society, it was extremely successful in its approach and the format appealed to American educational reformer Horace Mann. He marvelled at how the lessons taught in these school were catered to the age and capacity of the learner (Nietz, 1937). Horace Mann hoped to adopt this system in America "...to transform schools from one giant competition into a series of graded steps, but also to substitute the public quizzes and frequent re-ranking for written examinations and a series of monthly report cards" (Schneider & Hutt, 2014, p. 206). By doing this he hoped students would develop intrinsic motivation from learning in a less competitive environment. It was also a way to feedback to students and parents on achievement without encouraging competition among students. However, to accomplish this schools began grouping students by age with a set curriculum designed for each group. Masters (2005) discusses in his research how students' academic development is not fixed to their age, noting "that achievement levels becoming more dispersed as students move from one grade to the next, with high-achieving students continuing to make strong progress and low-achieving students falling further behind."

By 1880 the UK also introduced compulsory schooling, which as a result saw a drastic increase in enrolments in schools (Soysal et al, 1989). In North America similar trends saw enrolment almost triple by 1910. This in turn developed a need for a national system where there could be a formal and systematic recording and tracking of students (Soysal et al, 1989). Grading had existed in a few forms before this time. Starting from 1785, where a professor at Yale, Ezra Stiles first divided students into grades by using adjectives in his diary. Other schools adopted a range of similar methods: a scale of 4, a percentage out of 100, and adjectives and classifications (Durm, 1993). In 1880 Harvard introduced the 5-tiered A-E system in the hope of diminishing the importance of rank and competition amongst students (Grant & Green, 2013).

There have been many criticisms of this style of grading as many have argued that it is too simple and does not capture the achievement of the student. Research has also found there is a lack of reliability, often showing a range of marks for identical test papers (Durm, 1993; Wilson, 2009). Despite criticisms, however, there has been little change to this style of reporting as it had become ingrained in schooling culture as a method for students, parents and workplaces to interpret student achievement and placement (Durm, 1993).

Educational Theory

1. Growth Mindset

Growth Mindset is one of the theories which underpins the reason for this project's research into assessing and reporting growth in learning. The theory of Growth Mindset was developed by Professor Carol Dweck and outlined initially in her 2006 publication *Mindset; The New Psychology of Success*. Dweck discusses the research which led to the formation of the terms Growth Mindset and Fixed Mindset, and unpacks the two mindsets, demonstrating the impacts of each on relationships, learning and general daily life.

Dweck wrote that people with a fixed mindset believe that intelligence, character, ability and talent have a limit that will never be exceeded, and as a result, will need to prove that they have those qualities in abundance. While people with a Growth Mindset see that these aspects can be continually developed, through persistence and hard work. Dweck (2006) asked the question, "Do people with this mindset believe that anyone can be anything, that anyone with proper motivation or education can become Einstein or Beethoven?" She found that this was not the case, but with a Growth Mindset students

would be more likely to see their potential as a learner rather than define themselves through a grade (p. 7).

In explaining the two mindsets, Dweck acknowledges that we can move between the two mindsets in our approach and that becoming more growth-minded is a matter of training oneself. Following the training of college students in the Growth Mindset, Dweck (2006) wrote that her students altered the way they studied and found the new strategies to be more successful, "because they think in terms of learning, people with the Growth Mindset are clued into all the different ways to create learning" (p. 62). She also found that students' disposition towards learning changed as they were less focused on getting good results for a test and more focused on their learning. To further enable this, "having children focus on the process that leads to learning (like hard work or trying new strategies) could foster a Growth Mindset and its benefits" (Dweck, 2015). This indicated that educators should be encouraging a Growth Mindset in their students for them to achieve the best outcome in their learning.

Growth Mindset has had a large impact on education, some of which has proven to be negative. Australian researcher Susan Mackie coined the term False Growth Mindset through her observations of educators misapplying the theory of Growth Mindset. The theory was misapplied through three main habits: praising effort alone, telling the students "you can do anything", and blaming the student's mindset for their lack of progress. Dweck, on learning of this misapplication, reaffirmed her theory and encouraged teachers to instead develop practices which would positively encourage Growth Mindset through:

- Meaningful work
- Honest and helpful feedback
- Advice on future learning strategies
- Opportunities to revise their work and show their learning.

(Dweck, 2016)

Each of these aspects have implications for effective assessment and reporting practices. In order to implement a Growth Mindset approach in assessing student learning, the purpose of assessment must shift to accommodate the needs of the learner first and foremost. This is a need which Geoff Masters (2013) has recognised through his extensive review of current research into assessment practices. He proposed that educators be less focused on judging and grading success, and more focused on communicating where students are in their ongoing learning and what progress they have made. Providing only

a grade or mark is not helpful feedback as it does not provide a picture of where the learner is or provide information on their future learning strategies.

2. Vygotsky's theory of development

Incorporating another theory of development to frame our project was important because Growth Mindset focuses on what the student believes about themselves, and conceiving it as such would place the teacher in the role of developing the student's self-efficacy. This is a part of teaching, but it is not the whole of teaching. As such, the project needed to include a theory which considered the complexity of a teacher's role in developing and shaping a learner. This would act as a better explanation for how the project conceived of the role of assessment and reporting in locating a student on a learning continuum as well as a better argument for why to change current assessment practices when it comes to school-wide reform. Such a learning continuum will no doubt be able to clearly show a student's growth, but this is only one aspect of the potential for this view of assessment, as arguably marks and teacher feedback can still be made to show a student's growth if it is of the 'right' kind for the assessment.

An influential sociocultural approach to cognitive development theory was Lev Vygotsky's theory of development, which was conceived simultaneously to Jean Piaget's theory of stages of development, between the 1920's and 30's. Yet Vygotsky was not widely known outside his home country of Russia until the end of the Cold War when the reading of Russian work was no longer considered subversive (Kozulin, 2012). As a Swiss scientist, Piaget's universal stages had more of an immediate impact, permeating educational pedagogy from teaching practice in the classroom to leading educational reform and syllabus writing (Plowden Report, 1967; Roberts, 2013). The current curriculum structure of placing students in year groups, and teaching and assessing them through syllabus stages in part reflects the universal stages of development, what Masters calls the "one size fits all approach to classroom teaching" (2015, p. 15) and which Darling-Hammond refers to as the "industrial, assembly line model of schooling" (as cited in Masters, 2015, p. 15). Vygotsky attributed the reasons for this misconception as the connection between education and occupation:

When the goal is to find a suitable candidate for a certain profession, reasoning is as follows: To become a good professional in a certain area, the candidate must possess certain qualities. Then if the subject has demonstrated the required qualities, he is declared suitable, and if these qualities are absent or insufficiently developed, it is

concluded that the candidate is not suitable for the given profession. Children were selected for schooling in the same way. If the child already possessed mature functions required for the profession of schoolchild, he was declared suitable for schooling.

(1935/2011, p. 199)

This pedagogy conceives of the maturation of a child and the instruction of a child separately. It treats the child as a machine, which if put together in the same way should roughly work in the same way. Thus, assessment becomes a tool to check these machines by pausing the conveyer belt at a certain stage of development. Reporting feeds information back to the system as to the appropriate functioning of the machines.

Yet much research since then has revealed that this cognitive view of development is flawed as it does not account for social and cultural influences on development. Dylan Wiliam found in his review of students' mathematical results in standardised testing that, "Attainment is only loosely related to age" (2007, p.248). Dasen completed similar studies to Piaget with children in remote Aboriginal communities and found that the abilities of the Aboriginal children and Swiss children differed greatly despite them being in the same stage of development (1994). This research pointed to the need for an understanding of the impact that the social environment has on development. Vygotsky's theory diverged from Piaget's in a crucial aspect, an aspect which we find essential for justifying the aims of this research project. Vygotsky stated, "learning is a necessary and universal aspect of the process of developing culturally organized, specifically human psychological function" (1978, p. 90). Learning leads development, not the other way around. As such, the effect of the culture of learning surrounding a student becomes crucial. This culture is defined in part by how assessment and reporting are practised and conceived of in an institution. Assessment does not only measure a student's learning, it also leads their development. Reporting does not only feedback information on a student's learning, it can drive their learning forward.

In his time, Vygotsky recognised that the theory of student development did not fit with what the research into development was revealing. He was concerned with the paradoxical discovery in early 20th century studies that students who start with the highest levels of IQ's sometimes made the least developmental gains across the course of their schooling (1935/2011). To explain this difference in development, Vygotsky made a distinction between a student's *relative achievement* and their *absolute achievement* (1935/2011, p. 203). The absolute achievement is measured through marks and grades,

the relative achievement considers the growth that a student shows relative to their previous learning. It is this distinction which Geoff Masters has drawn our attention to, once again, in his critical report on *Reforming Educational Assessment* (2015). Masters made an extensive review of the current educational research, noting that a student's learning is variable and that "[i]ndividuals develop along idiosyncratic learning paths" (2015, p. 20). Thus, he draws the conclusion that, "the fundamental purpose of assessment is to establish where learners are in their learning at the time of assessment" (Masters, 2015, p. 5-6). An assessment that delivers the absolute achievement does not provide a full picture of the learning for the teacher or student.

This definition is useful as it makes the link between learning and student growth clear. The idea of 'where students are' reflects the idea that their learning falls on a progression, and that it is the role of assessment to measure where a student is in their learning progression. A system of marks and ranking can only ever measure a student against their own cohort in a discrete subject or unit of work; while the cohort can be large depending on the test they are taking (considering how many students take the HSC), this type of testing can only ever be reductive because it isolates a student's learning into one moment in time, whether this be one day or over the course of a year as in the HSC. Using assessment to place a student on a learning progression instead recognises learning as a continuous process, inducting students into a view of learning as lifelong, which privileges their growth, not their marks, as each assessment is an opportunity for them to measure their progress overtime, against themselves and not against their cohort. We could call this the 'personal best' view of learning rather than 'Olympic Gold' view of learning; only a few can get the Olympic Gold, but everyone is capable of achieving their personal best, and improving on this throughout their lifetime.

This brings us to the most well-known aspect of Vygotsky's theory: the zone of proximal development (ZPD). This theory is most frequently applied to a justification for using scaffolding and models to assist in student learning, as the theory states that there is a zone of possible development between what a student can do on their own and what they can do with the help of a 'master' (Zaretskii, 2009). Additional support will allow them to grow much faster in their learning and development. For this to be possible, the instructor must know what the student can do by themselves, in order that they can provide the support for what they can do with that support. This conception at its heart presents a continuum of student learning where instruction becomes a cycle of locating a student

on their learning continuum (what they can do) in order to give them feedback and support as to what they can do to develop (do what they can only do with support).

We suggest that this theory has much more far-reaching significance than classroom practice. Research into neuroscience has shown that the brain is shaped by experience (Masters, 2015). The *emotional experience (perezhivanie)* of a learner is an important factor that needs to be considered is assessment and reporting. Vygotsky defines *perezhivanie* as, "how a child becomes aware of, interprets and emotionally relates to a certain event" (Vygotsky, 1999, p. 242). Vygotsky identified experience as the unit which can be used to understand how the external (environment) influences the internal development. *Perezhivanie* represents the learner's attitude and interpretation of their environment (Vygotsky et al, 1994). Vygotsky's (1994) asserted that education must, "always be capable of finding the particular prism through which the influence of the environment on the child is refracted" (p. 341). The reason for this necessity becomes clearer when we consider the link between experience and development. Bozhovich (2009) explicates the significance of *perezhivanie* to development, stating, "the system of their needs and impulses (subjectively represented by the *emotional experiences* that correspond to them) that, refracting and mediating the effects of the environment, become the immediate force driving the development of new mental qualities in them" (p. 82). It is this *emotional experience* that drives mental development and it is this which we have too often been ignoring when it comes to assessment and reporting practice.

The number of students feeing stressed or depressed due to the experience and results of their assessment has been steadily increasing (Carr-Gregg, 2006). Changing the conceptualisation of the purpose of assessment and reporting has deeper implications more far-reaching than classroom instruction. It has implications for the personality development of the child as well; what we would call their disposition as a learner. Kratzova (2009) argues that personality development requires a child to have a sense of "self" in these mechanisms, to be aware and in control of themselves as the source of development (p. 18). In this way, mental development occurs before personality development. It is the role of the adult to develop this awareness of the child as the source of development. Kratsova (2009) describes personality development as "an aggregate self" (p. 20). This is what Vygotsky refers to as "a head taller" and it is this self, its understanding and communicative ability that characterises the breadth of possibility the ZPD offers.

Feedback and Reporting

Recent pedagogy acknowledges the crucial role that feedback plays in the learning process, being one of the key indicators of excellence in education. Meaningful and appropriate feedback assists students to progress through the curriculum levels. It is one of the most powerful moderators of learning and aims to reduce the gap between where the student "is" and where he or she is "meant to be", enabling students to grow and achieve learning outcomes. Feedback can be very powerful if well done, in that it has a double-barrelled approach, addressing both cognitive and motivational factors at the same time.

John Hattie (2012) has provided strong theory derived from evidence-based research. His argument on feedback addresses three questions for a learner: "Where am I going?" (based on goals, learning intentions and success criteria), "How am I going there?" (rapid formative feedback based on progress), and "Where to next?" (encouraging more self-regulation in the learning process). With this view of feedback in mind, teachers are encouraged to see learning through the eyes of students, appreciating their often non-linear progressions to the goals, supporting their deliberate practice, providing feedback about their errors and misdirection, and caring that the students get to the goals.

It has been found that not all feedback is beneficial and thus an emphasis is placed on what constitutes quality feedback. According to Hattie (2012) it should be provided in a timely manner. Brookhart (2008) supports this view, arguing that teachers should never delay feedback beyond when it would make a difference to students, and provide it as often as is practical for all major assignments. Both Hattie (2012) and Brookhart (2008) agree that it also needs to be provided in an appropriate manner. Brookhart (2008) writes that quantity needs to be considered; the teacher should prioritize the most important points that relate to major learning goals with consideration of the student's developmental level. It should be given in the best mode for the message; for example, oral, written, visual/demonstration. Its audience should be determined, as individual feedback tells the student that you value their learning, and group/class feedback gives the teacher the opportunity for reteaching if most of the class missed the same concept on a task.

Hattie's (2012) conclusions on feedback include a recognition of the work of Shute (2008) who provided nine guidelines for using feedback to enhance learning:

- Focus feedback on the task not the learner,

- Provide elaborated feedback (describing the "what", "how", and "why"),

- Present elaborated feedback in manageable units (for example, avoid cognitive overload),

- Be specific and clear with feedback messages,

- Keep feedback as simple as possible, but not simpler,

- Reduce uncertainty between performance and goals,

- Give unbiased, objective feedback, written or via computer (more trustworthy sources are more likely to be received),

- Promote learning goal orientation via feedback (move focus from performance to the learning, welcome errors), and

- Provide feedback after learners have attempted a solution (leading to more self-regulation).

Furthermore, Brookhart (2008) cites Butler and Nisan whose experimentation illustrated what constitutes good feedback: firstly, that the comments were about the task; secondly, they were descriptive; thirdly, they affected both performance and motivation (the double-barreled" effect of formative feedback); and fourthly, they fostered interest in the task for its own sake.

For the implementation of successful feedback and learning, a suitable learning atmosphere is required. Hattie (2012) recognises the importance of disconfirmation as well as confirmation, the necessity for the climate of the learning to encourage "errors" and entice students to acknowledge misunderstanding, and the value of appropriate peer feedback. Black and Wiliam (1998) refer to meta-task processes, arguing that studies show that feedback interventions that cue individuals to direct attention to the self rather than the task appear to be likely to have negative effects on performance. Thus praise, like other cues which draw attention to self-esteem and away from the task, generally has a negative effect. This is consistent with the findings of Cameron & Pierce (1994), who found that while verbal praise and supportive feedback can increase students' interest in and attitude towards a task, such feedback has little, if any, effect on performance. They concluded that the key feature in effective use of feedback is that it must encourage 'mindfulness' in the student's response to the feedback. Similar reviews by Dempster (1991, 1992) confirm these findings, demonstrating that tests can promote learning as well as sampling it. This aligns with Hattie's alternative to assessment *for* and assessment *of* learning, being "assessment as feedback".

Marshall and Wiliam (2014) note that meaningful formative oral feedback needs to be grounded on a good knowledge of students, a sense of trust within the class, a focus on improving rather than judging students' work, and differentiation. Regarding written feedback, the authors suggest that the most appropriate time for extensive written comments to aid progress is in the drafting stage of a piece of work, and that the feedback should promote further thinking on the part of the student. Royce Sadler (1989) is referenced by Marshall and Wiliam for the importance of his approach in developing student judgement about the quality of work they and others produce. This he describes as "guild knowledge" which goes beyond simply providing lists of criteria, in order to apprentice students through the assessment process, both peer and self-assessment. This extends the range and scope of students' repertoire by helping them understand issues of quality through exemplification, and engages the student with the complexity and layering of criteria to reach an understanding of what makes for a quality piece of work.

In regard to feedback and grading, Hattie (2012) does not relate feedback to marking or grading as he encourages it to be "feedback in motion", assisting all to move forward based on correctives and information that reduces the gap between where students are and where they need to be. Similarly, Brookhart (2008) states that descriptive comments supplied as feedback have the best chance of being read as descriptive if they are not accompanied by a grade.

Cornue (2018) presents the argument that we should change scoring and grading structures in order to foster learning and provide quality information that accurately and equitably evaluates student learning. He argues that grading has its place in providing feedback for the students, teachers, parents, employers and colleges, and to guide future instruction for the students, and that there is really no purpose to ranking as it does not better inform parents, children, or colleges as to what the student has learned. He proposes a 4 point grading system based on attainment of standards. Standards provide a means of communicating learning; it provides specific goals and helps students understand their strengths and need for additional support; it provides helpful information for the following year's teacher; and guides parents to help them ask the right questions of both their children and their children's teachers. Cornue (2018) recommends Black and Wiliam's approach to formative learning, suggesting that assignments, projects and homework should not be graded, but rather include the provision of quality feedback, providing students with an opportunity to improve upon their work, in order to develop a

growth mindset. This suggests following the mantra "Focused comments, fewer grades" (p. 73). He also approves of Wiliam in regard to the benefits of students doing the evaluation of their own work. In terms of group work, Cornue (2018) suggests that groups work together, but that students should have the opportunity to demonstrate their knowledge separately.

Cornue (2018) goes on to advise the setting up of a Foundation Team to change the school's practice. In developing the grading structure, a team of teachers should identify groups of standards that make sense together and are "grade-worthy" and be expressed in language that makes sense to the students and parents. (Providing 9 clear goals for the student to achieve by the end of the year is recommended.) Then the team must decide on the expected levels of learning for most students, most of the time, in each marking period. This number is the common goal to be added to the report card immediately following the student's grade for each standard. We should let the standards reflect the learning and resist the temptation to average the student's scores to come up with a grade. Soft skills should still be included in the report, but would best be limited to three or four overarching ideas such as: citizenship, effort and attitude towards learning. All of this should then make up a complete report card complying with Guskey and Jung's notion of "product, process, and progress".

The readings studied have clear links to the goals of the Growing Minds research project. For example, recent thinking about feedback acknowledges that individual students learn at different rates, making feedback a powerful tool in the process of empowering students to more strongly engage in their own learning growth, getting from where they are now to where they are meant to be. Furthermore, theory studied regarding grading and reporting supports the idea of establishing expected standards or levels of learning, but not ranking, and comparing an individual's learning path relative to these, highlighting students' learning gains over time. Finally, the readings also suggest the benefits of setting up a team within a school that might best accommodate improvements to grading and reporting systems.

Learning Progressions

Learning progressions have been researched for more than a decade, however; they have only recently been recognized as an approach for improving educational practice on a large scale (e.g., Corcoran, Mosher, & Mogat, 2009; Daro, Mosher, Corcoran, Barrett, Battista, Clements, et al., 2011). Early research in learning progressions emerged from an

interest in how students develop scientific knowledge and reasoning skills (Corcoran et al., 2009). The concept of learning progressions is based in cognitive psychology and the science of how students think and learn. The underlying principles are that (i) learning is a constructive process, (ii) how knowledge is organised within the learner is important and (iii) social interaction is an important element of cognitive development that fosters learning growth (Bruning et al., 1999).

Researchers have attempted to define learning progressions in the following ways:

- "A description of skills, understanding, and knowledge in the sequence in which they typically develop: a picture of what it means to 'improve' in an area of learning." (Masters & Forster, 1997, p. 1).
- "Descriptions of successively more sophisticated ways of thinking about an idea that follow one another as students learn: they lay out in words and examples what it means to move toward more expert understanding." (Wilson & Bertenthal, 2005, p. 3).
- "Carefully sequenced set of building blocks that students must master en route to a more distanced curricular aim. The building blocks consist of sub skills and bodies of enabling knowledge." (Popham, 2007, p. 83).

These definitions share the assumption that students' knowledge, skills and understanding progresses along one continuum of learning that is specific to the learning domain. The Australian National Curriculum and New South Wales Curriculum are currently organised into stages of learning. While outcomes within each stage describe what students should achieve by the end of that stage, they do not clearly detail how learning progresses in a domain. As explicit learning progressions describe a pathway of learning, they can support teachers in planning and assessing (Heritage, 2008). Four guiding principles of learning progressions include (Hess, 2008):

1. Research informs how learning develops over time,
2. Essential ideas, rules, and concepts (derived from domain or discipline experts) are mapped to characterise learning,
3. Progression represents learning movement from emergent to more advanced (although particular category labels can vary),
4. Use is informative to assessment and instruction.

Learning progressions have been used predominantly in Canada, the United States, the United Kingdom, Australia and New Zealand, with varying degrees of success. In the United States, the National Research Council (NRC) have argued for the use of learning progressions as a means to foster both deeper mastery of subject-matter content and higher level reasoning abilities. In 2006, the National Research Council report on science education described learning progressions as a "promising direction for organising science instruction and curricula across grades K-8." A framework of "enduring understandings" and essential learning targets for elementary, middle and high school levels was developed. Six mathematics strands were identified: symbolic expression, the nature of number and operations, measurement, patterns, relations, functions and geometry, data analysis, probability and statistics. These strands were not necessarily linearly related, but instead provided an integrated map, increasing in complexity across development.

In 2010, literacy experts in the United States synthesised research to identify specific content strands to inform learning progressions (Hess, 2011). Seven aspects of literacy were identified: reading and writing habits and dispositions; reading/making meaning at the word level; reading literature/making meaning at the text level; reading informational texts/making meaning at the text level; writing literary texts/communicating ideas and experiences; writing to inform/communicating through informative texts; and writing persuasively/communicating opinions, critiques and arguments. These strands were meant to be integrated to form a detailed learning map where the strands were not linearly related. Stringent empirical groundwork was not used to determine student understandings, but rather they are based on literature reviews. It is unknown how the learning progressions map from the United States will be further developed.

In the United Kingdom, the Assessing Pupil Progress (APP) and the Personal Learning and Thinking Skills were introduced in the National Curriculum reforms 2007-2008. These programs attempted to plot progressions through different areas of the National Curriculum levels. The use of the National Curriculum levels and attainment of targets were found to have a negative impact on teaching and learning. Teachers had become focused on getting students to the next level rather than ensuring that their learning was secure. There was a lack of consistency in interpretation of the levels by teachers and parents and students used the levels to draw comparisons (Heldsinger, 2018). More recently however, the National Foundation for Educational Research (NFER) has once again taken up this research and has been developing National based learning

progressions in Mathematics as commissioned by the Renaissance Learning (Kirkup et al, 2014).

In Australia, as part of the Australian Council for Educational Research (ACER, 2012) longitudinal study of literacy and numeracy, progression maps were developed in both numeracy and literacy. In numeracy, the study involved used empirical evidence to map the areas of mathematical knowledge, number, space, and chance and data. Researcher used Rasch modelling (item-person mapping) methods, researchers to compare skills and knowledge of students at different (percentile) levels of achievement. In literacy development, the study involved analysing patterns of growth in concepts about print, phonemic awareness, reading fluency, making meaning from text, and writing (Meiers, 2004). Item-person mapping of assessment results over time enabled the construction of a map of typical learning progress in these five areas. These learning progressions provide educators a map for measuring, describing and monitoring literacy growth over time.

The Australian Council for Educational Research (ACER) have continued to develop learning progressions in many subject areas and for many age levels as part of the ACER-GEM and the UNESCO Institute for Statistics (UIS) collaboration. As part of their research work they have developed reporting scales (UIS RS) which describe the progressive development of two domains of learning: reading and mathematics. ACER has also developed the Learning Progression Explorer, a tool used to display and explore learning progressions. The Learning Progression Explorer provides different layers of detail from a general description of a learning domain, proficiency descriptions for each level of the domain through to a skills illustration.

The Australian Curriculum, Assessment and Reporting Authority (ACARA) also published National Literacy and Numeracy Learning Progressions in January, 2018. The progressions describe common pathways or developmental sequences in student acquisition of knowledge in literacy and numeracy from Foundation to Year 10. The progressions do not describe what to teach but rather how students become increasingly proficient in literacy and numeracy development. They provide a means of locating where a student is at in their learning and the next steps in their learning.

Similar to Australia, the Literacy Learning Progressions were developed in New Zealand in 2007. The purpose was to provide teachers with a reference of the typical knowledge, skills and attitudes needed for mathematics strands and the reading and

writing domains of the New Zealand Curriculum from Year 1 to Year 10 (NZME, 2010a). In numeracy, a matrix of progress indicators were used to identify and describe learning in numbers related to fractions, number strategies, measurement, geometry and tessellations algebra and exploring patterns, statistics related to data and statistics related to probability. In literacy, three focus areas were emphasised: understanding written language code, knowing the meaning of texts, and the development of critical thinking skills. Similar to the Australian progression maps, learning is not seen as discrete events ordered by grade level, but rather a trajectory of learning within a domain (Heritage, 2008).

Learning progressions support educators in promoting a growth perspective which focuses on the process of learning and increasing proficiency in a learning domain over time (Krajcik, 2011). As raised by Heritage (2008), many teachers lack a deep understanding of how learning progresses in a domain over time and as a result, teachers are unable to engage in effective formative assessment. Learning progressions will support teachers in determining where student learning is on the continuum and what to do to move them along it (Black, Wilson & Yao, 2011). By explicitly describing a learning trajectory, teachers can effectively plan instruction. Learning progressions also expose student misconceptions in thinking or incomplete understandings about key concepts and/or skills (Saez et al., 2013).

Researchers have noted various issues in the use of learning progressions. Firstly, learning progressions are conjectural models of learning over time. Researchers and educators have developed many varying versions of learning progressions across the same domains of learning. Thus, learning progressions need to be empirically validated by research on student thinking and learning in a domain. Secondly, learning progressions vary in terms of grain size and varying grain sizes may be used for different purposes. When using a learning progression, it is useful to know how it connects to a more general learning progression and a learning progression at a smaller grain-size. *"A coherent set of learning progressions that allow one to "zoom" in and out may have distinct advantages over learning progressions that are more limited in scope or that are not as completely articulated"* (Gong, 2008, p. 4). Thirdly, if learning progressions are important for formative assessment, it is essential that consistency of interpretation by teachers is maintained. That is, there needs to be a careful balance between both internalised expertise of the teacher and externalised tools (e.g state research-based testing, standardised testing,

research based assessment tools and protocols) so the teacher does not have to learn and recreate it (Gong, 2008, p.6)

Change Management and Professional Learning

Quality professional learning opportunities for staff can be the catalyst for implementing significant change in an organisation. Unfortunately, the majority of professional development opportunities commence and conclude with an instantaneous response to course and workshop content (Christie, 2009). The message that is evident in research literature is that professional development is the outcome of numerous particular changes occurring over significant time. The best professional learning opportunities are not individual, they allow professional knowledge to be used for professional purpose and use reflection to enhance development and growth (Mitchell, 2013).

Whilst it is the job of leaders to 'create' and 'maintain' particular types of culture in an organisation (Ogbonna and Harris, 2000). The task of driving change to transform a culture of learning, growth and professional development in an organization is not easy. While it is incredibly important to have high quality pedagogical approaches and meaningful curricula, it is equally important that organizations are staffed with individuals who are continually working to improve their practice and knowledge to drive change.

For meaningful and sustainable change to occur, schools must steer away from an 'Individualised Instruction' model of professional development. This professional development model continually results in minimal to no measureable adjustment to an educator's instructional approaches or pedagogy (Hollins, 2006). Individualised instruction which is sometimes referred to as 'Seat Time' links closely to what Day and Sachs (2004) refer to as 'Managerial Professionalism' where the focus of professional development is on compliance and economic efficiency rather than learning and improved practice. The problem with a 'Seat Time' or 'Individualised Instruction' approach to Professional Development is that it is transient in nature, exclusively individual and non-cohesive.

Successful PD that improves learning, pedagogical outcomes and leads to positive change involves a teacher acquiring and enhancing skills, and changing attitudes in an attempt to improve practices over time (Mitchell, 2013). Significant professional learning needs time for individuals to reflect, have conversations, create narratives, coach each other and practice newly learnt skills with the job at hand (Mitchell, 2013).

The deliberate allocation of time for conversations and development of strong professional relationships play a critical role in the engagement of staff. The crafted professional relationships not only focus on teacher sharing, they also bolster school culture by expecting inclusive, genuine and ongoing collaboration whilst placing a high value on scrutinising practices to improve outcomes (Leithwood, Louis, Anderson and Wahlstrom, 2004). The existence of these types of social architecture in schools, help shape teachers' attitudes toward new pedagogies and implementing change (Toole, 2001). Louis and Kruse (1995) state that what teachers do outside the classroom together can be just as important as what they do in the classroom especially when it is directly related to school restructuring and pedagogical changes. These debates, discussions and examples of professional dialogue create greater clarity about what is desired, expected and valued by the school (Ladwig, 2005).

Empirical evidence suggests that when there is a higher involvement of leadership being active participants of professional learning activities, higher outcomes are obtained (Andrews and Soder, 1987). When leaders are involved in the professional learning it is more likely that clearer goals are set and staff are not exposed to multiple agendas and conflicting priorities, which over time can produce burnout, cynicism and disengagement (Robinson, Lloyd and Rowe, 2008).

Robinson, Lloyd and Rowe concluded in their 2008 study that instructional leadership has a notably greater impact on desired outcomes and driving change yet make special mention that an integrated approach focusing on instructional and transformational leadership theories was essential for improving intellectual quality. These findings cannot be ignored, and it is very clear that when implementing change, transformational leadership theories must be used to help achieve more social outcomes, whilst instructional styles of leadership must be implemented to improve academic outcomes and create greater rigour around expectations and desired outcomes (Robinson, Lloyd and Rowe, 2008).

Research Aims

This aim of this research was to reform our assessment and reporting paradigms to:

1. Make growth pathways more visible to teachers, students and parents,

2. Enhance the growth mindset amongst students and the importance of effort,

3. Facilitate a goal orientation towards growth, rather than generic, fixed standards of achievement,

4. Ensure that assessment always informs learning, and

5. Make assessment the engine of curriculum reform.

Research Questions

This project explores the following research question:

How do we effectively and reliably assess and report student growth in learning?

In order to address this research question, the following questions of enquiry were posed:

- What subject-based or skills-based proficiencies should be evaluated?

- How do we achieve subject-based or skills-based consensus on student growth in learning (amongst educators)?

- What is expected of students in terms of one year of learning in each subject?

- How do we effectively and reliably assess and measure student growth in learning?

- How do we effectively and reliably report student growth in learning (to parents, students and educators)?

- How do we use both summative and formative assessment data from both external (PAT, NAPLAN) and internal (School-based) testing sources to assess and report student growth in learning?

Methods and Data Collection Approaches

Methodology

This study used predominantly quantitative methods of data collection in order to develop a scale with which to measure student learning growth.

Quantitative data was utilised in the:

1. Development of test items, including scoring guides and codebooks,
2. Marking of student test scripts and the coding entry of data from student test scripts,
3. Data analytics phase which detailed the performance of the students on the test items as well as the effectiveness of the test items.

Qualitative data was also used in this study and captured information through:

1. Test item identification and descriptors in the codebooks,
2. Test item scoring guide rubric (English),
3. Key stakeholders' views about current and potential future reporting models,
4. The quality of professional learning provided throughout this research project,
5. New learnings for teachers involved in the professional learning workshops as part of this research project,
6. New learnings for teachers participating in this research project.

Research Design

This project utilised an action research methodology. The principle aim of the study is on improving teacher practice and processes in relation to assessment and the identification of evidence to support statements regarding student attainment and growth. As the research project has outcomes strongly aligned with driving change and improvement at a local level, it follows an action research design. Our vision is to build a better system of assessment and reporting that will have benefits for students, parents and teachers.

Cohen, Manion and Morrison (2000) describe action research as having the following purposes:

- To plan, implement, review and evaluate an intervention or design to improve practice and solve local problem,

- To empower recipients through research involvement and ideology critique,

- To develop reflective practice,

- To link practice and research, and

- To promote collaborative research.

Each of these purposes was addressed significantly throughout the methods employed in this research design.

The research approach had three main focus areas as outlined below, all of which were conducted during 2017-2018. The first two focus areas predominantly address the research question *"How do we effectively and reliably assess student growth in learning?"*, whilst the third focus area explores *"How do we effectively and reliably report student growth in learning?"* The three focus areas are inextricably linked and the reporting of student growth in learning relies solely on the development of a valid and reliable scale, as discussed and developed in the first two focus areas.

1. Professional learning

It was essential for teachers in this project to be involved in professional learning centred on quality test design and data analytics. Our specialist mentors were key facilitators in this aspect and provided clear understandings and guidance as to how we might "measure" student growth in learning.

The key learning articulated by our specialist mentors and illustrated through the professional learning workshops, was that in order to measure student growth in learning, you need to develop a reliable and valid scale.

The professional learning phase of the project introduced teachers to the concepts of models of intent with specific knowledge, skills and responses providing evidence of attainment of increasing capacity in the traits of interest: Reading, Writing and Mathematics.

Phase 1:

In Phase 1, teachers in the Growing Minds Team actively participated in five, one day workshops which were conducted by specialist mentors Frances Eveleigh and Chris Freeman from the Australian Council of Educational Research (ACER) during 2017.

Image 1. Growing Minds Team collaborating on writing test items.

Workshop 1: Developing a learning continuum

- Exploring and investigating existing achievement statements and continua e.g TIMSS Mathematics, PAT Reading, Writing, Maths, NAP Science Progress Map, Naplan Achievement Standards
- Mapping a learning domain and understandings about a learning continuum
- Developing a scale, test frameworks and specifications
- Exploring examples of key ideas and competencies

Workshop 2: Unpacking outcomes and principles of test construction

- Unpacking outcomes
- Principles of test construction
- Test validity and reliability
- Writing items – best practice

Workshop 3: Test construction

- Practical workshop time for writing test items collaboratively and putting the principles of quality test construction into practice
- Two tests were constructed: one for Year 6 Reading, and one for Year 6 Mathematics

Workshop 4: Feedback on test items

- Feedback from our specialist mentors, including the English specialist Dr Sandra Knowles, also from ACER, on the two tests constructed in Workshop 3
- Deepening understanding of quality test design principles and the importance of valid and reliable data
- Refining and finalising the two Year 6 tests in order to conduct testing with Year 6 students

Workshop 5: Describing Growth

- Unpacking and understanding sample item statistics collected from the Year 6 Mathematics and English testing
- Application and interpretation of the statistics provided to determine (i) the effectiveness of the test item and (ii) how the student performance maps to the scale

Phase 2:

In Phase 2, teachers of Year 5 and 6 actively participated in three, one day workshops, conducted by our specialist mentors during Terms 2-3, 2018. These three workshops were a compacted version of the previous five workshops. Members of the Growing Minds Team were also involved in this phase in order to support the learning and knowledge transfer of the Year 5 and 6 teachers. The teachers developed one Year 5 Mathematics test and one Year 6 Reading test. In addition, senior school members of the Growing Minds Team worked with Year 7 and 8 Mathematics and English teachers, to construct Mathematics and English tests for Year 7 and 8 students using the principles of quality test construction from the professional learning workshops. They developed two Year 7 and two Year 8 Mathematics tests and one Year 7 Writing test. These tests were conducted during terms 1-2, 2018 and the data analytics from some of the tests, further contributed to the previously developed 2017 scale for Kincoppal-Rose Bay students.

Images 2 and 3: Years 5 and 6 Teachers Involved in the Professional Learning Workshops with Mentor Frances Eveleigh

2. Application of learning to develop a scale for describing student progress

To measure growth accurately and fairly requires:

- Aligning test items to content standards

- Creating a vertical scale of measurement

- Matching item difficulty level to student ability

- Gaining precision using deep and expansive pool of items

- Ensuring fairness through empirical bias and sensitivity reviews

- Balancing the accuracy required with the need for which the data is gathered

- Providing context for growth
  (NWEA, 2014, p. 5)

This focus area involved teachers of Years 5-8 applying their professional learning about the principles of quality test construction to the design of test items, administration of assessment tasks, scoring of student scripts and collection of data, for a particular year level and learning domain. Our specialist mentors supported us with the data analytics and mapping of the data to a scale for describing student progress. This focus area included:

i) Construct and administer assessment tasks for data collection

    a. Identify and deconstruct outcomes

    b. Develop task frameworks and specifications

    c. Write and review items and construct assessment instruments

    d. Write descriptors of skills assessed for each item

     e. Develop codebook information and scoring rubrics/guides

     f. Administer assessments, score and record data

Refer to Appendix 2 for examples of test construction.

  ii)   Conduct Analysis

     a. Undertake analysis using Rasch methodology using 1-PL(RUMM/Conquest)

     b. Interrogate test and item level statistics

     c. Construct Kincoppal-Rose Bay School Mathematics scale

  iii)   Map Kincoppal-Rose Bay School Mathematics scale on to existing PAT scale

     a. Use existing PAT Mathematics scores for common persons

     b. Equate Kincoppal-Rose Bay School and PAT Maths using common persons

     c. PAT and Kincoppal-Rose Bay School descriptors together on one scale

     d. Define 'bands' and develop descriptions of achievement for different bands

3. Development of a prototype report for reporting student growth in learning

The third focus area was a significant project in itself. The end of semester school report is traditionally the predominant method of reporting student learning and achievement. Key stakeholders such as parents, teachers and students have varying views about: (i) *what should be reported and (ii) how it should be reported*. Kincoppal-Rose Bay School as a NSW Catholic, Independent school, is required to comply with NESA policies in regard to reporting student achievement. The current educational climate and context clearly shows that there is a growing interest in reporting student growth in learning (ACER and ACARA) and that research advocates the use of learning progressions to support identification of students' placement on a learning continuum.

> *"Introduce new reporting arrangements with a focus on both learning attainment and learning gain, to provide meaningful information to students and their parents and carers about individual achievement and learning growth."*
>
> (Gonski et al, 2018, p. xiii)

Many schools are moving towards an online platform of continuous reporting which provides students and parents with timely feedback as to a student's performance on a

particular assessment task. This type of platform provides scope for utilising and embedding the elements of formative assessment (Wiliam, 2015) and quality feedback for improvement. In addition, we were seeking to establish a means of reporting summative student progress or growth across a continuum of learning and learning domains, potentially provided to parents and students each semester.

The structured investigation below was used to explore a potential model for reporting student growth in learning.

a. Draft 7-12 Report Review Project brief and scope and establish 7-12 Report Review Team.

b. Examination of current school practices related to reporting student learning progress.

c. Surveying key stakeholders (Kincoppal-Rose Bay teachers, parents and students 7-12) as to their views on current 7-12 Kincoppal-Rose Bay School reports and potential features of future K-12 Kincoppal-Rose Bay School reports.

d. Examination of other schools' reports, including electronic systems and tools used to generate the reports.

e. Drafting of the scope and brief for a new prototype Kincoppal-Rose Bay School report.

f. Design of a new model prototype Kincoppal-Rose Bay School report.

g. Ongoing meetings with potential vendors to investigate potential ability to electronically deliver the new prototype report.

h. Ongoing communication and presentation of work to date for the School Leadership team, Growing Minds Team, Heads of Department and K-12 teachers.

i. Collection of feedback from focus groups (Kincoppal-Rose Bay teachers, parents and students K-12).

A timeline of the three focus areas for development over 2017-2018 is provided in Appendix 1.

Participants

Participants in the three focus areas of this study were students, teachers and parents at Kincoppal-Rose Bay School.

In order to make the project scope more manageable, the study was confined to Years 5-8 students and focused on the learning domains of Mathematics and English. The choice of using Years 5-8 students would provide sufficient data for exploring growth in student learning across four years. In test design, it would allow for overlap or common testing of items across year levels, for example Years 6 and 7. The learning domains of English and Mathematics were chosen because of the current research available about learning progressions.

The Growing Minds research team, which included two senior school Mathematics teachers, two senior school English teachers, and three junior school teachers, were key participants in Phase 1 of the project. Given that the scope of the project involved students across years 5-8 in the learning domains of English and Mathematics, members of the team were selected from both the Junior School and Senior School and from the English and Mathematics faculty areas. They were also selected and invited to be a part of this research project based on their:

- Knowledge, understanding and experience of and with curriculum design.
- Knowledge, understanding and experience of and with assessment and utilising data.
- Interest in evidence-based research and a willingness to explore to research questions posed in this project.

This team was instrumental in taking the learnings and methodology of the project back to their own stage teams and faculties and the broader school community.

Phase 2 of the project endeavoured to broaden the scope of the project to Year 5-6 teachers (five additional teachers) and Year 7-8 Mathematics and English teachers (six additional teachers).

The following number of cases were included in each collection of data about the effectiveness of assessment instruments, and the individual questions that contributed to the assessment task.

Table 1: Assessment sample sizes years 5-8, 2017-2018

Timing	Subject	Year Level	Participants
Nov-17	Reading	6	48
Nov-17	Maths	6	56
Apr-18	Maths	8	77
May-18	Writing	7	74
May-18	Maths	5	62
May-18	Maths	7	80
Aug-18	Reading	6	49

It is envisioned that the outcomes of the project may be more widely extended and applied to other learning domains and possibly K-10 beyond 2018.

Research Procedure and Data Analysis

1. Professional learning

Data about the quality of the professional learning provided, was collected via an online questionnaire administered to the members of the Growing Minds Team and Year 5 and 6 teachers in Term 3, 2018. The questionnaire included both closed and open ended questions and asked teachers to rate and provide feedback about:

- Quality of the professional learning workshops conducted by our mentors from ACER.
- Positive aspects and challenges of the professional learning and the assessment design process that followed.
- New learnings from the professional learning workshops conducted by our mentors and from the work/process that followed.
- Positive aspects and challenges of being a part of the Growing Minds project.

Finally, teachers were asked to provide their thoughts and reflections in regard to the future direction of the Growing Minds project.

2. Application of learning to develop a scale for describing student progress

The data was collected and analysed at the item level in order to explicitly demonstrate the information contained in student responses.

Item Response Theory has been the underpinning model to guide the research with two Rasch Mathematical modelling analysis programs employed.

RUMM (Andrich et al) and Conquest (Adams and Wu) are grounded in marginally different algorithms that are manifested in differences in estimates in cases where polytomous scoring is employed. However, in the case of multiple choice items being analysed, both programs produce comparable results that are marginally variant due to the overall test design and the approach to handling missing data.

The reason for using two analysis applications is that they provide a range of statistics to inform the manner in which items have performed. The research model involves exposing the teaching participants to a variety of techniques for assessing the performance of an item in respect to its intent.

For example, it is common for an easy item to display low discrimination – everybody can do it. From a purely statistical viewpoint, it may be considered to have performed poorly. However, if the intent of the item is to engage all students, and it is positioned early in the test sequence (Wright & Stone, 1979) then the most salient statistic is not the discrimination, but the proportion of students, and in fact which ones, were unable to do this simple item. The use of different analysis programs allows a variety of statistics to be analysed to consider the inferences that can be made regarding items and to emphasise the important fact that consideration of a single statistic can be quite erroneous in considering item performance.

A strength of Item Response Theory, and in particular the Rasch Model, is the capacity to develop graphical representations of item difficulty and student ability on a single scale.

These representations provide a highly informative, and easily interpreted, review of the effectiveness of a test in relation to the target group to discriminate across the range of abilities typically present in a class group. Masters (2016, 2017 and 2018) frequently comments that it is not uncommon to have up to six years of variation in ability within a single cohort.

The Wright Maps (item/person maps) described in the Results and Findings Section, display the effectiveness of the test design and specification that has been employed to maximise the information about the target group.

Comparisons can be made over time, and subsequently, progress can be tracked, by establishing a common scale. Because the research is a combination of disparate assessments, it was decided that an established scale be used to link to the Kincoppal-Rose Bay scale, with the intention of enriching the scale with the Kincoppal-Rose Bay data. A commonly-used methodology is equating of results using common persons, such as undertaken to equate NAPLAN results from year to year. For the past decade, this has been achieved with a secure assessment administered to a specific sample of students who also undergo the NAPLAN assessments. The results of these students, or common persons, are then used to adjust the current NAPLAN assessments onto the historic scale.

For the Kincoppal-Rose Bay School research project, the process involved creating an independent scale of the School results and then by matching the results of the same students on a School scale with the independent established scale, the Kincoppal-Rose Bay scale can be matched to the established scale. Because of the School's rigorous engagement with the established PAT Reading and PAT Mathematics assessments, the Schools' results were mapped to these established scales, which also have currency with the Kincoppal-Rose Bay School staff.

The methodology is undertaken through determination of the mean and standard deviation of the common group of students on each scale and then a linear transformation of the Kincoppal-Rose Bay School scale to the parameters of the PAT scale made for each subject domain.

3. Development of a prototype report for reporting student growth in learning

Parents, students and teachers views about current and potential future reporting practices were collected via an online questionnaire conducted in Term 3, 2018. All 7-12 parents, students and teachers were invited to complete the questionnaire. The questionnaire included both closed and open-ended questions and the same questions, at times adapted for the particular respondents, were used.

Feedback sought via the questionnaire focused on rating the quality of various aspects of the School report including:

- Subject information in regard to content and skills taught

- Learning profiles for a student including level of effort, engagement and application
- Student grade and grade distribution table
- Teacher's personalised student comment
- Student learning strengths and areas for improvement or development.

The questionnaire also invited comments about aspects of other schools' reports that participants were familiar with and that they valued. Finally, it invited comments and feedback about features that they would value and seek to include in a future report model.

Results and Findings

The results from the recent project undertakings have continued to provide useful feedback to the team of selected teachers, as well as delivering insightful information regarding student thinking, and cohort ability.

1. Professional learning

Having engaged the key stakeholders in the models proposed to develop school capacity in assessment with the ultimate aim of developing descriptive scales of understanding and skills to implement a program to action the concepts described, it is reasonable to contend that there has been a significant development in the skills of the target teachers in understanding the relationship between curriculum, test design, item writing and the interpretation of results. There has also been demonstrated a greater understanding of the information about teaching, learning and question design that are uncovered by item level analyses.

The study of the item level statistics provides a new lens through which greater skill of discernment, reviewing and critical appraisal rapidly develop.

This increased awareness of the importance of using data, and building proficiency add strength and depth to the entire exercise.

There is ongoing development of the understanding of scales and their development.

Described learning progressions or subject scales typically have two components:

1. a numerical integer representation that is used to locate students relative to others on an established 'rule' of progressive achievement; and
2. a description of the skills and understanding that are exhibited by students at various points along the scale.

The participating teachers have acquired a strong understanding of the numerical component of scales and have been exposed to the manner in which descriptions evolve and have a dynamic nature to be revised as more information becomes available.

Results from the Professional Learning Questionnaire:

The results below from the online questionnaire, which the Growing Minds Team and Year 5 and 6 teachers (12 people in total) were invited to complete, includes ten responses. A complete list of responses and graphical data collated from these questionnaires is provided in Appendix 3.

The feedback data collated from the questionnaires was extremely positive and indicated that the teachers involved in the professional learning found the process useful, informative and were able to apply their new learning.

Graph 1: Teacher (10) responses from the Professional Learning Questionnaire

A five point Likert Scale was used: Strongly Agree (far left), Agree, Neutral, Disagree, Strongly Disagree

1. Please rate the quality of the professional learning workshops conducted by our mentors from ACER. The professional learning workshops conducted by our mentors from ACER provided me with:

What were 2-3 positive aspects of the professional learning workshops conducted by our mentors from ACER?

Comments centred on the strong expertise and support provided by the mentors, the professional standard of the workshops and learning how to write quality test items.

S5 Understanding what good assessment should look like and how to actually write great questions to get the most information about the students. I had no idea how many different elements were important in the creation of the question.

3. What were 2-3 positive aspects about the work/process that followed after the workshops?

Comments centred on the opportunity to apply the theory to practice, receiving feedback on the test items prior to administering the task and working collaboratively.

S4 We were able to implement these concepts into the classroom. They continued to support the work we were completing after the workshop had been completed.

4. What were 2-3 challenges of the professional learning workshops conducted by our mentors from ACER?

Comments centred on some of the challenges posed by the data literacy aspect.

S8 At times, the theory and analysis of the data became challenging to understand. At times, it was difficult to see the big picture, relative to the assessment items we were devising.

5. What were 2-3 challenges about the work/process that followed after the workshops?

Comments centred on the challenges of finding sufficient time for collaboration and implementation alongside the day to day demands of classroom teaching.

S7 Managing work commitments, often the workshops were very inspiring, but we would not have more time to work on them until a few weeks had passed. By this time a lot of what had been covered had been lost to the haze of memory and a busy work schedule.

6. What are 2-3 learnings you have taken from the professional learning workshops conducted by our mentors from ACER?

Comments centred on the process of designing good test items through to creation of a scale to map student learning progress.

S3 Assessments need to be valid and reliable, and, the learning progressions provide a continuum of learning that can be used when designing assessment.

S4 That age does not determine a student's academic ability. The flaws in the current reporting system.

7. What are 2-3 learnings you have taken from the work/process that followed after the workshops?

Comments centred on the importance of valid and reliable data linked to well-constructed assessment.

S8 The need for the assessment task to correlate more strongly with what has been taught in class. The need for collaboration among teachers and test writers.

8. What were 2-3 positive aspects of being a part of the Growing Minds project?

Comments centred on the currency of the project in terms of the broader educational agenda and the opportunities to work with colleagues from across the campus.

S1 Working with colleagues from Junior School and the English Faculty, as well as being part of a project that is on the cutting edge of assessment and reporting best practice.

S4 The opportunity to work with different teachers across the school and build a strong network. Different experiences that I would not have been a part of in my regular teaching day (workshops, presentations, lit review!). Stimulating conversation on an interesting topic.

9. What were 2-3 challenges of being a part of the Growing Minds project?

Comments centred on the time element of balancing the day to day teaching responsibilities with the commitments of the project.

S7 Managing my work commitments with the requirements of the project. The implementing of one of the English writing tests and having to mark it according to the coda, this was an extremely labour and time intensive process.

10. What questions do you have or recommendations to make in regard to the future direction of the Growing Minds project?

Comments centred on the sustainability of this assessment design process and recommendations to continue to drive the project across the school.

S3 Continued time to work together as a team to drive the project forward, and, continued contact with ACER colleagues.

S7 How to implement these assessment practices without creating a larger workload for all the teachers involved? How to change the assessment culture in the school, while still having to prepare students ultimately for the HSC.

2. Application of learning to develop a scale for describing student progress

This element of the data collection and analysis was led and conducted by our mentors from ACER, and primarily by Chris Freeman.

Test Level Statistics

The Item Person maps provide a visual representation of the scale and compares the difficulty of the test items with the demonstrated ability of the students interacting with this set of items. A test that exhibits a wider range of difficulty across the items, provides greater discrimination for the cohort assessed.

As figure xx displays, the Year 5 Mathematics Test spreads across seven logits (from almost -3 through to 4), thereby effectively spreading the students and discriminating effectively between the students demonstrating higher and lower ability in this particular trait. The distribution of students against the set of items also indicates that the initial estimated ability of items when developed and reviewed against the test specifications, were overall quite accurate.

There are, however, also some gaps in-between clusters of items. This indicates that there are fewer items matching the abilities of the students at certain points on the scale, and therefore less evidence is available about what the students at these locations actually know and can do.

Figure 1: Year 5 Mathematics Item/Person Map (May, 2018)
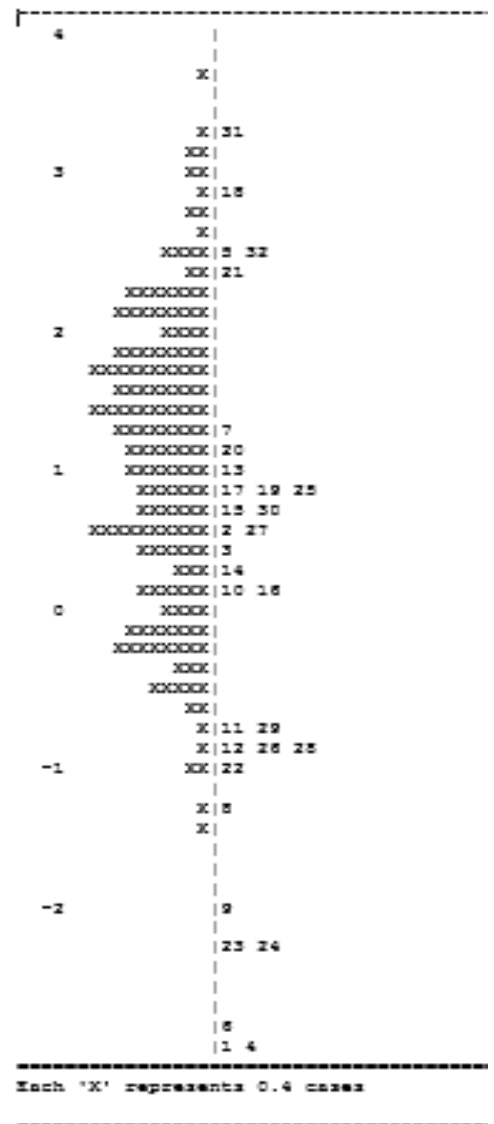
The Year 6 English Item Person map (figure xx) indicates an assessment that for this cohort essentially served as a measure of mastery, with a more limited distribution of students along the continuum (or scale). As can be seen by the majority of items on the lower half of the map, most questions were confidently mastered by the students, with the test providing limited discrimination overall. The instrument provided some evidence within a limited range on the scale, but less evidence of the real ability of this cohort of students, as most students were able to answer the majority of questions. The strength of this outcome is the feedback provided to teachers on the ability of this cohort, and the indications for subsequent development of assessment tasks to cater for an extended range of abilities.

Item Statistics using Rasch Analyses

In addition to test-level analysis, the item level analyses provide critical information back to the test developers in terms of student learning and demonstrated understanding.

The analysis of the individual items reveals empirical evidence of student thinking and understanding of content and insight into student misconceptions. It provides educators with starting points to administer targeted instruction to build on knowledge or correct misunderstandings.

Figure 2: Year 6 English Item/Person Map (Aug, 2018)

The Item Characteristics sheets (see figure XX) consolidate the item level statistics and provide a snapshot of the statistical information about an item. Each sheet shows the actual item, the item's statistics, and the item's characteristic curve.

The item statistics provide information on the number of students who attempted the item, and the number and percentage of students who selected each option. The information also reveals the estimated mean ability of the students who have selected each option. Information about the item's discrimination amongst students is provided, and also the item's individual fit in the overall set of items.

Perhaps most interestingly, the item characteristic curve provides a graphical representation of the probability of students, grouped according to estimated ability based on the overall assessment, achieving success on an individual item. The 'expected' curve is displayed, with the actual achievement of the students on the correct answer (key) and the incorrect distractors. This collective statistical information provides insight into the difficulty of the items, student response patterns, including guessing, and provides pointers to possible misconceptions, or even issues with items that can be subsequently investigated.

Figure 3: Year 6 English Reading (Aug, 2018)

Figure 4: Year 5 Mathematics Item Characteristic Sheet (May, 2018)
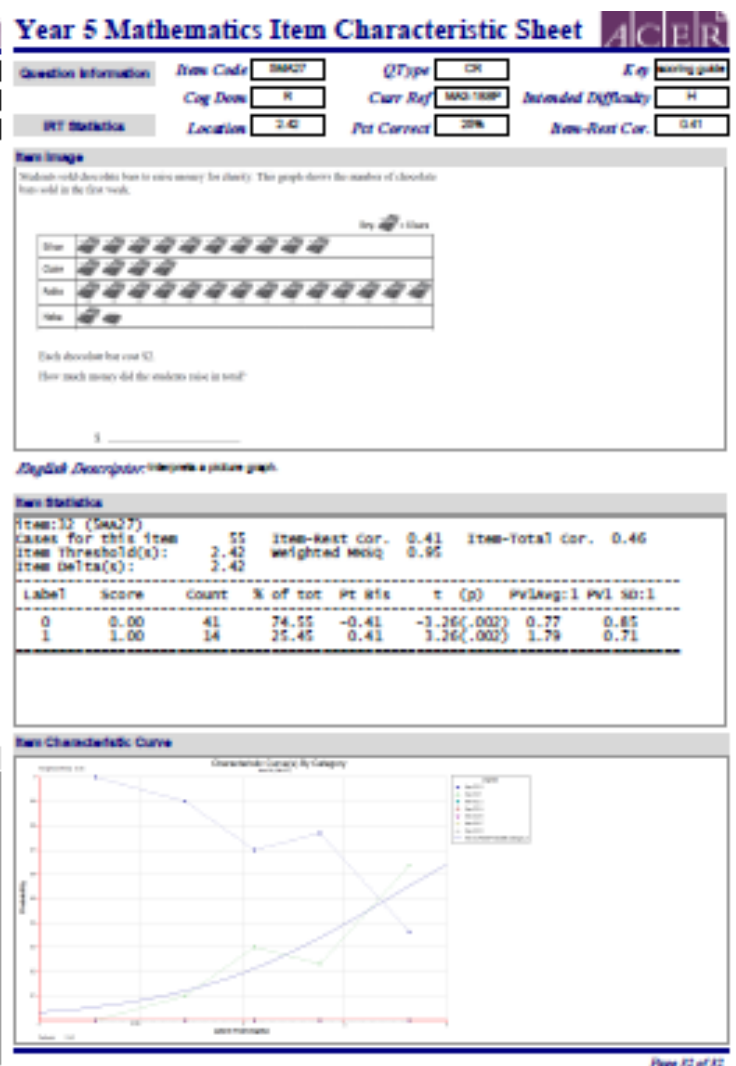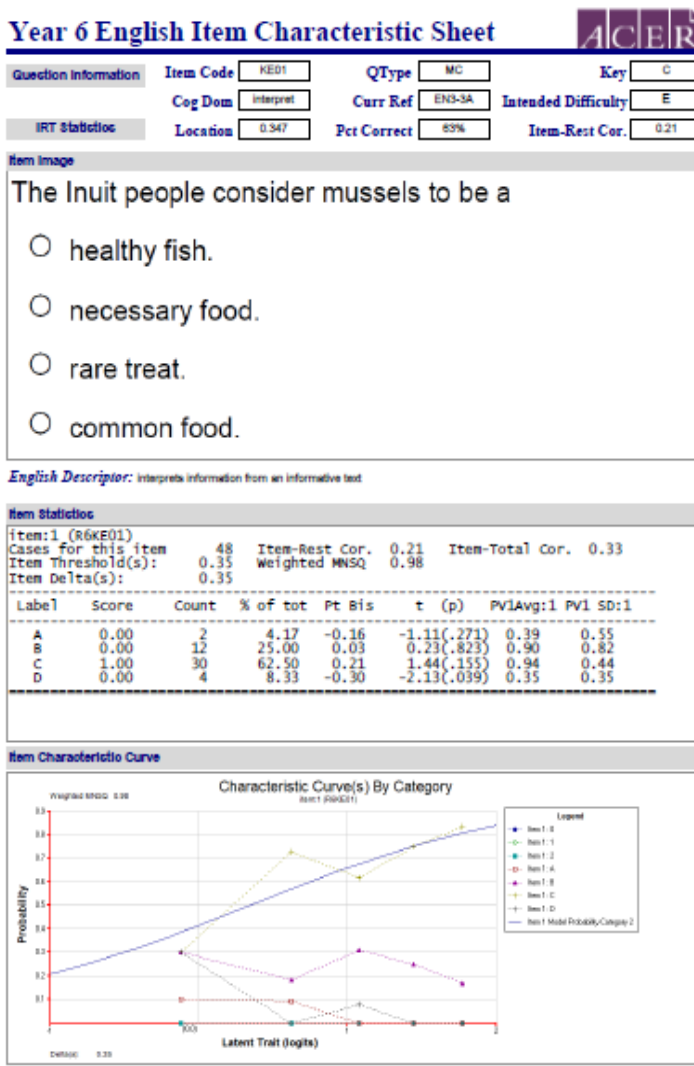
Developing a scale

The work on the development of scales is ongoing. The approach has been undertaken thus far in Writing, Reading and Mathematics with progress made on each. The focus continues to be on the design and development of rigorous tasks which provide valid results.

Writing

The analysis of Writing, in combination with the descriptors of the skills associated with the Kincoppal-Rose Bay writing rubric, has allowed a conceptual scale for Year 7 to be developed. This initial work is intended to be a blueprint for the development of a longer described scale that extends from the early years through to Year 10. Further development of rubrics appropriate to the skills exhibited by younger students and older students on the writing domain will be developed in the future. Additional tasks will then be administered and the data from those used to verify and extend the scale.

Reading

For English Reading, there is numerical commonality in the alignment of the Kincoppal-Rose Bay scale and the PAT Reading scale. When the descriptors of items which represent outcomes are compared on the scale, it is evident that more work needs to be done on the refinement and precision of the articulated skills embedded in the items used to define the Kincoppal-Rose Bay scale. This is a challenging task given the interaction of text types and the attempt to deconstruct more generic outcomes. This refinement will enable the enrichment of the PAT descriptive scale with the types of skills observed in Kincoppal-Rose Bay students reading.

Figure 5: Year 7 Writing Student Report (May, 2018)

Report

StudentID 28681

Band   BandDescriptor

9 Skilfully develops ideas to engage with the stimulus and persuade the reader. Skilfully persuades the reader by the skilful composition of a persuasive text. Skilfully composes a variety of complex and well-developed sentences with precise meaning. Skilfully makes a range of precise and contextually appropriate language choices, by skilfully using correct and appropriate punctuation to aid reading of the text.

8 Skilfully develops ideas to engage with the stimulus and persuade the reader. Effectively persuades the reader by the composition of a persuasive text. Effectively composes a range complex and controlled sentences, in which the meaning is clear. Skilfully makes a range of precise and contextually appropriate language choices and skilfully uses correct and appropriate punctuation to aid reading of the text.

7 Effectively develops ideas to engage with the stimulus and persuade the reader to adequately persuade the reader by the composition of a persuasive text. Effectively composes a range complex and controlled sentences, in which the meaning is clear. Skilfully makes a range of precise and contextually appropriate language choices and skilfully uses correct and appropriate punctuation to aid reading of the text.

6 Effectively develops ideas to engage with the stimulus and persuade the reader to adequately persuade the reader by the composition of a persuasive text. Effectively composes a range complex and controlled sentences, in which the meaning is clear. Effectively makes a range of precise and contextually appropriate language choices and uses correct and appropriate punctuation to aid reading of the text.

5 Effectively develops ideas to engage with the stimulus and persuade the reader to adequately persuade the reader by the composition of a persuasive text. Effectively composes a range complex and controlled sentences, in which the meaning is clear. Effectively makes a range of precise and contextually appropriate language choices and uses correct and appropriate punctuation to aid reading of the text.

4 Effectively develops ideas to engage with the stimulus and persuade the reader to adequately persuade the reader by the composition of a persuasive text. Effectively composes a range complex and controlled sentences, in which the meaning is clear. Adequately uses contextually appropriate language. and effectively uses correct and appropriate punctuation to aid reading of the text.

3 Effectively develops ideas to engage with the stimulus and persuade to adequately persuade the reader through the composition of a persuasive text. Adequately composes a range of simple and compound sentences, in which te meaning is predominantly clear. Adequately uses contextually appropriate language and uses correct and appropriate punctuation to aid reading of the text.

2 Adequately develops ideas to engage with the stimulus and persuade the reader. Attempts to persuade the reader by composing a persuasive text. Adequately composes a range of simple and compound sentences,in which the meaning is predominantly clear.Adequately uses contextually appropriate language and correct and appropriate punctuation to aid reading of the text.

1 Adequately develops ideas to engage with the stimulus and persuade the reader and attempts to persuade the reader by trying to compose a persuasive text. Attempts to form some simple sentences and some compound sentences. Adequately uses contextually appropriate language and to use correct and appropriate punctuation to aid reading of the text.

Mathematics

The Kincoppal-Rose Bay Mathematics scales have aligned well with the established PAT scale, and the skills evidenced in the Kincoppal-Rose Bay developed assessments sub domains match closely with the PAT skill descriptions. The Kincoppal-Rose Bay descriptors representing the items, and consequently outcomes, have been well-articulated and discriminate according to the difficulty of the items. The well-targeted assessments also demonstrate a close knowledge of the capability of the cohort assessed with estimated expected difficulty of items proven mostly accurate in the analysis.

3. Development of a prototype report for reporting student growth in learning

Results from the 7-12 Report Review Questionnaire:

The summary of results, given below, is from the online questionnaire, which all 7-12 parents, students and teachers were invited to complete. A complete display of graphical data collated from these questionnaires is provided in Appendix 4.

The feedback data collated from the questionnaires was generally positive from all participants; however, there were some variations between the three groups (parents, students, teachers).

Graph 2: 7-12 Parent (55) responses from the 7-12 Report Review Questionnaire

A five point Likert Scale was used: Strongly Agree (far left), Agree, Neutral, Disagree, Strongly Disagree

5. Below are some elements on our current Academic Report. Please indicate how well the current format communicates these aspects.
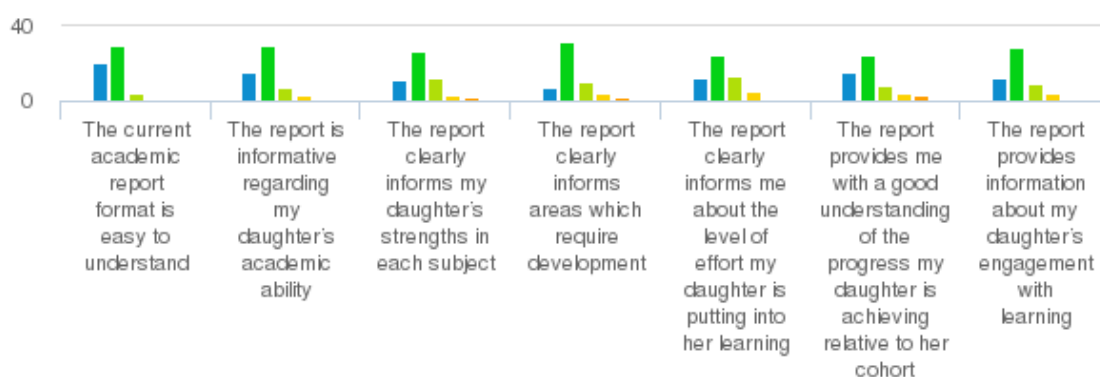
Graph 3: 7-12 Student (128) responses from the 7-12 Report Review Questionnaire

5. Below are some elements on our current Academic Report. Please indicate how well the current format communicates these aspects.

Graph 4: 7-12 Teacher (26) responses from the 7-12 Report Review Questionnaire

5. Below are some elements on our current Academic Report. Please indicate how well the current format communicates these aspects.
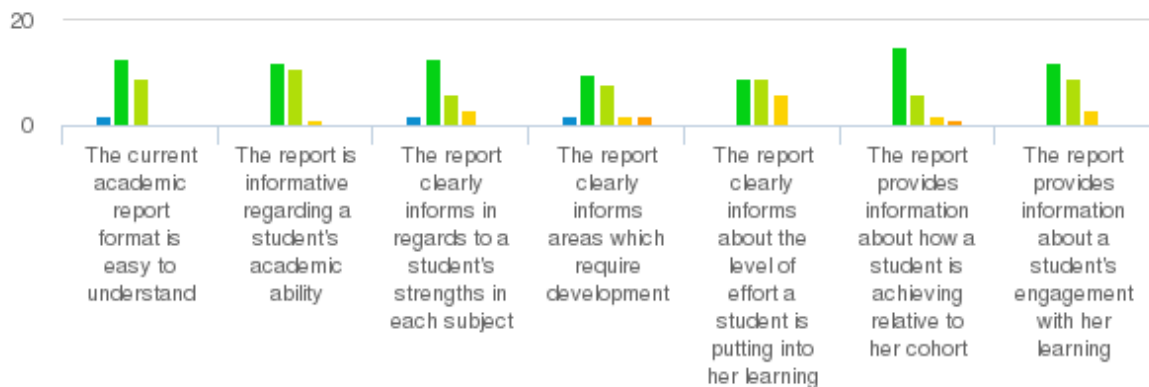
The following is a summary of the open-ended responses provided by (i) 7-12 parents (ii) 7-12 students (iii) 7-12 teachers

3. As a parent/caregiver, what sort of information do you look for when you read your daughter's academic report?

- Specific comments pertinent to individual student on attitude/strengths/weaknesses/achieving to ability level
- Peer comparison/ranking (especially from Year 10 up)
- Strategies/suggestions to enable improvement
- Class/year average plus actual individual mark
- Report on progress/growth

3. What information does your parent/caregiver value or discuss with you when they read your Academic Report? e.g. improved grade

- Teacher comments on individual effort and strategies for improvement
- Improved grades
- Rankings
- Progress year to year

3. What information do you think parents/caregivers would value or be looking for in an academic report?

- Marks/ranking
- Engagement/achievement/suggestions for improvement
- Personal growth/progress and **how** to further it

7. Thank you for taking the time to share your perspective with us. Please feel free to offer any other suggestions on how we might improve our reporting on student progress.

- Reports to be received before parent/teacher interviews
- Parent/teacher interviews too short and some teachers could be better prepared
- More specific advice required especially for those unable to attend interviews i.e. international parents
- An explanation of each grade is needed + how to overcome difficulties
- Allocation of grades or descriptions such as "commendable" are not consistent across subjects

6. Thank you for taking the time to share your perspective with us. Please feel free to offer any other suggestions on how we might improve our reporting on student progress.

- Prefer comments to be **individualised** and focus on how to improve
- Reasons for allocation of grades
- Graphs for comparison
- Progress from previous report

7. What would you like to see included in a future KRB student academic report? How might this be reported? (e.g. visual representation, student rating, etc.)

- Some graphical representation (or other means of reporting) student growth
- Graphical representation as a comparison to the remainder of the cohort
- Explicit discussion with teachers on what codes/grades (e.g. C, S, R) mean
- Headings that reflect mastery/growth
- Learning profiles applied consistently

The research work that has been completed in assessment design and mapping student performance to a scale has provided us with a potential tool for reporting student growth in learning. Our current model prototype report utilises this scale, and is anticipated to show individual student growth, across each of the learning domains, between semesters and from year to year. The scale will be a visual representation of change in performance and will be linked to a description of what this means in terms of the learning the student is currently demonstrating. Information is also provided about the next steps in learning for that student. This descriptive element would essentially be based on the learning progressions in a particular learning domain.

Graph 5: Prototype Report for Reporting Student Growth in Learning
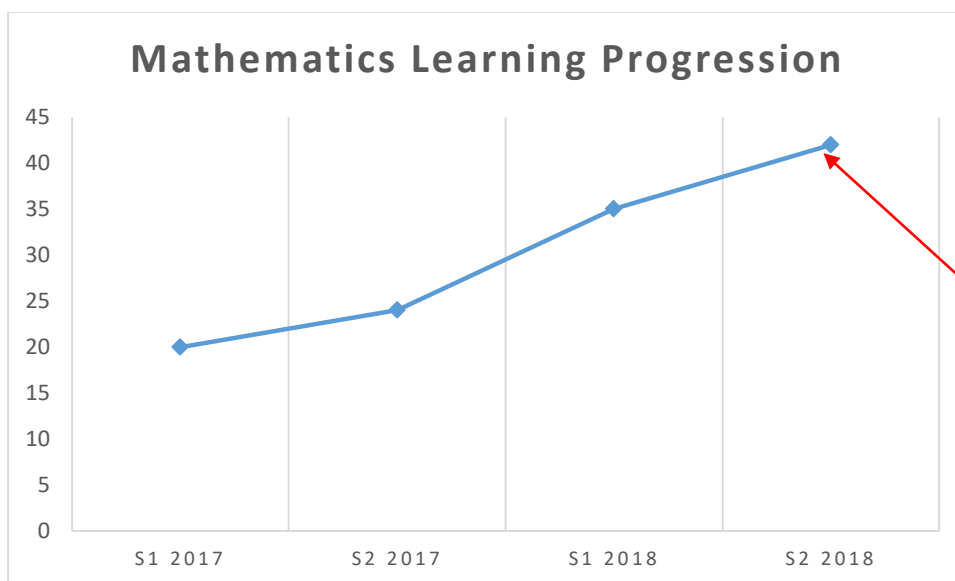
Interactive – hover over the graph and it takes you to a table of learning progression descriptors

Level (Not Year level)	Number and Algebra
LP7	Use concrete representations of negative numbers (e.g. temperature, height below a reference point). Use large numbers, including bridging across tens, hundreds and thousands. Represent the remainder of a division as a fraction or a decimal. Compare and convert between fractions, decimals and percentages. Solve problems requiring the calculation of percentage of numbers up to 1000. Add and subtract fractions with the same denominators. Multply and divide decimal amounts (including decimal currency).
LP6	Use a number line to represent relative locations of whole numbers, common fractions with related denominators, and decimal fractions with tenths and hundredths. Recognise fractions (and their different equivalent representations) including percentages. Calculate percentage (multiples of 10% e.g. 10%, 20%, 30%) of numbers up to 100. Interpret remainders in situations involving division.
LP5	Use place value to recognise the structure used to say, label and write numbers with decimal fraction parts. Compare and order multi-digit numbers; identify relative positions of numbers in extended sequences; and use large ordinal numbers (such as 64th, 70th).

Next Steps

Current progress

In addition to this summative, longitudinal, prototype report model, a formative, continuous, means of reporting will also be developed. A formative report will provide information about a student's achievement on the assessment tasks across the year in a timely manner. The report will include some statistical information as well feedback for further improvement. This data will be used in to inform the summative longitudinal report.

Discussion

The overall aim of this research project was to explore how to effectively and reliably assess and report student growth in learning. The purpose was to promote a shift in the current practice of recognising and reporting a "fixed" measure of student achievement, to one which focuses on identifying, measuring and reporting student growth in learning.

External, national and international assessments such as Naplan (ACARA), PAT (ACER), Allwell (Academic Assessment Services) and ICAS (UNSW Global) have provided the School with data about longitudinal student growth in learning. However the data provided can be disparate and difficult to align for an individual student. The scales, testing instruments, sample populations and learning descriptors are different and unique to each assessment. The testing is completed at less regular intervals; usually each year or every second year. School based internal assessment currently used, includes both summative and formative assessment tasks and these are conducted at more regular intervals across the year. They provide a snapshot in time of where a student is at in their learning, what a student can do and feedback about areas for improvement and the next steps in learning. Results from assessment tasks are combined to give an overall percentage result and/or grade for an individual student, which is then reported on the semester reports. This type of summative reporting using a grade or percentage does not provide a valid means of comparison of student growth or improvement from semester to semester nor from year to year. A "D" grade in Semester One and a "D" grade in Semester Two does not indicate the growth in learning that may have occurred for that student. Attaining a 94% in Semester One and 90% in Semester Two also may not necessarily mean a decline in learning for that it student; it may mean for example that the tasks in Semester Two were more challenging.

The use of a fixed and valid scale, once developed for the School cohort, will provide the means to map a student's learning progress over time. It will visually display the growth in learning that the student has made from Semester One to Semester Two or from year to year. The scale linked to learning progressions will provide a description of the learning journey including indicators of where a student is at in their learning and where they need to go next. Both external and internal assessment data, including summative and formative assessment, can be mapped to the scale.

The first key focus area for this project, was that professional development of our teachers in quality assessment design and data analytics was essential. In order to develop a scale

with which to measure student growth in learning, valid and reliable assessment tools need to be used. An understanding by teachers of the entire process from test construction to mapping to a scale was required. It is clear through the teachers' reflections collated from the Professional Learning questionnaire that the professional learning provided them with new learnings and understandings in quality assessment design and data analytics. In the construction of the assessment and the development of the test items, teachers were able to apply their learnings and to receive feedback. The quality of the assessment greatly improved from the first draft to the final draft and the data analysis utilising the Rasch methodology showed the effectiveness of the test items in their intention. Some of the questions showed a strong correlation (Item-Rest Cor) to expected student group performance on the item, whilst others showed a weak correlation. This provided insight into the difficulty of the items, student response patterns, possible misconceptions or potential issues with the item.

A second key element to this research project, was that we be able to use different assessment types to link to the scale and to thus provide an overall picture of a student's learning growth. We did not want to rely solely on pen and paper tests types, nor Naplan style assessment. Teacher professional judgement, observation, investigative tasks and formative assessment opportunities were also to be used as the scale was developed. It became evident during the research that it was a much easier process to map Mathematics to the scale than it was for English. There was debate around whether this process would only allow us to assess and report aspects of literacy. The question and dilemma raised became how we might align skills in critical thinking, sophistication of ideas and use of text to a scale. In addition, there was debate around the concept of holistic marking versus analytical marking. The English teachers addressed this by designing a rubric (refer Appendix 5) of ever increasing levels of development and sophistication for a Persuasive Writing task. The rubric outlines the development in students' ideas, persuasive devices, text structure, sentence structure vocabulary and punctuation. By using a scoring code for each level, qualitative data was thus able to be used and mapped onto the scale. This method and use of a scoring guide or rubric could potentially be used for any assessment type in order to map qualitative data to the scale.

A second dilemma which arose from our research was how to map different strands of a learning domain to a common scale. For example, in Mathematics, assessment tasks were developed and administered in Number, Geometry and Algebra. After discussion with our

mentors, the possibility of using and finding a correlation between the external PAT data in Mathematics along with the internal School based assessment information was explored. The results from this analysis showed that the Kincoppal-Rose Bay scales aligned well with the established PAT scale. This, along with the use of common test items across Mathematics tasks by strand and year level, may strengthen the established scale.

In the initial stages of the research work, test item writers who were developing the codebooks wrote their own item descriptors based on the curriculum outcome statements. There was an attempt to use some of the language of the ACER (2012) learning progressions and subsequently the ACARA learning progressions (2018) in writing the item descriptors. Given that understanding, and the experiences gained from interactions with described scales such as NAPLAN and the ACARA and ACER described learning progressions is essential, the skill that is under continuing development with the participating teachers is the writing of item descriptors that capture the complexity and skill that are implicit in items. These descriptors, following their empirical analysis, are used to enrich the described scale.

Although much work was achieved in developing the scales, and mapping a student's performance onto the scale in English and Mathematics (years 5-8), the research has not yet been able to provide data about the student's learning growth using the scale. This was partly a result of trying to resolve some of the dilemmas mentioned above as well as the limitations imposed through the time required to complete the entire test construction to data analytics process. The data from the Year 7 Mathematics assessment in Term 2 is still to be analysed but this would provide further information about Year 7 Mathematics students' growth from Term 1. Data is also yet to be compared and mapped between the pilot Year 6 Mathematics and English testing completed in Term 3 2017 and the Year 7 English and Mathematics testing completed during Term 1, 2018. Time constraints prevented further assessment construction and administration for Year 7 and 8 in Mathematics and English during Term 3. The focus during Term 3 was on the Year 5 and 6 data analytics, the design of the prototype report model and ongoing review of literature and writing of the final report. Further work on development of the scale will continue in Term 4 2018 and into 2019.

Recommendations and directions for future research:

Although much progress has been made in providing possible solutions to the research question posed by this project, there is much work still to do. It is recommended that the Growing Minds team continue to lead this project across the school in 2019, and that we continue to engage mentors Frances Eveleigh and Chris Freeman to support and assist us with the ongoing construction of tests and data analytics. This will allow us to continue to map student performance to the Kincoppal-Rose Bay School scale for Mathematics and English. Further data collected in 2019 from Years 5-8, will provide better means of representing and visualising individual student growth on the scales. In looking further into the future, in terms of the sustainability of this project, the establishment of a specialist data analytics role, will be considered.

Professional learning needs to be provided to support teachers to gain a better understanding of both the ACARA and ACER learning progressions. It is intended that learning progressions be used in the development of the codebooks for each assessment and that ultimately they will inform the longitudinal report for student growth. Teachers need to be consistently interpreting the learning progressions and applying their teacher judgement to student work samples. There is a great deal more work to do be done in this area and further refinement needed. As Kincoppal-Rose Bay School develops scales to describe achievement and growth, the development of greater skills in this activity is imperative. It is not sufficient to describe a skill as 'locates information in text' when items have significant differences in difficulty. The difference and the reason for the difference in difficulty needs to interpreted and explained. It may relate to inferences, the subtleness of the information, or its reactive length through the passage. Student work samples need to be collected across the various stages and learning domains, in order to develop a repository of "illustrations of practice" that could be referred to by teachers, students and parents.

Finally work needs to continue in educating parents, students and teachers as to a shift in the current practice of recognising student achievement to one which goes beyond achievement and focuses on identifying and monitoring student progress.

Conclusion

This project was conducted at a time when the aims and research question posed by the project were also very much the focus of the broader educational agenda for Australia. We have watched with interest and anticipation the direction of educational research and advisory authorities such as ACARA and ACER and read the recommendations of the review "Through Growth to Achievement" (Gonski et al, 2018). It is hoped that this research project offers some solutions as to how schools might effectively and reliably assess and report student growth in learning in the future. There is much educational research written and available as to why schools need to move to such an assessment and reporting paradigm, but there is little research or information yet as to how this might be achieved by schools. Some schools have attempted to report student learning growth to parents via the traditional semester reports, and although the term 'progress' is often used, it rarely describes learning gain (Hollingsworth & Heard, 2018). Schools that have endeavoured to report progress in a 'time-lapse' manner usually do so as a rise and fall in student achievement scores, perhaps as percentages. Learning progressions offer a means of mapping student growth in learning and describing ever increasing level of skills development in a particular learning domain. Learning progressions are not new and have been used in the United States, the United Kingdom, Australia and New Zealand with varying degrees of success. ACER's ongoing research work and development of the Learning Progression Explorer may offer schools solutions in the future. Online assessments are also being developed by ACARA and NESA to support formative assessment of literacy and numeracy against the learning progressions. The use of online adaptive testing will further enhance the capacity to map student learning growth against the learning progressions. This research project shows how it might be possible to combine both external standardised testing and internal school based assessment data to develop a scale in order to measure student growth in learning.

Research to Practice Impact

Participation in the AISNSW School Based Research Project has significantly improved knowledge, understanding and practice in quality assessment design and data analytics for the teachers involved in the project. Teachers have a greater awareness of the principles of test construction and item writing and have applied them to their practice. For some it has become part of their day to day practice and they actively seek to further improve this practice. It was always the intention that this research project would expand to other key learning areas and potentially across years K-10 and that the Growing Minds team and Year 5-8 teachers would share their learnings with their colleagues in order to build the collective capacity of these teachers.

The action research project provided the opportunity for teachers from the junior school to work and collaborate with teachers from the senior school. This was viewed by all members of the Growing Minds team as one of the most valuable, rewarding and rich learning experiences they had ever been involved in. The professional sharing, exchange, discussion and debate that took place throughout the workshops and work process that followed was enriching and enlightening. Teachers were able to identify differences and commonality between teaching and learning in the junior school versus that of the senior school. There was an increased awareness and understanding of assessment, curriculum and pedagogy practices between the two campuses and some of the issues surrounding them. The team also engaged in academic readings and contributed to the literature review for this final report.

A second key opportunity for the teachers involved in the project and for the broader school community, was that Kincoppal-Rose Bay School established networks and relationships with the educational research organisation ACER. The expertise, experience, support and guidance provided by our specialist mentors Frances Eveleigh and Chris Freeman from the Sydney branch of ACER has been invaluable and enriching. Their experiences and current research work for ACER has opened our eyes to the bigger educational research context and agenda. We were fortunate to have Geoff Masters (CEO, ACER) present at our Staff Professional Learning Conference in 2017. We have also recently established a relationship with Dr Hilary Hollingsworth and Jonathan Heard, Research Fellows from ACER in Melbourne, who have been conducting a research project "Communicating student learning progress" and have been collecting information about current practices in reporting student learning from schools across Australia. Dr Hollingsworth and Jonathan

Heard visited Kincoppal-Rose Bay School during Term 3, 2018 and made some workshop presentations to K-12 teaching staff about the research project work they are conducting. Their project work aligns exactly with the research work of the Growing Minds project so their visit provided an opportunity for sharing and exchange of work to date and future directions. Dr Hollingsworth and Jonathan Heard also conducted some small focus groups with 7-12 teachers, students and parents around reporting student progress.

Throughout 2017-2018, we have provided teachers, students and parents with regular updates on the Growing Minds project work. This has been communicated via KRB Newsletters, presentations made to staff and parents and the digital signage in the junior and senior schools. The Principal and Leadership team have been regularly updated at Leadership Team meetings and meetings between the Principal and the Director of Teaching and Learning. The School Board has been provided with progress reports through the regular Board Reports. We also displayed the Growing Minds poster that was used at the AISNSW Research Symposium 2017 in our senior and junior school reception waiting areas.

In Term 2, 2018 we were able to share our project work to date with other Sacred Heart Schools in Australia and New Zealand at the ANZNET Sacred Heart Schools' Conference (Baradene, Auckland). It is anticipated that as we further progress the project into 2019 and beyond, we will continue to share our learning with other Sacred Heart Schools and AISNSW schools through such structures as the ANZNET network and AHISA Director of Studies network association. Many schools in Victoria are also seeking solutions to this research question and may perhaps be a little further along the path than NSW schools. Our ongoing relationship with Dr Hollingsworth may provide further opportunities for visits and collaboration with schools in Victoria and their network groups as they also grapple with this research question. Finally, we have designed a website that we hope to use in order to share our work and developed resources with other schools and the broader community.

Appendices

1. A timeline of the three focus areas of development over 2017-2018

2. Examples from the Test Construction

3. Responses and graphical data collated from the Professional Learning Questionnaires.

4. Graphical data collated from the 7-12 Reports Questionnaires (parents, students and teachers)

5. Rubric of ever increasing levels of development and sophistication for a Persuasive Writing task.

Appendix 1:

Term 1 2017	1	2	3	4	5	6	7	8	9	10
Professional Learning					Pre reading G Masters Reforming Educational Assessment		Workshop 1 ACER		Workshop 2 ACER	
Deliverables					PAT Testing Year 5-6 Reading, Mathematics					
Knowledge Transfer	Briefing Middle Leaders and E-12 Staff re project	KRB News	Finalise Growing Minds Team 2017 with Principal		Briefing of Growing Minds Team		AIS Network Afternoon		Board Report	
Review, reflect plan			Planning workshops Term 1 ACER			Planning Meeting				

Deliverables:	Knowledge Transfer:
• Learning Domains • Assessment Tools • Data collection, analysis • Reporting	• Teachers • Students • Parents • Community AIS

Term 2 2017	1	2	3	4	5	6	7	8	9	10
Professional Learning	Staff Professional Learning Conference G Masters Keynote Speaker						Workshop 3a Development of test items Year 6 Mathematics Year 6 English	Ongoing work on test items		
Deliverables							Selection of test forms. Development of descriptors and codebook			
Knowledge Transfer		KRB News			AIS Network Afternoon				Board Report	
Review, reflect plan	Planning for Term 2 workshops ACER				Update 2017 project plan				Planning Term 3 workshops ACER	

Deliverables:
- Learning Domains
- Assessment Tools
- Data collection, analysis
- Reporting

Knowledge Transfer:
- Teachers
- Students
- Parents
- Community AIS

Term 3 2017	1	2	3	4	5	6	7	8	9	10
Professional Learning			Workshop 3b ACER Refinement of test items Coding of items	Workshop 4 ACER Development of scale Data analytics						
Deliverables					6MA T1 finalise 6EN T1 finalise Codebooks, scoring guide and tests sent to ACER			6MA T1 and 6EN T1 conducted		6MA T1 and 6EN T1 data send to ACER
Knowledge Transfer		E-12 Staff Meeting	KRB News			AIS Network Afternoon	Board Report	Draft poster for symposium PD team members to attend		
Review, reflect plan									Meeting AIS	Planning Term 4 Workshops ACER

Deliverables:	Knowledge Transfer:
• Learning Domains • Assessment Tools • Data collection, analysis • Reporting	• Teachers • Students • Parents • Community AIS

Term 4 2017	1	2	3	4	5	6	7	8	9	10
Professional Learning		AIS Symposium 20 October		How to complete a literature review AIS	Workshop 5 ACER Describing Growth	Literature Review (ongoing)				
Deliverables					AIS Interim Report due 7 November					
Knowledge Transfer	Finalise poster for Symposium	AIS Symposium 20 October Poster Presentation	Draft Interim report Members of the team KRB News		AIS Interim Report due 7 November	AIS Network Afternoon	E-!2 Staff Meeting Presentation on the project to date including the data and scale		Board Report	
Review, reflect plan										

Deliverables:
- Learning Domains
- Assessment Tools
- Data collection, analysis
- Reporting

Knowledge Transfer:
- Teachers
- Students
- Parents
- Community AIS

Draft Timeline 2018:

Term 1 2018	1	2	3	4	5	6	7	8	9	10
Professional Learning	Literature Review (ongoing)					Criterion Conference Evidence Based Teaching in Schools	AIS Network Day			Team literature review day AIS online PD courses in data
Deliverables		PAT Testing 5-8 Reading, Mathematics		8MA T1 finalised	7MA T1 finalised 7MA T1 finalised	8MA T1 conducted		Draft questionnaires completed for review of 7-12 reports	7MA T1 conducted 7EN T1 conducted	Data entry 7MA T1, 8MA T1, 7EN T1
Knowledge Translation		KRB News		7-12 Report Review Committee formed	Parent presentation 7-10 Information Evening		AIS Network Day		Board Report	Website design
Review, reflect plan			Planning for 2018 ACER			Finalise plan for 2018 and dates with ACER				Team meeting

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Deliverables:
- Learning Domains
- Assessment Tools
- Data collection, analysis
- Reporting

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Knowledge Transfer:
- Teachers
- Students
- Parents
- Community AIS

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Term 2 2018	1	2	3	4	5	6	7	8	9	10
Professional Learning	Literature Review (ongoing)	Workshop 1 ACER Assessment Develop Principles Year 5 and 6 Teachers	Workshop 2 ACER Year 5 and 6 Teachers Assessment items	Literature Review (ongoing)	AIS Network Workshop at KRB: Literature Review and Final Report	Literature Review (ongoing)				
Deliverables	7-12 report review survey conducted teachers	8MA T2 conducted	5MA T1 finalised 6EN T1 finalised	7MA T2 conducted		5MA T1 conducted 6EN T1 conducted	5MA T1 6EN T1 codebook, scoring guide and test sent			
Knowledge Translation	K-12 Staff Meeting: Update on Project Evidence Based Teaching in Schools Presentation	KRB News					Sacred Heart Schools Conference Baradene		Board Report	
Review, reflect plan										

Deliverables:
- Learning Domains
- Assessment Tools
- Data collection, analysis
- Reporting

Knowledge Transfer:
- Teachers
- Students
- Parents
- Community AIS

Term 3 2018	1	2	3	4	5	6	7	8	9	10
Professional Learning	Literature Review (ongoing)							Dr Hollingsworth ACER wshop KRB		
Deliverables	Map ACARA Learning Progressions to NESA Report survey parents students	Data entry 6EN T1 7MA T2 8MA T2 codebook, scoring guide and test sent Unpack Learning progressions	Final report Introduction, aims and research questions Draft 1 Report model	Final report methods and data collection	Final report results and findings 6EN T2 conducted 6MA T2 conducted Draft 2 Report model	Final report discussion, conclusion, research to practice	Final report literature review	Final report Executive summary, appendices, acknowledgement	Edit Final report	Final report due 1 October
Knowledge Translation		KRB News		Prototype report Review Team			Prototype report HODS		Prototype report Leadership Board Report	KRB News Final report Principal
Review, reflect plan	Planning Term 3	Meeting ACER								

Deliverables:	Knowledge Transfer:
• Learning Domains • Assessment Tools • Data collection, analysis • Reporting	• Teachers • Students • Parents • Community AIS

Term 4 2018	1	2	3	4	5	6	7	8	9	10
Professional Learning										
Deliverables	Presentation for AIS Research Symposium									
Knowledge Translation	Final report Board, Leadership team	Final report KRB Community	AIS Research Symposium 2 November			KRB News	Board Report			
Review, reflect plan	Planning Term 4 and 2019									

Deliverables:
- Learning Domains
- Assessment Tools
- Data collection, analysis
- Reporting

Knowledge Transfer:
- Teachers
- Students
- Parents
- Community AIS

Appendix 2:

A. Test Specifications:

Content	E	EM	M	MH	H	Total		Cognitive domains:	
Number & Algebra	3	3	3	1	1	10		Knowing	25%
Measurement & Geometry	4	2	3	5	2	16		Applying	50%
Statistics & Probability	1		1	1	1	4		Reasoning	25%
Total	8	5	7	7	4	30			

B. Test Scoring Guide:

Question 3.

Sam bought a car for $36118.
He added tinted windows for $860 and Bluetooth connectivity for $1376.
How much did he spend altogether? **Please show all working.**

Strand	Number and Algebra: Addition and Subtraction
Estimated Difficulty	M
Cognitive Domain	A
Curr Ref	MA3-5NA
Outcome	Selects and applies appropriate strategies for addition and subtraction with counting numbers of any size
Key: Full credit	Code 1: $38354
Partial credit	Code 1: 38354
No credit	Code 0: other responses

Question 4.

Tim used these cards to make the largest number.

4 5 3

What number did he make?

☐ ☐ ☐

Strand	Number and Algebra: Whole Numbers 1
Estimated Difficulty	E
Cognitive Domain	K
Curr Ref	MA3-4NA
Outcome	Orders, reads and represents integers of any size and describes properties of whole numbers
Key: Full credit	Code 1: 543
No credit	Code 0: other responses

C. Test Codebook

Codebook: Kincoppal-Rose Bay Y5 Mathematics T1 June 2018									
Item order	Name	Key	QType	Content	Expected difficulty (E, EM, MH, H)	Cog Dom	Descriptor	Curr Ref	MaxScore
5MA01	find value	scoring guide	MC	Place Value	E	K	Identifies the correct value of a digit in a 3 digit number	MA3-4NA	1
5MA02	expanded notation	scoring guide	CR	Expanded Notation	EM	K	Records a 6 digit number using expanded notation	MA3-4NA	1
5MA03	add money	scoring guide	CR	Addition	MH	A	Uses addition to solve monetary worded problems	MA3-4NA	2
5MA04	order number	scoring guide	CR	Place Value	E	K	Arranges three digits to create the largest number	MA3-4NA	1
5MA05	harder order	scoring guide	CR	Place Value	EM	R	Arranges four digits to create the second largest number	MA3-4NA	1
5MA06	missing number	scoring guide	CR	Number Patterns	EM	A	Identifies the missing number in the number patter	MA3-4NA	1
5MA07	HCF	scoring guide	CR	Highest Common Factor	MH	A	Identifies the Highest Common Factor of two numbers	MA3-4NA	1
5MA08	factors	scoring guide	MC	Factors	MH	A	Identifies which number is not a factor of 30	MA3-4NA	1
5MA09	less than greater than	scoring guide	CR	Greater than Less than	E	R	Uses 'Greater than' 'Less than' or 'Equal to' to make the statement true	MA3-4NA	1
5MA10	Find prime number	scoring guide	MC	Prime numbers	H	R	Identifies a prime number correctly	MA3-4NA	1
5MA11	rounding	scoring guide	CR	Rounding Numbers	MH	A	Rounds a four digit number to the nearest hundred	MA3-4NA	1
5MA12	convert m to km	scoring guide	CR	Converting Kilometres	E	K	Converts metres to kilometres	MA3-9MG	1
5MA13a	convert cm to m	scoring guide	CR	Converting Measure	MH	A	Converts centimetres to metres	MA3-9MG	1
5MA13b	convert km to m	scoring guide	CR	Converting Measure	MH	A	Converts kilometres to metres	MA3-9MG	1

5MA14	total km	scoring guide	CR	Measure addition	EM	A	Uses addition to solve measurement questions	MA3-9MG	2
5MA15	km time	scoring guide	CR	Time and distance measure	MH	R	Calculates the distance per hour travelled on a route	MA3-9MG	2
5MA16	perimter	scoring guide	CR	Perimeter	MH	A	Calculates the total perimeter of two rectangles	MA3-9MG	2
5MA17	missing value	scoring guide	CR	Perimeter	MH	A	Calculates the perimeter of an irregular shape with a missing value	MA3-9MG	2
5MA18	perimiter cost	scoring guide	CR	Perimeter	MH	A	Calculates the cost of covering the perimeter of a rectangle	MA3-9MG	1
5MA19	perimter rule	scoring guide	CR	Perimeter	MH	A	Measures the perimeter of a four sided shape	MA3-9MG	1
5MA20	perimeter block	scoring guide	CR	Perimeter	MH	A	Uses reasoning skills to calculate the area of an irregular shape	MA3-10MG	2
5MA21	convert min	scoring guide	CR	Converting Time	E	K	Calculates the amount of minutes in 2 and a half hours	MA3-13MG	1
5MA22	24 hour	scoring guide	MC	24 Hour Time	EM	K	Correctly identifies 12 hour time as 24 hour time	MA3-13MG	1
5MA23	Reading time	scoring guide	MC	Time	MH	A	Identifies the correct time on an analog clock	MA3-13MG	1
5MA24a	Timetable A	scoring guide	MC	Timetables	H	R	Accurately calculates the amount of stations a train stops at before it reaches its destination	MA3-13MG	1
5MA24b	Timetable B	scoring guide	CR	Timetables	E	K	Correctly reads a timetable to identify when a train arrives	MA3-13MG	1
5MA24c	Timetable C	scoring guide	CR	Timetables	E	K	Correctly calculates how long it takes a train to travel in minutes	MA3-13MG	1
5MA24d	Timetable D	scoring guide	CR	Timetables	H	R	Reads a timetable to identify the best train to reach a destination by a certain time	MA3-13MG	1
5MA25	Chance Dice	scoring guide	MC	Chance	E	R	Identifies the chance of an event occurring as a fraction	MA3-19SP	1
5MA26a	Line Graph	scoring guide	CR	Line graph	MH	R	Interprets the distance travelled on a line graph	MA3-18SP	1
5MA26b	Line Graph Harder	scoring guide	CR	Line graph	MH	A	Interprets the time travelled on a line graph	MA3-18SP	1
5MA27	Picture Graph	scoring guide	CR	Picture Graph	H	R	Interprets a picture graph.	MA3-18SP	1

Appendix 3:

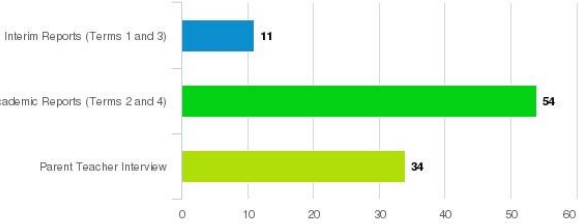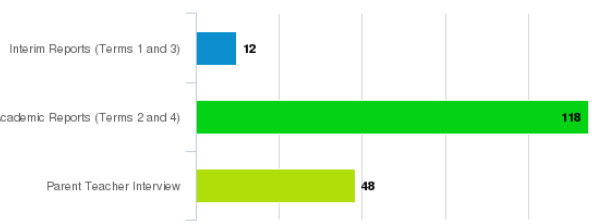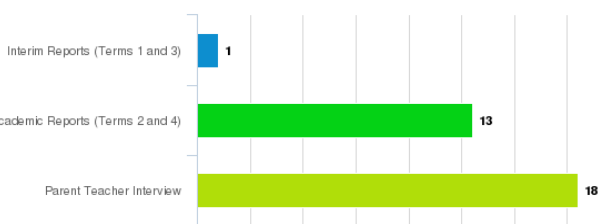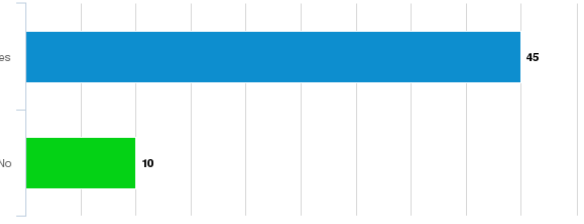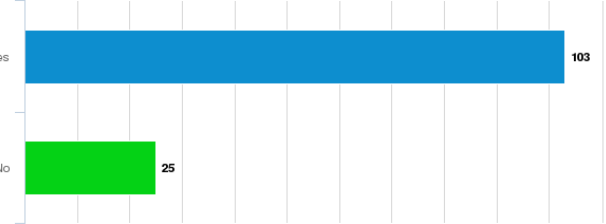| Questions	2. What were 2-3 positive aspects of the professional learning workshops conducted by our mentors from ACER ?	3. What were 2-3 positive aspects about the work/process that followed after the workshops?	4. What were 2-3 challenges of the professional learning workshops conducted by our mentors from ACER?	5. What were 2-3 challenges about the work/process that followed after the workshops?
S1	The workshops were professionally produced and presented. The content was challenging and well tailored to the needs of the group and the project.	To directly apply the theory from the workshops really cemented the learnings. The whole process, from creating test items and performance descriptors, through to the outcome of the data analytics in creating a scale, brought to life what had been presented in the sessions.	Some of the sessions at the start of the process were a little "heavy going" and it wasn't until we started actually writing test items that much of the learning started to make sense. I think, for me, I needed a bit more of that context regarding where we were "going" with the project.	Not too many challenges in this regard as I found it quite enjoyable. Having clerical support for clerical processing of the student's assessments was a great help, otherwise it would have been quite onerous.
S2	Data analytics, expertise, their experience	Assessment item development,	Time - classroom teachers do not have the amount of time required.	Time - classroom teachers do not have the amount of time required. Not having the resources ACER use.
S3	Learning how to write quality test items with the support of colleagues and viewing sample reports that demonstrate growth in learning.	Analysing data as a group after the assessment and receiving feedback on test items prior to the administering the assessment.	What does a quality assessment look like in the Writing domain, and, how do we support teachers in undertaking the process of designing a high quality assessment.	Considering how to apply the principles learnt in a Junior School context with less focus on multiple choice style questions, and, streamlining the process to make it user friendly for busy teachers.
S4	They were experts knew their work. They provided hands on experience with evidence to support findings.	We were able to implement these concepts into the classroom. They continued to support the work we were completing after the workshop had been completed.	The initial workshop was at times difficult to understand. I didn't feel confident with what the purpose of the workshop was until the second . (That may have just been because of me!)	Trying to complete some of the work on top of a normal teaching load.
S5	Understanding what good assessment should look like and how to actually write great questions to get the most information about the students. I had no idea how many different elements were important in the creation of the question.	The students were exposed to different forms of assessment. It was good to see the responses of the students after writing the questions in the new style.	There was a lot of background knowledge to get through before we actually got to create. I'm not sure all of this is necessary. Or it needs to be moved through a little quicker to give time to the actual task of creating questions.	Challenges were the time frame given to complete the questions post workshop. I don't think we have it enough detailed thought due to the constraints.

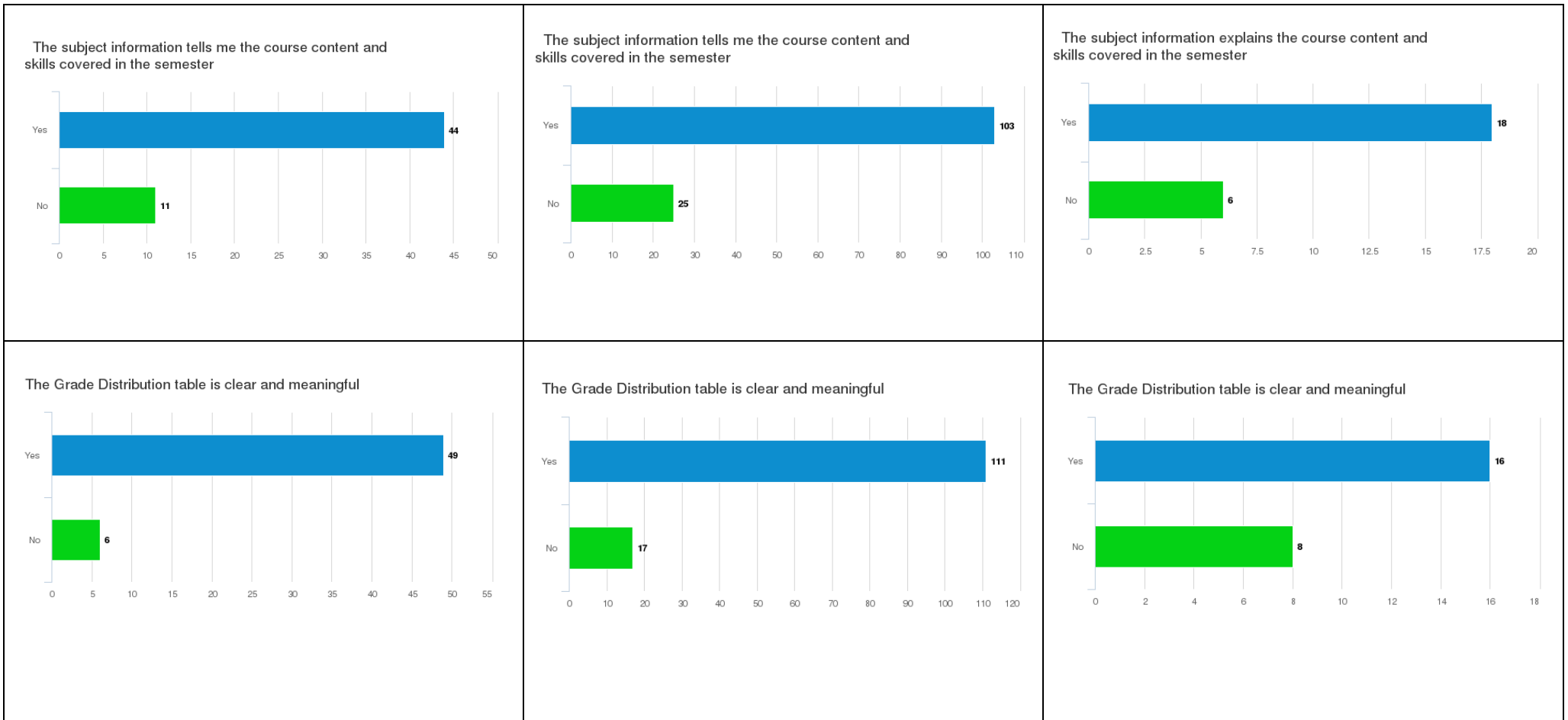| Questions	2. What were 2-3 positive aspects of the professional learning workshops conducted by our mentors from ACER ?	3. What were 2-3 positive aspects about the work/process that followed after the workshops?	4. What were 2-3 challenges of the professional learning workshops conducted by our mentors from ACER?	5. What were 2-3 challenges about the work/process that followed after the workshops?
S6	Being able to assess questioning to improve on it. A better understanding of where KRB wants to go in the future.	Creating a quality assessment. Working collaboratively.	Creating well written questions. Deciphering data tables.	Creating well written and appropriate questions. Getting an assessment created, delivered and marked in an appropriate time frame.
S7	Having the support of two experts with such extensive knowledge and experience and also the examples and resources that were provided.	Drawing off specific examples and models made it easier to put theory into practice. The feedback we got form our assessment items was comprehensive and allowed us to see what needed to be improved.	The data literacy requirement became a hurdle to overcome, for English there was a real difficulty of writing effective 'test items' which did not narrow down on the skills and knowledge we want the students to demonstrate.	Managing work commitments, often the workshops were very inspiring, but we would not have more time to work on them until a few weeks had passed. By this time a lot of what had been covered had been lost to the haze of memory and a busy work schedule.
S8	They shared their extensive knowledge and experience. They imparted this knowledge using strong communication skills. They encouraged and support us in our endeavours.	We were able to put the theory into practice. Our assessment items were thoroughly critiqued by the mentors from ACER which was very helpful..	At times, the theory and analysis of the data became challenging to understand. At times, it was difficult to see the big picture, relative to the assessment items we were devising.	Finding the time to meet with the other teachers to continue the process. At times, it was difficult to pick up the thread of the project if we didn't meet soon after the workshop.
S9	Looking at good questions	Opportunity to implement	Mentors lacked an understanding of KRB Junior School current practices.	Writing test questions to the standard of the mentors who write standardised tests full-time.
S10	the workshops provided were extremely informative about quality task design and using valid and reliable assessment data. The activities to support our learning were well constructed and suited.	This allowed us time to try putting into practice what we had learned about quality assessment design. Recieving constructuve feedback from our mentors.	the assessment items provided tended to be mainly test type. Sometimes the constructive feedback was difficult to accept when you become attached to an item.	writing high quality test items was challenging, putting into practice the guidelines in item design and things to watch out for.

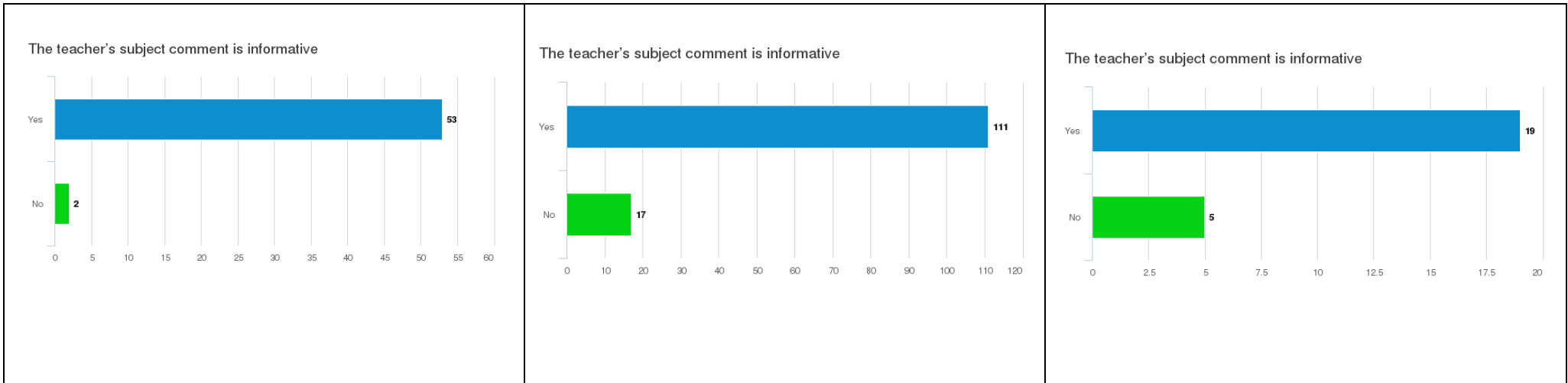| Questions	6. What are 2-3 learnings you have taken from the professional learning workshops conducted by our mentors from ACER?	7. What are 2-3 learnings you have taken from the work/process that followed after the workshops?	8. What were 2-3 positive aspects of being a part of the Growing Minds project?	9. What were 2-3 challenges of being a part of the Growing Minds project?
S1	The whole process of designing good test items through to the creation of a scale to map progress against.	It really reinforced the importance of using all of the data we have on students to inform and feedback on their progress.	Working with colleagues from Junior School and the English Faculty, as well as being part of a project that is on the cutting edge of assessment and reporting best practice. The Team Leader always made sure we knew what we were doing and kept everything on track, and working with our ACER Mentors was really enlightening.	No real challenges, only concern about the "way forward" with the project and rolling it out across the school in the future, as it does require significant change.
S2	Writing assessment items / data analysis	Be more specific and considered when writing items	Learning about best practice and assessment design theory.	Time, focus and energy taken away from own classes
S3	Assessments need to be valid and reliable, and, the learning progressions provide a continuum of learning that can be used when designing assessment.	The importance of analysing assessment results and using them to inform teaching and learning, and, keeping the principles of quality assessment design in mind when creating an assessment task.	The huge amount of Professional Learning around assessment, and, working collaborative with colleagues across the Junior and Senior School.	The Growing Minds project required the investment of time which is difficult in any school, and, applying new learnings to ensure relevance for Junior School aged students.
S4	That age does not determine a students academic ability. The flaws in the current reporting system.	How to construct an appropriate test item that informs on all student progress. How to use data to inform future test items and teaching.	The opportunity to work with different teachers across the school and build a strong network. Different experiences that I would not have been apart of in my regular teaching day (workshops, presentations, lit review!). Stimulating conversation on an interesting topic.	At times feeling very out of my comfort zone and overwhelmed. Finding time outside my normal workload to complete tasks.
S5	I look at assessment so differently! I am very aware of the types of questions I'm asking now, even verbally.	Data from the questions can give us so much information! I think it's taught me to put the work in at the start to get the best data at the end.		

	6. What are 2-3 learnings you have taken from the professional learning workshops conducted by our mentors from ACER?	7. What are 2-3 learnings you have taken from the work/process that followed after the workshops?	8. What were 2-3 positive aspects of being a part of the Growing Minds project?	9. What were 2-3 challenges of being a part of the Growing Minds project?
S6	To recognise a good quality maths question. How to improve the wording of a maths question.	How to create an assessment positively and collaboratively. Seeing how the results show the true difficulty of the questions.		
S7	How to use a coda to mark assessments and how to interpret results by reviewing how effective test items are as much as the individual student result themselves.	A measure of the time and expertise it takes to create these test items and the collaborative process required to effectively create, implement and record the results.	Developed my understanding of best pedological practices for assessments and also given me an understanding of what growth can actually look like using hard data. It has also been fantastic to work in such a committed team and to make connections across the junior and senior campus.	Managing my work commitments with the requirements of the project. The implementing of one of the English writing tests and having to mark it according to the coda, this was an extremely labour and time intensive process.
S8	Using the coda, and calibrating the difficulty of questions in assessment tasks.	The need for the assessment task to correlate more strongly with what has been taught in class. The need for collaboration among teachers and test writers.	It was a good opportunity to review the latest pedagogy around assessment, feedback and reporting. It was a very positive experience of sharing and learning with like minded colleagues.	Maintaining the coherence of the project as a whole over time and picking up the thread of our endeavours after an absence between workshops. Finding the time to develop strong tests that were valid.
S9	How to write a variety of quality questions	Greater awareness of what makes a quality question		
S10	How to develop a scale which will support measuring student grwoth in learning. How to interpret that data and graphs that provided information about student performance on the items as well as information about the effectiveness of the items.	Continuing to improve my test item writing design. Knwoing what to watch out for. Using test specifications to plan our the assessment.	Working with like minded teachers who are keen to learn and care deeply about improving the learning outcomes of all students. Working with mentors who are specialists in their fields and provide us with a braoder understanding of the educational agenda.	Being able to focus on the project alongside the demands of my every day role demands and responsibilities. Communicating with the broader community about the project work and trying to get other teachers interested in the proejct work. The project scope and aims was very ambitious.

Questions	10. What questions do you have or recommendations to make in regards to the future direction of the Growing Minds project?
S1	No questions or recommendations, but I do think that the changes that this project is proposing will require significant teacher professional learning across the school. Also, we can use the language of the Learning Progressions in our assessment regime and in reporting.
S2	N/A
S3	Continued time to work together as a team to drive the project forward, and, continued contact with ACER colleagues.
S4	The project needs to continue! We need to consolidate our learnings and continue to refine assessment and data collection in our school.
S5	I loved it! But it is really heavy on the prior information and data.
S6	To start the project earlier in the year and also to have more allocated time to address all aspects of it (creating, delivering, analysing, amending)
S7	How to implement these assessment practices without creating a larger workload for all the teachers involved? How to change the assessment culture in the school, while still having to prepare students ultimately for the HSC.
S8	How will the changes envisaged be put into practice for different subjects and departments? How will we manage to educate the parents about the benefits of growth mindset?
S9	I am not sure how this style of testing in the Junior School fits in with our philosophy at KRB and current testing. How often are we now doing standardised tests each year?
S10	This project was a huge and ambitious undertaking. It is crucial that we continue the work that has been started. One of the challenges will be how we maintain/sustain our direction in terms of resourcing e.g. technology and data analytics, test design etc. How do we extend our project to other KLAs and what learning progressions can we utilise? Do we need to design our own learning progressions?

Appendix 4:

7-12 Parent (55)	7-12 Student (128)	7-12 Teacher (26)
1. Which KRB report is most informative in regards to your daughter's learning? (You can click on more than one option) Interim Reports (Terms 1 and 3): 11 Academic Reports (Terms 2 and 4): 54 Parent Teacher Interview: 34	1. Which KRB report is the most informative in regards to your learning? (You can click on more than one option) Interim Reports (Terms 1 and 3): 12 Academic Reports (Terms 2 and 4): 118 Parent Teacher Interview: 48	1. Which KRB report is the most informative in regards to student learning? (You can click on more than one option) Interim Reports (Terms 1 and 3): 1 Academic Reports (Terms 2 and 4): 13 Parent Teacher Interview: 18
The Learning Profiles state valuable information Yes: 45 No: 10	The Learning Profiles state valuable information Yes: 103 No: 25	The Learning Profiles state valuable information Yes: 5 No: 19

The subject information tells me the course content and skills covered in the semester

Yes	44
No	11

The subject information tells me the course content and skills covered in the semester

Yes	103
No	25

The subject information explains the course content and skills covered in the semester

Yes	18
No	6

The Grade Distribution table is clear and meaningful

Yes	49
No	6

The Grade Distribution table is clear and meaningful

Yes	111
No	17

The Grade Distribution table is clear and meaningful

Yes	16
No	8

The teacher's subject comment is informative

Yes	53
No	2

The teacher's subject comment is informative

Yes	111
No	17

The teacher's subject comment is informative

Yes	19
No	5

7-12 Parents

5. Below are some elements on our current Academic Report. Please indicate how well the current format communicates these aspects.

The current academic report format is easy to understand

The report is informative regarding my daughter's academic ability

The report clearly informs my daughter's strengths in each subject

The report clearly informs areas which require development

The report clearly informs me about the level of effort my daughter is putting into her learning

The report provides me with a good understanding of the progress my daughter is achieving relative to her cohort

The report provides information about my daughter's engagement with learning

A five point rating scale was used:

- Strongly Agree (far left)
- Agree
- Neutral
- Disagree
- Strongly Disagree

7-12 Students:

5. Below are some elements on our current Academic Report. Please indicate how well the current format communicates these aspects.

7-12 Teachers:

5. Below are some elements on our current Academic Report. Please indicate how well the current format communicates these aspects.

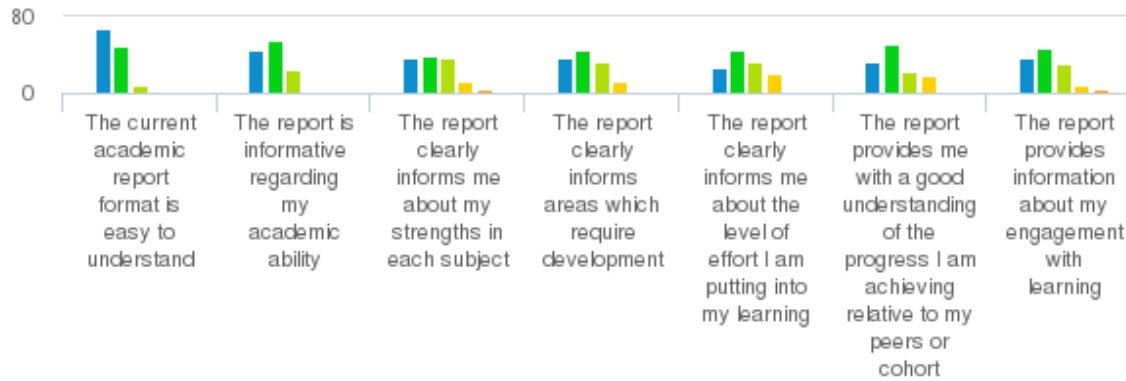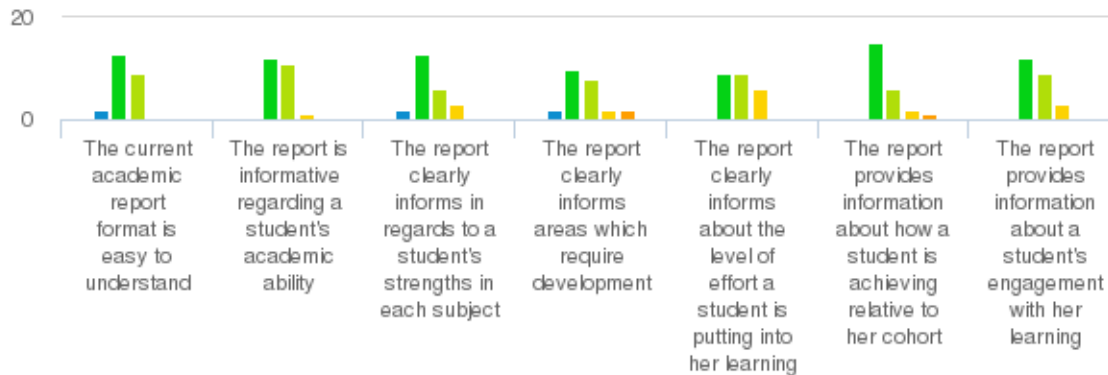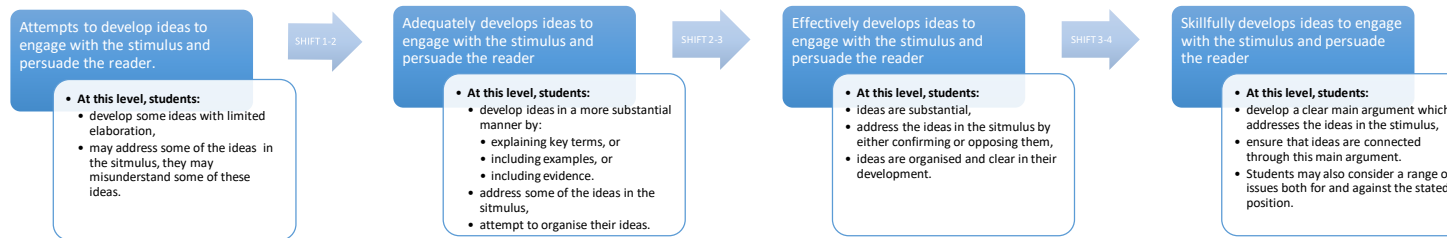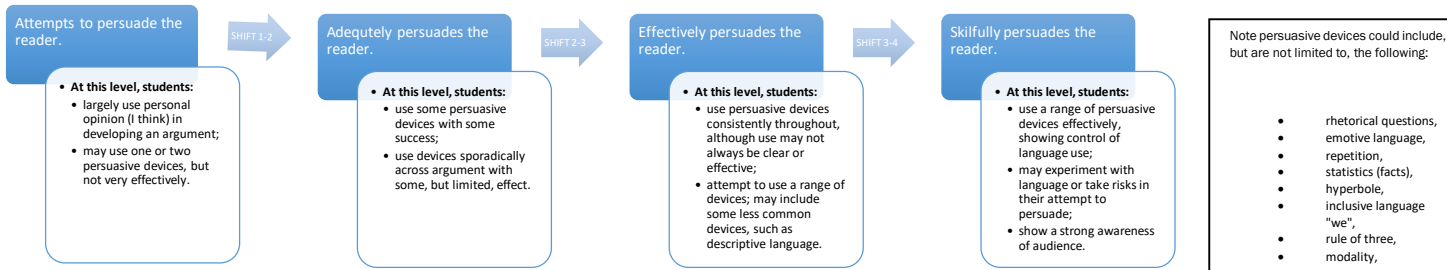# Appendix 5:

PERSUASIVE WRITING MARKING CRITERIA

Student Name:

IDEAS

Attempts to develop ideas to engage with the stimulus and persuade the reader.

SHIFT 1-2

- **At this level, students:**
  - develop some ideas with limited elaboration,
  - may address some of the ideas in the sitmulus, they may misunderstand some of these ideas.

Adequately develops ideas to engage with the stimulus and persuade the reader

SHIFT 2-3

- **At this level, students:**
  - develop ideas in a more substantial manner by:
    - explaining key terms, or
    - including examples, or
    - including evidence.
  - address some of the ideas in the stimulus,
  - attempt to organise their ideas.

Effectively develops ideas to engage with the stimulus and persuade the reader

SHIFT 3-4

- **At this level, students:**
  - ideas are substantial,
  - address the ideas in the sitmulus by either confirming or opposing them,
  - ideas are organised and clear in their development.

Skilfully develops ideas to engage with the stimulus and persuade the reader

- **At this level, students:**
  - develop a clear main argument which addresses the ideas in the stimulus,
  - ensure that ideas are connected through this main argument.
  - Students may also consider a range of issues both for and against the stated position.

PERSUASIVE DEVICES

Attempts to persuade the reader.

SHIFT 1-2

- **At this level, students:**
  - largely use personal opinion (I think) in developing an argument;
  - may use one or two persuasive devices, but not very effectively.

Adequtely persuades the reader.

SHIFT 2-3

- **At this level, students:**
  - use some persuasive devices with some success;
  - use devices sporadically across argument with some, but limited, effect.

Effectively persuades the reader.

SHIFT 3-4

- **At this level, students:**
  - use persuasive devices consistently throughout, although use may not always be clear or effective;
  - attempt to use a range of devices; may include some less common devices, such as descriptive language.

Skilfully persuades the reader.

- **At this level, students:**
  - use a range of persuasive devices effectively, showing control of language use;
  - may experiment with language or take risks in their attempt to persuade;
  - show a strong awareness of audience.

Note persuasive devices could include, but are not limited to, the following:

- rhetorical questions,
- emotive language,
- repetition,
- statistics (facts),
- hyperbole,
- inclusive language "we",
- rule of three,
- modality,

TEXT STRUCTURE

Attempts to compose a persuasive text.

SHIFT 1-2

- **At this level, students:**
  - compose a persuasive text with structural components not clearly identifiable, OR
  - one component is developed only, e.g. an introduction or body.

Adequately composes a persuasive text.

SHIFT 2-3

- **At this level, students:**
  - compose a persuasive text which contains two clearly identifiable structural components, OR
  - all components are present but weak.

Effectively composes a persuasive text.

SHIFT 3-4

- **At this level, students:**
  - compose a persuasive text with all components clearly present.
  - Some elements may not be fully balanced. This may include:
    - short or repetitive detail in the introduction and/or conclusion,
    - the body of their text may be undeveloped with little evidence to support their arguments.

Skilfully composes a persuasive text.

- **At this level, students:**
  - compose a balanced and well developed persuaisve text,
  - thier writing is controlled and develops a sustained argument. This may include:
    - connecting their supporting arguments through transitions
    - using topic sentences to introduce their points in each paragraph,
    - developing a strong conclusion.

SENTENCE STRUCTURE

Attempts to form some simple sentences and compound sentences

SHIFT 1-2

- **At this level, students:**
- use simple sentences correctly
- compose some complex or compound sentences where meaning is unclear
- compose sentences with little variation in length and style.

Adequately composes a range of simple and compound sentences, meaning is predominantly clear

SHIFT 2-3

- **At this level, students:**
- compose mostly simple and compound sentences and some complex sentences correctly,
- make their meaning predominantly clear.

Effectively composes a range complex and controlled sentences, meaning is clear

SHIFT 3-4

- **At this level, students:**
- use a variety of different sentence structures
- consider the effect of simple, compound and complex sentences to make their meaning clear

Skillfully composes a variety of complex and well-developed sentences with precise meaning

- **At this level, students:**
- compose a variety of complex sentence structures and styles for different effects, considering the approrprateness of different styles for different purposes
- continue to refine their sentence structure by writing for impact, e.g. utilising short sentences to develop tension, etc.

VOCABULARY

Attempts to use language appropriately.

SHIFT 1-2

- **At this level, students:**
- compose a short text,
- use mostly simple verbs, adverbs, adjective or nouns.

Adequately uses contextually appropriate language.

SHIFT 2-3

- **At this level, students:**
- write a substantial text,
- develop the appropriateness of their language choices by using 2-3 precise words in each paragraph.

Effectively makes a range of precise and contextually appropriate language choices.

SHIFT 3-4

- **At this level, students:**
- write a subtsantial text,
- develop the range of their language choices by using precise words consistently, such as:
  - modal adjectives and adverbs,
  - precise word groups,
  - modal groups.

Skilfully makes a range of precise and contextually appropriate language choices.

- **At this level, students:**
- ensure all their language choices are appropriate to their style, purpose and audience,
- they may develop their accuracy by using:
  - technical language
  - nominalisations
  - figurative language.

PUNCTUATION

Attempts to use correct and appropriate punctuation to aid reading of the text.

SHIFT 1-2

- **At this level, students:**
- compose some sentences (at least two) with correct punctuation (e.g. full stops, capital letters)

Adequately uses correct and appropriate punctuation to aid reading of the text.

SHIFT 2-3

- **At this level, students:**
- compose most sentences with correct punctuation.
- include some examples of other appropriate punctuation.

Effectively uses correct and appropriate punctuation to aid reading of the text.

SHIFT 3-4

- **At this level, students:**
- compose most sentences with correct punctuation.
- incorporate other forms of punctuation which are mostly correct.

Skillfully uses correct and appropriate punctuation to aid reading of the text.

- **At this level, students:**
- use different forms of punctuation which allow them to modulate the style and tone of their writing.

Note other appropriate punctuation could include, but is not limited to, the following:

- commas in lists,
- apostrophes for contractions,
- apostrophes for possession,
- capital letters and commas used within quotation marks,
- quotation marks for text extracts,
- semicolons and colons,
- quotation marks for words used with ironic emphasis
- hyphens,
- ellipsis.

Student Feedback Reflection:

1.

2.

6. Biographies

Growing Minds Team:

Danielle Albertini is the Stage 2 coordinator and a Year 4 teacher at Kincoppal-Rose Bay. She has five years of leadership experience in Catholic and Independent schools. Her role involves leading curriculum in the Mathematics and Writing domains in the Junior School by working alongside students and teachers from Kindergarten to Year 6. She is passionate about improving student learning outcomes through professional learning and data analysis.

Nicola Dennis is the Director of Teaching and Learning K-12 at Kincoppal-Rose Bay School. She is also a Senior Mathematics teacher with over 25 years teaching experience in Mathematics across a broad range of abilities from Year 5 to Year 12 Extension 2 and across all three education sectors. Nicola has an extensive knowledge, interest and passion for the subject, has completed a Master of Arts in Pure Mathematics, a Graduate Certificate in Education Enrichment Mathematics, and has presented at various AIS and MANSW Conferences or workshops. She is passionate about improving the learning outcomes for all students, no matter where students may be in their learning. Nicola has a particular interest in understanding how students learn, and in evidence-based research practices.

Luke Duncan is a Stage 2 teacher at Kincoppal-Rose Bay. In his role, he ensures that the Junior School is kept abreast of current research and in particular the inclusion of STEM and effective technology rich teaching pedagogy in all KLA's. He is heavily involved in curriculum design, the implementation of the new syllabi and current pedagogical practices. He led a review and update of the Junior School's Academic Reporting system. He is passionate about improving student achievement through meaningful assessment and effective data analysis.

Vicki Minton is a Senior English and ESL teacher at Kincoppal-Rose Bay School with a Bachelor of Arts (Honours English) and a Diploma of Education from the University of Sydney, and a Master of Arts (Comparative Literature) from the University of Tours, France.

She has 30 years of experience teaching English and ESL in Australia and overseas. She has a keen interest in effective assessment, feedback and reporting for English, and has co-ordinated the enrolment testing of international students and the ICAS English and Writing competitions at the School over a number of years.

Gina Taranto is a Senior English Teacher at Kincoppal-Rose Bay Rose Bay. She has completed a Master of Teaching and is currently completing a Master of English at the University of Sydney. Gina's role has included writing and planning of assessments for Stages 4 and 5 of the NSW English syllabus. Gina is passionate about changing the assessment paradigm to reflect best practice pedagogy.

Dan Walsh is a Year 6 teacher and Academic Operations Coordinator in the Junior School. As Academic Operations Coordinator, his role is to create workflows and processes to ensure the Junior School operates in a timely, proficient and effective manner. Part of his role is to coordinate all Junior School academic competitions and external assessments. This results in using data analytics to track and monitor student growth and achievement. His passion is to incorporate lean operational and academic processes that focus more on teaching and learning and less on administrative tasks.

Jennifer Woods is the Head of Mathematics at Kincoppal-Rose Bay Rose Bay. She is a teacher of over 30 years' experience, 19 of those in the public sector. She has developed programs which integrate Growth Mindset into the Mathematics classroom and has presented at state and national Mathematics Conferences. Jennifer is an HSC Senior Marker for the Mathematics General 2 course, has completed her Master of Educational Leadership and Management through Newcastle University and is a member of ACEL.

Mentors:

Frances Eveleigh is a Senior Research Fellow at the Australian Council for Educational Research, joining in 2002, and is part of the Systemwide Testing team located in Sydney Australia. Frances has been responsible for developing test forms in numerous state wide testing programs and in the development of assessment forms for NAPLAN from 2008 to 2011. She managed the large-scale testing program, EMSA, in Abu Dhabi with oversight of all test development and logistics components from 2014 to 2017. More recently, Frances conceptualised and implemented a new learning and assessment program, *Question-a-Day*, which sees approximately 50,000 students in the UAE answering online questions daily. Frances was the National Project Manager for the administration of the OECD's Teaching and Learning International Survey (TALIS) in 2007 and 2012, and co-authored the Australian report, *Australian teachers and the learning environment: An analysis of teacher response to TALIS,* for both iterations. Frances continues to maintain close ties with government education bodies, and works regularly with various state and national educationalists. She presents at workshops and conferences, focusing on the use of assessment data to improve student learning.

Chris Freeman is the Research Director of Systemwide Testing and the General Manager of the Sydney office of the Australian Council for Educational Research. Since joining ACER in 2001, Chris has had oversight of a wide range of state, national and international projects, providing policy advice on assessment strategies and outcomes; and delivering communication of assessment outcomes in public, policy and technical reports at a national and international level. As a leading researcher in implementing large-scale monitoring programs, capacity assessment and capacity building, and data management and analysis, Chris has held key advisory roles in conceptualising and directing all components of various large-scale assessment programs and implementing new initiatives; notably in the Middle East, and also in Bangladesh, New Guinea and the Pacific Islands. Chris held the Project Director role for the Australian implementation of the OECD's Teacher and Learning International Survey (TALIS) in both 2007 and 2012, liaising with the IEA and overseeing logistics for both the field trial and the main study, and was the lead author of the Australian report entitled *Australian teachers and the learning environment: An analysis of teacher response to TALIS,* for both cycles. Chris continues to present at conferences and workshops internationally and act as the chief advisor on key projects for ACER in Australia and the Middle East.

Dr Sandra Knowles is a Research Fellow at the Australian Council for Educational Research (ACER). She works for the Assessment and Reporting division in the humanities area. Her current role includes Reading Test Manager for the Progressive Achievement Tests (PAT) and the PAT Teacher Resource Centre. She is Literacy consultant for the Pacific Island Literacy and Numeracy Assessment (PILNA), and has been a contributor to the development of the ACER Learning Progression Explorer in Reading – a tool that maps the development of Reading skills along a described scale. Her key skills include Literacy test development, interpreting psychometric data, producing educational research reports, presenting at workshop and training sessions, and both small and largescale project management.

Critical Friends:

Peter Cuttance has held teaching, research, and senior management positions in New Zealand, Australia, Finland, Denmark, and Scotland. He was previously Professor of Education at the University of Sydney and the University of Melbourne. Peter holds a BSc in mathematics, economics; a MSocSci degree in sociology, econometrics, social economics; and a PhD (Edinburgh) in educational statistics and school effectiveness. He is a Fellow of the Royal Statistical Society and has an international profile in the fields of school improvement, accountability, school effectiveness, and educational statistics.

Peter has worked closely with schools throughout Australia and has undertaken research that later became the foundation for key educational initiatives and policies. His specialist areas are the measurement of school performance, educational evaluation, student assessment, school review and accountability, and school improvement.

Peter now leads Research Australia Development and Innovation Institute (RADII), an independent organization committed to the development of advanced technologies to support research–based approaches to the improvement of student learning.

Jonathan Heard is a research fellow at the Australian Council for Educational Research in the Assessment and Reporting team. He develops test content and instructional resources for verbal reasoning, reading and critical thinking assessments. He is also a member of the Centre for Assessment Reform and Innovation (CARI) project team, which investigates alternative methods of communicating student progress in learning other than the traditional school report. Jonathan has 15 years' experience in high school teaching, last holding a leading teacher position as the Director of Pedagogy at Balwyn High School in Melbourne, and has an interest in instructional practice, information literacy and teaching critical thinking.

Dr Hilary Hollingsworth is a principal research fellow in the Educational Monitoring and Research Division at the Australian Council for Educational Research. She has 30 years' experience working in a wide range of national and international educational contexts including schools, universities, research organisations, government education departments and private education service organisations. Her expertise is in teaching and learning, teacher education and professional development, classroom observation frameworks and the use of teacher feedback, teaching quality, school improvement, assessing student learning, and communicating student progress. Hilary is a member of

ACER's Centre for Assessment Reform and Innovation (CARI) and leads the Communicating Student Learning Progress project.

Susi Steigler-Peters is the CEO of ProLearning, an education company that provides schools with an automated system to capture, analyse & interpret the analysis of data for the improvement of individual learning & school performance. Susi's key areas of focus are the provision of sales & thought leadership, solution innovation, industry insight & strategic engagement with education C-levels and ministers. She is focused on collaborating with education leaders to help them arrive at their preferred future.

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