Teachers using classroom data well: Identifying key features of effective practices

Final report

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Executive summary

Introduction

The Queensland College of Teachers (QCT) initiated this report as an investigation of the practices associated with Standard 5 of the Australian Professional Standards for Teachers (AITSL, 2011). Related to professional practice, Standard 5 refers to "assess, provide feedback and report on student learning." This Standard incorporates school executive and teacher understandings of how to collect, analyse, interpret and use systemic and classroom data to support and improve students' learning. It is argued that the development of teachers' knowledge and skills in these areas will assist with informing and generating improved student outcomes. Simultaneously the acquisition of such knowledge and skills will empower teachers as they become inquiry-minded and data-literate.

Specifically, the report provides:

- a literature review related to best practice in the interpretation and use of data to improve teaching practices, programs and student outcomes;
- descriptive accounts of consultations conducted with a range of stakeholders and with staff in schools across Queensland school sectors and regions;
- an Analytic Framework developed by the researchers and against which the literature and the accounts were evaluated; and
- case studies created from the examples of effective practice that were collected.

Literature review

An extensive review of the literature related to the topics of: assessment, data collection, analysis, interpretation, and data use was undertaken. The literature review was organised into four themes that emerged from an inductive analysis of the literature.

The first theme was identified as: *data and accountability*. Vertical and horizontal accountabilities are mentioned in the literature. At present in systems and schools there is a preoccupation with vertical accountabilities, which refer to the use of externally mandated, high stakes testing. These types of assessment/testing are almost solely used to audit and monitor schools for external purposes and are often associated with the performance of schools and their teachers. This first part of the literature review canvases a range of lessons for classroom assessment that can be drawn from an understanding of vertical and horizontal accountabilities. In addition, a close analysis of the literature in this section reveals that increasingly both vertical and horizontal accountabilities are being used

more appropriately, and more usefully, to help improve students' learning outcomes. This section concludes with a discussion of the barriers to the effective use of data and to how systems and schools might break down these barriers.

The second theme was identified as: *data and assessment literacy*. Assessment literacy refers to the ability to select appropriate assessment techniques, to assess students' learning for summative and formative purposes, to provide feedback to students on their learning and to use effective strategies to make consistent and comparable assessment judgements. Assessment literacy is associated with the assessment culture in a school that promotes professional dialogue around assessment and a common language for discussing and analysing the characteristics of effective assessment practice. The literature review in this section described the key findings related to formative and summative assessment, assessment feedback, and an understanding of authentic assessment. Considerable attention in this section is paid to assessment *for* learning and refers to influential researchers in this area, such as Stiggins (2002) who argues that teachers and policy makers should lay importance on assessment *for* learning where information gained from assessment is used to inform teachers about students' learning and to improve it.

The third theme that emerged from the review of the literature was: *data and numerate teachers*. This theme refers to the need for teachers to understand what data is, be able to interpret it carefully, be aware of the limitations of data, and evaluate whether their decisions based on data are justified. Specifically teachers need to become knowledgeable about data and to be able to use it competently and confidently in order to make instructional decisions. The literature review highlights the types of knowledge and skills that teachers need to develop as they engage with various data-driven systems. A number of models of the processes of becoming data numerate are described. These include the Inquiry Circle - A Philosophy of Continuous Improvement (Barnes, 2004) and the Data Wise Improvement Process (Boudett, City, & Murnane, 2006). The importance of data teams and of leadership to develop a school's capacity to be data numerate are highlighted. In the last part of this section of the literature review the role of professional learning in becoming data numerate and the importance of active reflection in professional learning are highlighted.

The fourth theme referred to: *using data*. The fourth theme describes the strategies mentioned in the literature that can be used to source and interpret data. Initially in this section of the literature review various researchers' and writers' accounts of the uses of data are presented. Next, examples are provided from two Australian states describing how literacy and numeracy data, namely NAPLAN data, are used. In addition, an example of the use of diagnostic data in numeracy is provided. These examples serve to highlight how data can be used. This project sought to reveal other practices of data use.

Methodology

The first data set in this report was collected through consultation interviews with senior staff in various key organisational stakeholder groups. These groups comprised educational authorities from the government, Catholic and Independent sectors in Queensland. The purpose of this data collection was to identify examples of effective practices of data collection and use. Consultations also addressed issues arising from the literature review, such as the barriers to effective data use. Therefore, stakeholders were asked about the challenges they faced implementing Standard 5 of the Australian Professional Standards for Teachers. Stakeholders were also asked to comment on assessment and data use in the current national and state educational policy contexts. For example, top-down or vertical accountability to governments and schooling systems has dominated assessment practices in recent years, therefore, stakeholders were asked about accountability pressures they may have felt or encountered associated with implementing Standard 5. The stakeholders were also asked about their expectations related to how teachers might exemplify the Australian Professional Standards for Teachers, with particular reference to Standard 5.

Another data set was collected through interviews with key informants, such as principals, heads of departments, and teachers. These interviews were conducted during school visits across the three sectors. This data set also included the collection of artefacts and exemplars that were thought to demonstrate effective practice. Additional data was gathered from public documents such as annual reports, and education and school websites.

General titles will be used when referring to participants. For example, 'education officer' refers to individuals employed at a district or regional level within an education authority. Some of these individuals are in roles other than those of education officers, but are identified using the collective title. The sector (government, Catholic or Independent) has not been identified for reasons of confidentiality. "Principal", "head of department" and "teacher" will be used to identify the participants' role, but again, the sector will not be mentioned. In total, there were five individuals identified with the title "education officer", two as "principal', one as "head of department", and eight as "teacher".

Key findings

There are eight key findings. Each finding is discussed in turn in the next section.

1. It's about accountabilities

The findings of this investigation reveal that the main focus of the descriptive accounts from stakeholders was on accountabilities and alignment. That is, the vast majority of the stakeholders' remarks were dominated by references or inferences related to "being

accountable", "having to be accountable" or "expecting others to be accountable". In addition, the stakeholders made references to the need for alignment between the purposes for which data were collected and the uses of the data.

Only a few stakeholder accounts referred to differentiation. These remarks typically referred to the desire to differentiate pedagogy based on information about individual students and their needs. It should be noted, however, that while this was an intention or goal that some of the stakeholders articulated, there were very few examples that clearly demonstrated this practice. Some accounts also referred to differences within the P-12 structure, that is, that the collection and use of assessment data differed at the various levels of schooling. However, there were more references to assessment and data use at the primary school (P-7) level. Surprisingly, no accounts addressed the notion of student self-assessment or the use of challenging tasks.

2. We have heaps of data – we are drowning in it

The descriptive accounts indicated that the education systems and schools were inundated with data, which they had created or was provided to them by educational authorities. The stakeholders suggested that this increased emphasis on measurement data served primarily as a tool for improving vertical accountability. In commenting on this phenomenon, Lingard and Sellar (2013) have suggested some of this measurement data, in particular the NAPLAN data, act as "catalyst data" and are pivotal to school and system accountability practices. Indeed such data seem to "launch" even more data collection. There was concern that some data were not interpreted and left as raw data rather than being interpreted and used to good effect in schools.

3. Use of visual data displays

The stakeholders spoke of the recent and very common practice of making visual displays of the data collected. The data were presented via online portals that were accessible by computers.

One key finding related to such visual displays was that it became apparent that access to data was related to the position of the individual within the education system. Often only specific key people (e.g., the Principal, Deputy Principal, a Head of Departments or Head of Curriculum) had access to the data and "released" it to the teachers. While this provides an ease of access, it is also a mechanism of control. Increasingly, within societies of control, schools rely more and more on numerical codes and data, and the utilisation of socio-technological mechanisms such as passwords that create gatekeepers and users (Deleuze, 1995). Consequently, institutions such as schools are becoming corporate systems that are increasingly required to maintain copious record keeping of measurement and

performance data in order to enable auditing (Power, 1999) and at the same time privilege only certain people with the data and/or the release of the data.

The incidence of online warehousing tools and the utilisation of dashboards was evident across two of the sectors. These data displays provided teachers, schools and education systems with tools for comparison of individual students, classes, and schools across a state, nationally and internationally, as well as comparisons of teachers based on extrapolated student data. These warehousing tools also scaffolded the data interpretation process for the teachers by providing pre-determined formats and visual displays. However, Australian and international studies (Hayes, Mills, Christie, & Lingard, 2006; Sahlberg, 2007) have indicated the limited usefulness of these data and cautioned against the use of simplistic analyses and international comparisons derived from these data because these data fail to take into account the many underlying characteristics, such as socio-economic status or family background, that may explain the comparative performance of schools.

4. Making data public within the school

The stakeholders identified a tendency towards the use of other visual and public displays of data, such as the use of spreadsheets and data walls. Often the stakeholders spoke about such public displays in the context of becoming sites of professional conversations among teachers about assessment and student improvement. However, conversations surrounding these data walls were generally focused on data obtained from diagnostic or other classroom assessments rather than high-stakes NAPLAN data, or conversations about assessment practices and pedagogy.

The displays, while public, were generally reserved for the teacher cohort, rather than being made available to students and their parents. However, conversations between teachers that were based on data from the visual displays also led to conversations with students and their parents.

5. Data are used for lots of purposes

The descriptive accounts focused on the multiple purposes of data. The stakeholders were of the opinion that effective use of data was dependent upon alignment between the purposes for which data were collected and the consequent purposes and uses of these data. Here, it was suggested, there needs to be a “fit” or an alignment of these purposes in order to ensure integrity of practice and the effective use of data.

6. The preoccupation with literacy and numeracy data

Many of the descriptive accounts from the systemic and administrative levels focused on literacies and numeracy. Stakeholders linked the uses and purposes of data to improving

students' literacy and numeracy performances. Improvement was frequently gauged through NAPLAN testing; however, diagnostic literacy and numeracy assessments were also used.

While much of the data related to literacies and numeracy, the stakeholders generally did not speak of such data in relation to the actual curriculum, for example, the Australian Curriculum and literacy and numeracy as general capabilities, or to the use of literacies and numeracy in the learning areas of the Curriculum. While this omission could be related to the context of the data gathering process associated with this study, it is thought to more likely be associated with the very, very strong emphasis on measurement and performance data from high-stakes testing (NAPLAN) and the known consequences of such an emphasis which includes a narrowing of the curriculum (Darling-Hammond, 2010; Klenowski, 2011; Sahlberg, 2010; Stobart, 2008; Thompson, 2012). Additionally, this omission could relate to the need for a greater focus on aligning curriculum with pedagogy and assessment (Hayes et al., 2006).

7. The danger of failing to use data to differentiate learning to meet students' individual needs

As indicated in reporting of the findings earlier, the notion of differentiation was not significantly addressed in the stakeholder accounts. As such, there is a danger that while there is an abundance of data, these data are not focused on providing differentiated learning opportunities for those who are most marginalised in our society.

Consequently, if these students or groups of students are not identified as "under-performing" and do not get the opportunities to participate in instruction that is aligned with their educational needs, there is a risk that such students "fall through the cracks".

Classroom data can be used to help align classroom instruction with learning goals and simultaneously be used to refocus pedagogy on content and skills that are lacking (Moon, 2005). The danger associated with misalignment or a lack of differentiation is that students become disengaged with the learning process and there is an associated risk of the emergence of negative behaviours and negative attitudes that contribute further to an achievement gap (Moon, 2005).

8. Developing a broader understanding of what counts as data

Many of the descriptive accounts provided a limited understanding of what counts as data. Data was almost exclusively limited to student performance data, often derived from tests, and, as indicated earlier, the data often focused only on literacies and numeracy.

With respect to the data described and exemplars offered, there were none that recorded students' abilities to engage in analysis and evaluation, to apply knowledge and skills to real-life contexts and problem-solving, or to use critical thinking – the so-called 21st century skills. In addition, there were few references to students' skills in communication or related to their affect and social-emotional well-being, although one school referred to tracking students with respect to their career aspirations and consequent achievements on their future career paths. Finally, in discussing data, there were few references of the need to take into account or to "read" and interpret data in the contexts of students' access and engagement with learning, their opportunities to learn, and the teaching practices employed. Thus it is suggested that developing a broader understanding of what counts as data and ensuring that attention is paid to the broader contexts of data gathering so that richer and more nuanced understandings and uses of data can be developed are essential.

Recommendations for further development and future directions

1. For the QCT:

An effective professional learning program that helps teachers learn to use classroom data well would focus on:

1.1 Classroom assessment as collegial professional practice

The AITSL standards are written with respect to the competencies of individual teachers, but classroom assessment occurs within collegial professional practices, involves shared responsibility for students' learning across time, and collective accountability to parents, to the schooling systems that employ them, and to the local and broader community. This report has highlighted the importance of teachers collaborating in planning and implementing quality assessment, interpreting and moderating assessment, and reporting to parents. This shared, joint, and collective set of practices needs to be highlighted more in the standards per se. To meet the requirements of Standard 5 teachers need skills in conducting professional conversations about assessment, they need confidence in sharing their practices with colleagues, and in participating in moderation meetings. Across time as students progress up the grades, teachers need to discuss the cumulative effects of their teaching and be able to plan whole school approaches to teaching and assessment.

1.2 Recognising the distinctive assessment requirements of different curricular domains

The AISTL standards are neutral (silent) with regard to the distinctive assessment requirements of different curricular domains. This report has highlighted the constraining effects of accountability pressures on curriculum coverage and emphasis. The current context of heightened assessment pressures has led teachers, principals and systems to be preoccupied with literacy and numeracy outcomes. The broad scope and importance of learning across curricular domains needs to be re-emphasised and professional development needs to be focussed on quality assessment practices across domains. Paradoxically, it is in the broader and less scrutinised curriculum areas such the Arts and Social Studies for example, that some exemplary assessment practices were reported and where students were more challenged with complex tasks and invited to be more agentic in self-assessment.

2. For principals and school leaders:

Principals and school leaders can help teachers learn to use classroom data well by:

2.1 Turning external accountability demands into opportunities for improving student learning

The leadership of principals is crucial in establishing the culture of assessment within the school. The principal's role is situated strategically between the demands and expectations of the schooling system and policy-makers on the one hand, and the actual circumstances of classroom teachers and their students on the other. While tests such as NAPLAN will be salient for principals in responding to the external demands of vertical accountability, the effective principal has the capacity to interpret such test results realistically in the context of their school, and to orchestrate whole school assessment and teaching practices that consider the holistic education of students taking into account the full range of curricular offerings. In short, the effective principal can tell the whole story of learning at the school and identify where improvements need to be made.

2.2 Strategically allocating resources so as to build an assessment culture

Principals can direct material and personnel resources to improve the quality of assessment within the school. For example, professional development programs can be planned to increase teachers' assessment literacy, and particular staff with assessment expertise can be redeployed to coach groups of teachers in improving their assessment practices. The principal can find ways to facilitate professional dialogues amongst teachers, create opportunities for groups of teachers to moderate their assessment judgements, and identify the learning needs of students across and within grades. A key task here is to

create a climate of trust where teachers are willing to share their "warts and all" stories and seek better outcomes for their students.

2.3 Advocating for differentiation practices that raise expectations of students while supporting their learning needs

Principals also are responsible for selecting assessment instruments that are used to assess students' prior learning when they arrive at the school and for the kinds of instructional grouping practices that arise from such assessment instruments. Inflexible grouping based on notions of inherent ability has a detrimental effect on the learning of students most in need. But equally, a lack of understanding of students' prior learning and their current needs has negative consequences for students. The effective principal can advise teachers on how to differentiate their teaching methods for the needs of different learners without creating low expectations for some students.

3. For teachers:

Teachers can develop their capacity to use classroom data well by:

3.1 Expanding their conception of what counts as "assessment data"

Teachers have the intensity of daily contact with their students and interact myriad times with students across a school year. Through this process they come to understand students and their learning needs in relation to the demands of the curriculum and external accountability tests such as NAPLAN. Therefore assessment is not separate from classroom teaching but embedded in everyday interactions. Taking time to reflect on this rich information and to consider each student in the class on a regular basis is the foundation of good assessment and teaching. Reflection on the class as a whole and on individuals within the class is necessary if teachers are to provide effective learning experiences for students.

3.2 Planning learning opportunities for their students that are informed by interpretation of assessment data

The challenge for teachers is to assess students in a manner that leads directly back into more effective teaching and scaffolding of their students' learning. Such "assessment for learning" is difficult to sustain when external and vertical accountability pressures are high. The effective teacher has the capacity to manage these pressures whilst maintaining a focus on the breadth and depth of the overall learning journey of their students.

3.3 Designing assessment that provides students with useful feedback on their learning

Hattie and Timperley (2007) distinguished four levels of teacher feedback: (i) focus on task per se; (ii) focus on how to process the task; (iii) focus on how to develop self-regulation and self-assessment; (iv) focus on students and their "selves". It is clear from this report that too often students experience school assessment and feedback as powerful messages about them and their capacities, rather than as useful information and support for improving their capacities and developing self-regulation and self-assessment. The development of an assessment culture for learning would banish feedback that limited students' expectations and decreased their sense of confidence in themselves as learners. Good assessment can demonstrate to students that they are capable of more than they expected – effective teachers know how to design such assessment tasks.

4. For dissemination of exemplars of good practice:

4.1 The QCT should disseminate the exemplars of good practice provided in this report as interactive web resources that provide a focus for teacher professional learning

The report includes five exemplars of good practice that capture teachers' impressions, implementation strategies and outcomes, and evidence of success. The exemplars feature the authentic voices of teachers, principals, and education officers, together with pictures from real classrooms and a set of discussion questions that could be used to stimulate teachers' professional dialogue or individual reflection.

Although each exemplar is presented as a linear document comprising several sections, there are internal hyperlinks between sections and external hyperlinks to other relevant parts of the report. The exemplars have been designed to facilitate their conversion into interactive web resources.

Introduction

Terms of reference

The Queensland College of Teachers (QCT) has indicated that from 2013 the *Australian Professional Standards for Teachers* (the Standards) (AITSL, 2011), endorsed by all Australian State and Territory Ministers for Education, will be used to underpin the functions of the QCT. *Table 1: Australian Professional Standards for Teachers* outlines the key areas of the Standards.

TABLE 1: AUSTRALIAN PROFESSIONAL STANDARDS FOR TEACHERS

Domains of teaching	Standards
Professional Knowledge	1. Know students and how they learn 2. Know the content and how to teach it
Professional Practice	3. Plan for and implement effective teaching and learning 4. Create and maintain supportive and safe learning environments ***5. Assess, provide feedback and report on student learning***
Professional Engagement	6. Engage in professional learning 7. Engage professionally with colleagues, parents/ carers and the community

SOURCE: http://www.teacherstandards.aitsl.edu.au

The Standards are a public statement that describes the professional knowledge, professional practice, and professional engagement required of teachers. *Standard 5*, the *focus on assessing, providing feedback and reporting on student learning* is the focus of this report. This incorporates teachers' understandings of how to interpret and use classroom (and systemic) data to support and improve students' learning, which is of particular importance to teachers in an age of increasing accountabilities for student outcomes. Schools and teachers now have access to a myriad of formal and informal data from both external and internal sources. To maximise the potential to inform and generate improved student outcomes teachers need to be inquiry-minded and data-literate.

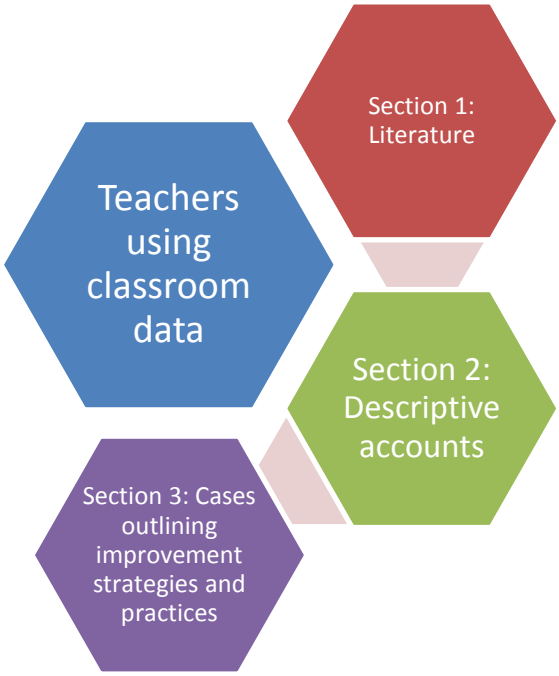
The scope of this report, outlined by the QCT, includes:

- Conducting a literature review of national and international best practice in teachers interpreting and using a range of student assessment data to improve their teaching practices, programs, and student outcomes;
- Undertaking consultations with a range of stakeholders across Queensland school sectors and regions to pinpoint where examples of good/best practice are occurring;
- Developing a range of descriptive accounts from these examples; and
- Analysing these exemplars to identify key features of what works and why in interpreting and using assessment data to improve teaching practice and programs.

Report structure

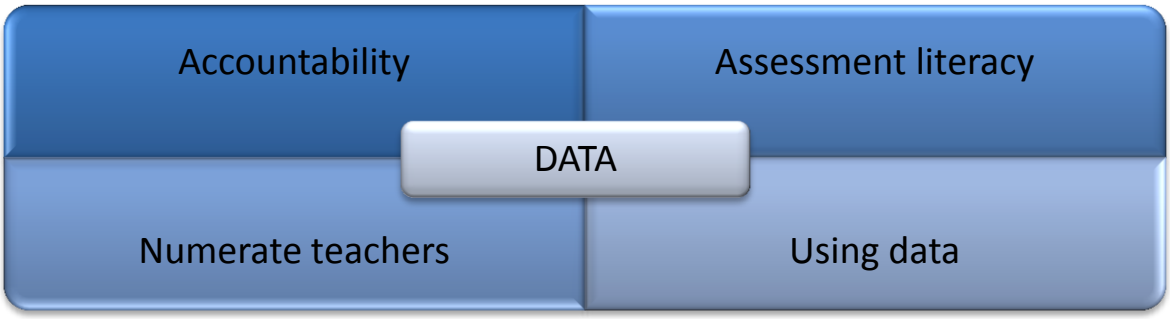
The report is structured into three sections: the literature, the descriptive accounts, and the key features for improving teachers' classroom practices related to data (see *Figure 1: Report structure*).

FIGURE 1: REPORT STRUCTURE



The literature section is divided into four sub-parts that are comprised of themes related to both systemic and classroom practices surrounding the use of data (see *Figure 2: Themes of the literature*). The literature-derived themes relate to accountability, assessment literacy, numerate teachers, and data literacy and practices, and reflect the emphases that were identified through the literature review.

FIGURE 2: THEMES OF THE LITERATURE



These four themes as well as the analytic framework for this project are loosely related to Standard 5. *Table 2: Standards and analytic framework for this project* outlines the sections of Standard 5 with the elements of the analytic framework, within a matrix structure.

TABLE 2: STANDARDS AND ANALYTIC FRAMEWORK FOR THIS PROJECT

Standards framework	Analytic framework				
	Accountabilities	P-12 structure	Alignment and differentiation	Students' self-assessment	Challenging tasks
5.1 Assessing student learning					
5.2 Providing feedback to students on their learning					
5.3 Making consistent and comparable judgments					
5.4 Interpreting student data					
5.5 Reporting on student achievement					

Referring to the matrix columns, *Accountabilities* are clearly important and foregrounded within the terms of reference, the literature and the school practices related to data use in schools. The *P-12 structure* is taken into account in presenting different strategies that teachers might deploy in assessment *of* and *for* learning, and in considering the different professional contexts of early childhood, primary, and secondary school teaching. With regard to *Alignment and differentiation*, the examples of assessment address the uses of assessment for different purposes such as to group students for instruction, individualise assistance, or create other types of adaptations to students' different strengths and needs. *Students' self-assessment* is implicated in the strategies that teachers deploy and the goals that they have for their teaching such as developing metacognitive skills and meta-learning skills (learning how to learn). Finally, assessment using *Challenging tasks* is referred to in the section on strategies under *hybrid* forms of teaching and assessment.

Data collection

The first data set in this report was collected through consultation interviews with senior staff in various key organisational stakeholder groups, including educational authorities from government, Catholic and Independent sectors in Queensland, to identify examples of effective practice. Consultations also addressed issues arising from the literature review, the current national and state educational policy context regarding student assessment and the interpretation of assessment data, and expectations of how teachers might exemplify the *Australian Professional Standards for Teachers*, with particular reference to Standard 5.

Another data set was collected through interviews with key informants, such as principals, heads of departments, and teachers, during school visits across the three sectors. This data set included the collection of artefacts and exemplars that demonstrate effective practice. Additional data was gathered from public documents such as annual reports, and education and school websites.

General titles will be used when referring to participants. For example, 'education officer' refers to individuals employed at a district or regional level within an education authority. Some of these individuals are in roles other than those of education officers, but are identified using the collective title. The sector (government, Catholic or Independent) has not been identified for reasons of confidentiality. "Principal", "head of department" and "teacher" will be used to identify the participants' role, but again, the sector will not be mentioned. In total, there were five individuals identified with the title "education officer", two as "principal", one as "head of department", and eight as "teacher".

Section 1: Literature

Literature review

The literature review is organised in three parts. Part A sets the context for the review by introducing the notion of vertical and horizontal accountabilities and discussing conditions that hinder or enable effective use of data to improve teaching practice. Part B shifts the focus to teachers, and in particular how to develop teachers' assessment literacy and data numeracy. Part C identifies strategies for using data effectively and includes an illustrative example of a mathematics education research and development project. Additionally, Appendix A provides an annotated bibliography of a range of literature on data in schools.

Part A: Context

Theme 1: Data and accountability

Top-down or vertical accountability to governments and schooling systems has dominated assessment practices in recent years but as Lingard (2011a, 2011b) has argued, accountability should be considered as both vertical and horizontal. Vertical accountabilities commonly take the form of mandated system tests such as NAPLAN. Horizontal accountability can highlight requests arising from teachers and principals for reciprocal accountability from governments and systems to provide sufficient support and resources at the local level so that the learning needs of students can be addressed (Darling-Hammond, 2010). Horizontal accountability also refers to the relationship between teachers, their students, parents, and communities: that is, schools and teachers being accountable primarily to their students and the local community. These two accountabilities are linked, in that managing vertical demands for accountability is crucial for effectively translating data about students' learning into effective teaching strategies in the classroom.

Politicians and policy makers frequently link school accountability with school performativity (Newmann, King, & Rigdon, 1997). Often, such perceptions are linked to business-derived models that favour strong external accountability, with incentives and sanctions as a means of compelling schools to improve students' learning outcomes. Research by Newmann et al. (1997) found that:

- strong accountability was rare;
- organizational capacity was not related to accountability;
- schools with strong external accountability tended to have low organizational capacity; and

- strong internal accountability tended to reinforce a school's organizational capacity. (Newmann et al., 1997, p. 41)

Instead, these researchers suggest internal accountability in schools, identified above as horizontal accountability, was more likely to enhance school performance (Newmann et al., 1997).

Vertical accountabilities: Lessons for classroom assessment

Researchers in Australia have advocated for increased vertical accountability linked to maintenance of living standards and a competitive economy. For example, Randy Bennett (2006) writing the foreword for the monograph (Matters, 2006) arising from the ACER annual conference, noted the following:

> Accountability has become critical because today's globalised economy means that companies can invest anywhere that is politically stable and that has a skilled, productive workforce. Anywhere. To beat their competitors, companies must go to those locations that afford the best mix of skills and productivity. To keep jobs and to maintain current living standards, governments need to constantly improve the skill levels and productivity of their existing workforces. But to guarantee that future living standards are maintained, those governments must also ensure that today's students are educated to the highest achievement standards possible. And schools must be held accountable for that achievement if those standards are to be met. (Bennett, 2006, p. iii)

This competitive discourse regarding school and teacher accountability has gained further traction in Australian schools since 2008 with the introduction of annual NAPLAN tests in Years 3, 5, 7 and 9. NAPLAN is a whole population test rather than a sample test for specific purposes, and as a high-stakes population test for schools and teachers, it has had predictable negative effects on pedagogy, curriculum, assessment, and the way time is allocated to teaching tasks across the year. Australia did not learn from international experience. For example, reflecting on the USA assessment and testing context, Marsh, Payne and Hamilton (2006) wrote in a review paper for RAND:

> RAND's research studies and others raise concerns about the consequences of high-stakes state testing and *excessive reliance on test data* (e.g., Hamilton, 2003). While some responses to testing and test results … have the potential to improve educational outcomes, others may be less productive, *such as increased time spent on test-taking strategies, increased focus on problem styles and formats that appear on state tests, or targeting instruction on "bubble kids"*[1] … Other concerns about emphasis on test results revolve around the potential *narrowing of instruction to the subject areas and content covered*

[1] See Text box 1: Bubble kids

> *on state tests.* Finally, *there is a risk of excessive testing,* due to the addition of progress tests and other assessments intended to prepare students for state tests. (Marsh et al., 2006, p. 10, emphasis added)

The website for the National Assessment Program in Australia claims that "NAPLAN test results provide an objective view of students' performance". This goal is currently confounded in actual practice because NAPLAN tests have ceased being *an* objective "litmus test" of how schools, classes and students are performing in some aspects of literacy and numeracy, to being *the* objective *per se*. That is, parents, teachers, and students are devoting substantial time and resources to simply performing well on the kinds of items included in the tests. The tests have become the *end* and so distort the objective function claimed. Extensive in-class coaching by teachers on NAPLAN items as well as directly teaching test-taking heuristics and skills is being supplemented at home by an increasing number of parents coaching their children specifically on NAPLAN items. One of the top selling publications in Australia currently is a NAPLAN preparation booklet for parents. These kinds of unintended consequences are raising levels of stress regarding testing taking and distorting classroom practices.

Bubble kids are those just below a certain level of proficiency. They are often the focus of intense teaching because raising them above that proficiency level has a very positive effect on perceived effectiveness of the teacher. Other students in the class may be neglected somewhat.

Datnow, Park, and Kennedy (2008) suggest that such practices "inadvertently compromise the overarching purpose of data-driven practice" (p. 95).

TEXT BOX 1: BUBBLE KIDS

Research by Hardy and Grootenboer (in press) into the implementation of NAPLAN in three low socioeconomic status (SES) school communities in south-east Queensland: a rural school (approx. 350 students); a large urban school (almost 1000 students); and a smaller urban school (340 students) revealed that teachers expended considerable energy on NAPLAN, as they sought to improve test scores and achieve genuinely educative purposes. These purposes, however, remained in tension; that is, considerable effort and energy were expended by teachers as they grappled with the political demands for increased test results, and educative concerns about how to provide productive academic and social learning opportunities for students.

The Australian experience is part of a global trend. Vertical accountability procedures are deployed almost everywhere. Professor Pasi Salhberg has critiqued this current orthodoxy, termed GERM (global education reform movement). GERM attempts to promote reforms in

teaching and schooling through public pressure on teachers and principals, comparison of education systems within and across nations, and through rewards and sanctions distributed on the basis of test performance. As early as 2002, Earl and Katz wrote:

> Large-scale assessment and testing has moved from being an instrument for decision-making about students to being the lever for holding schools accountable for results (Firestone *et al*., 1998). Leaders in states, districts and schools are required to demonstrate their successes and many are creating organisational report cards as a way of communicating with the public. (Earl & Katz, 2002, p. 1004)

In their paper, *Leading Schools in a Data Rich World*, Earl and Katz (2002) examined a number of school districts in England and Canada and summarised the dilemmas for teachers and schools arising from high-stakes testing regimes in the following manner:

- First, the contrast between "surveillance and improvement" captured teachers' unhappiness about what they termed the "surveillance" orientation of systems. They deplored the fact that data were being used inappropriately to "name and shame" schools and ensure compliance, as well as create negative incentives to change.
- Second, there was a sense of losing control of interpretation of the data. Teachers developed a sense of powerlessness as outcomes from testing regimes were publicised in the press before they had time to interpret the data and understand the results. Principals found themselves surrounded by data and the rhetoric of *transparency* but the "story" about the data was out of their control. Data were publicly reported to ensure transparency but this created vulnerability as principals and teachers were trying to make sense of the data and present it in reasonable ways.
- Third, the key task faced by principals and teachers was to "turn data and information into useable knowledge for teaching". Data and information *per se* have no meaning. It is in the process of interpreting and communicating information from the data that sense and meaning emerge. This was found to be critical to improvement. Earl and Katz (2002) suggest that a key role for teachers and principals is to create the conditions for colleagues and the community to authentically understand data and translate it into useable knowledge for decisions about pedagogy and curriculum.
- Fourth, the pressure of high-stakes tests highlighted the need for assessment literacy amongst teachers. Such literacy provides the basis for teachers and leaders in schools to examine data, make critical sense of it, develop action plans based on the data, take action, and monitor progress along the way (Fullan, 2001).

- Finally, Earl and Katz (2002) propose a forward looking accountability where data are used not as a surveillance activity but in the service of improvement. Overt accountability controls can create a sense of urgency but, as Earl and Katz argue, accountability is much more than providing a ledger sheet or identifying the "culprits". Rather, real accountability is looking forward, using data to inform judgements about current performance, and formulate plans for reasonable actions.

Horizontal accountabilities: Lessons for classroom assessment

Assessment practices influenced by horizontal accountabilities are designed to enhance learning *per se* (assessment *for* learning), and to address the locally situated needs and aspirations of students, their families, and communities. Horizontal accountability is seen as a fairer method of auditing the performance of teachers and schools because it foregrounds the local conditions and challenges in the community and the school. Additionally, it broadens the scope of what is considered worthwhile learning from a narrow focus on basic skills in a few key curriculum areas to a range of outcomes that include measures of student well-being, learning beyond the classroom and the school, and a concern to build networks and social capital with local

Learning Commissions

A Learning Commission is a group of eight community members who have a stake in schooling. This group might include students, parents, employers, educators, school volunteers, community service workers, and any other concerned members of the community.
The Commission provides an opportunity for these people to share their knowledge about schools and to gather knowledge and views from others.
This evidence provides a basis for making recommendations for changes that could help communities to understand and support schools better and schools to support their students and communities in more productive ways.
The Commission meets once a month with each meeting lasting a few hours. There are two ways to participate in the Learning Commission. First, you can submit an Expression of Interest to sit on the Commission. These will be considered by the Chair, who may ask to hear more about why you would like to be involved. Second, you can submit an Expression of Interest to share your views with the Commission. This would involve attending one meeting to talk with the Commissioners, providing you with an opportunity to contribute to the findings of the Commission.
SOURCE: Media release, Dr Sam Sellar, PETRA project (Pursuing Equity Through Rich Accountabilities)

TEXT BOX 2: LEARNING COMMISSIONS

community members and groups so that school is not divorced from community life. Consequently, as Sahlberg (2007) suggests, horizontal accountability "preserves and enhances trust among teachers, students, school leaders and education authorities in the accountability processes and involves them in the process, offering them a strong sense of professional responsibility and initiative" (p. 155).

Currently a group of scholars centred at The University of Queensland is researching horizontal accountabilities in the Bundaberg region of Queensland. A key activity in this research is the establishment of a "learning commission". A recent press release in Bundaberg (see *Text box 2: Learning Commissions*) describes the purposes and processes of the commission. As the press release makes clear, assessment issues (and classroom data) are critical here. It directs attention to richer types of information and data about how schools and communities can and do make a difference for learners. Horizontal accountabilities, in short, seek to broaden the learning outcomes that are considered worthwhile, and in that sense, broaden what teachers might regard as relevant data on which to base their teaching.

Accountability, national testing, and improvement

Within this growing global trend that focuses on accountability, the challenge for educators and educational institutions is to understand the purposes of accountability testing. Stiggins (2002) suggests:

> Politicians routinely ask, How can we use assessment as the basis for doling out rewards and punishments to increase teacher and student effort? They want to know how we can intensify the intimidation associated with annual testing so as to force greater achievement. (p. 758)

National testing, such as NAPLAN, provides a measure for educators that can be viewed as a reference point, and should be used to improve student learning (Klenowski, 2011). This can become difficult in the face of national comparison testing that is publically available in the media, such as league tables, as there is the potential to pervert the system in order to maintain a particular position on these ranks (Stobart, 2008). A recent review of the effects of NAPLAN by Greg Thompson (2012) suggest there is the potential for such high-stakes tests to narrow the curriculum, cause a fixation on basic skills rather than higher-order thinking, focus on content rather than the investigative processes, and increase time pressures on teachers and schools. This, and other research, indicates that such testing becomes high-stakes as it can potentially modify teachers' curriculum and pedagogy practices (Darling-Hammond, 2010; Klenowski, 2011; Sahlberg, 2010; Stobart, 2008) and generate a shift to teacher-centred classrooms (Wildy, 2004). Additionally, Stiggins (2002) makes the following observation about resources and standardised tests in US schools:

> Student achievement suffers because these once-a-year tests are incapable of providing teachers with the moment-to-moment and day-to-day information about student achievement that they need to make crucial instructional decisions. Teachers must rely on classroom assessment to do this. The problem is that teachers are unable to gather or effectively use dependable information on student achievement each day because of the drain of resources for excessive standardized testing. (p. 759)

If accountability testing is used in terms of identifying a standard in relation to student achievement, and less as a comparison tool, it is more likely to lead to improved student learning outcomes. Klenowski (2011) suggests that such data could be used to improve student learning by identifying expectations related to the "quality of achievement" and make judgements about the "quality of students' work" (p. 82). Additionally, such uses of accountability testing data could help inform teachers' work and identify "areas for improvement in teaching, curriculum design or development" (Klenowski, 2011, p. 82). It should be acknowledged, however, that research identified in a paper by Ingram, Seashore Louis, and Schroeder (2004) suggests that while early career teachers are more likely to use standards to inform their teaching, more experienced teachers are more resistant and resentful of external interference, instead preferring to draw on their experience. Therefore, such a focus on accountability testing suggests there would be increased pressure on governments and education systems to build and maintain all teachers' assessment capacity and assessment literacy (see Theme 2).

Wildy (2004) refers to the work of Frederiksen and White who suggest there are two considerations in relation to student assessment and accountability: student outcomes and the processes used to obtain those outcomes. The research identifies the key constructs of directness and transparency to elaborate on these considerations (Wildy, 2004):

> *Directness* focuses on the assessment tasks themselves: they must explicate the cognitive processes to be assessed and give students opportunities to demonstrate them.
>
> *Transparency* focuses on the assessment processes: they must be amenable to use by students in relation to their own work, as well as by teachers. (p. 161)

Williams and Ryan (2000) shift the debate regarding improving student learning outcomes to beyond the notion of accountability, suggesting that student assessment data from national tests can help improve student learning outcomes. For example, they suggest that students' errors and misconceptions, in particular in mathematics testing, can help teachers

effectively design diagnostic mathematics teaching strategies (Williams & Ryan, 2000). However, they also indicate that many teachers do not use diagnostic methods for improving classroom practice (Williams & Ryan, 2000, p. 50). Additionally, they suggest teachers predominantly associate assessment with summative testing (Williams & Ryan, 2000, p. 50), thereby missing opportunities in diagnostic testing. They also review previous research that indicates that "genuinely valid summative assessment should fully reflect the curriculum it assesses and so be formative as well" (Williams & Ryan, 2000, p. 52). When quoting Gipps (1994), it is suggested education systems should move from a "testing culture" to an "assessment culture", where the tests become an opportunity for teachers to improve the pedagogy (Williams & Ryan, 2000) (also see Theme 2).

Barriers to effective use of data to improve practice

Research by Ingram et al. (2004) has identified seven barriers to the effective use of data in schools. These are divided into cultural challenges, technical challenges, and political challenges:

Cultural challenges: culture is considered a strong determinant in how teachers use data to make judgements, and in determining the type of data that teachers think is needed.

> *Barrier 1*: Many teachers have developed their own personal metric for judging the effectiveness of their teaching and often this metric differs from the metrics of external parties (e.g., state accountability systems and school boards).
>
> *Barrier 2*: Many teachers and administrators base their decisions on experience, intuition and anecdotal information (professional judgment) rather than on information that is collected systematically.
>
> *Barrier 3*: There is little agreement among stakeholders about which student outcomes are most important and what kinds of data are meaningful.
>
> *Barrier 4*: Teachers may disassociate their own performance from outcome-oriented effectiveness, which leads them to the opinion that there is only a modest relationship between their efforts and student achievement. (Ingram et al., 2004, p. 1281)

Technical challenges: technical factors that affect the use of data include:

> *Barrier 5*: Data that teachers want are rarely available and refer to characteristics of student learning that are hard to measure.
>
> *Barrier 6*: Schools rarely provide the time needed to collect and analyse data. (Ingram et al., 2004, p. 1281)

Political challenges: the inherently political nature of educational systems results in difficulties in terms of using data for decision-making.

> *Barrier 7*: Data have often been used politically, leading to mistrust of data and data avoidance. (Ingram et al., 2004, p. 1282)

Additionally, this last barrier, related to mistrust of data, was explained by teachers in this study through the sense that the data could be misused or "used as a tool to force a decision that has already been made rather than as information to shape a decision" (Ingram et al., 2004, p. 1276). This highlights the concern that often school norms are not consistent with the intent of accountability policies (Ingram et al., 2004).

Collecting, interpreting and analysing data

Wayman, Cho, and Johnston (2007) have contextualised aspects of data collection, interpretation, and analysis in schools:

> For years, educational entities have collected data on school process and student learning. Recent accountability policies have brought public attention to these data, increased the amount of data collected, and tied funding to certain characteristics of these data. Consequently, educators respond to reporting requirements while simultaneously struggling with better ways to understand these data internally to improve practice. (p. 2)

Young (2006) adds that government accountability policies place "tremendous faith in the power of data – especially standardised test data – to effect school improvement" (p. 521).

Based on their district-wide evaluation of a US county, Wayman et al. (2007) made the following recommendations regarding data in education systems:

- integrate data and practice throughout the data-informed district;
- devise a plan for acquiring an efficient data system that can integrate data district-wide; and
- establish a healthy, district-wide data initiative. (Wayman et al., 2007, p. 7)

Key to implementing these recommendations was the establishment of a *data-informed district*, where there were clear understandings regarding "how education will be conducted, what is meant by learning, and how data will be used to understand and support these" (Wayman et al., 2007, p. 7). Additionally, they recommended that these processes be established through district-wide involvement at all levels of the education system, especially teachers and principals; clear documentation regarding protocols, processes and goals to support the implementation; and the integrated computer system to link all areas of the district (Wayman et al., 2007, pp. 7-8).

Young (2006) elaborates on the notion of identifying the roles associated with developing data-related knowledge and functions, suggesting these build organisational capacity to support teachers' use of data for improved teaching and in relation to implementing new data practices. These include:

> *Dealing with data reporting*: Alleviating time-consuming and frustrating data entry and downloading, especially where teachers' knowledge and comfort with data systems vary and access to computers is uneven.
>
> *Interpreting data and teaching teachers about data*: Providing expertise to answer teachers' questions and guide them in accurately interpreting data reports.
>
> *Furnishing instructional resources linked to issues arising from data analyses*: Aiding teachers in accessing professional development, lesson plans, curricular materials, and colleagues' expertise to act on data analyses.
>
> *Facilitating meetings so that teachers answer "so what":* Purposefully moving teachers' discussions toward implications for instruction and concrete instructional plans that address problems revealed in data analyses.
>
> *Following up with teachers on responses to data analyses*: Translating plans into action by charting teachers' progress on expected reforms, reassessing the effectiveness of supports and resources available to them, and establishing professional accountability for instructional changes that address identified concerns. (Young, 2006, p. 540)

While appearing "commonsensical", these roles or practices within an organisation are able to help support teachers with using classroom data for improved teaching and developing assessment literacy.

Part B: Focus on teachers

Two themes emerged from consideration of the literature on teacher's roles in assessment. The first theme centres on what is commonly referred to as teachers' "assessment literacy", including their ability to select appropriate assessment techniques, to assess students' learning for both summative and formative purposes, to provide feedback to students on their learning, and to use effective strategies for making consistent and comparable assessment judgments. The second theme concerns teachers' "data numeracy" that is their ability to interpret student data in order to modify their teaching so as to improve student learning. These two themes are thus closely associated with most of the elements of Standard 5 in the Australian Professional Standards for Teachers (*Assess, provide feedback and report on student learning*; see Tables 1 and 2).

Theme 2: Data and assessment literacy

Assessment literacy amongst teachers provides the basis for productive examination of data, where teachers make critical sense of it, develop action plans based on the data, take action, and monitor progress along the way (Fullan, 2001). Recent local research in Queensland has highlighted the importance of the history of externally moderated school-based assessment in the senior secondary years of schooling. It seems to have promoted substantial assessment literacy at least amongst teachers in the senior secondary school. Assessment literacy is associated with an assessment culture in the school that encourages professional dialogue and a common language for discussing and analysing the characteristics of good assessment practice. However, Phase 1 evaluation of the Queensland Curriculum, Assessment and Reporting Framework (QCAR)(Goos et al., 2008) found lower levels of familiarity with and confidence in implementing good assessment amongst primary and lower secondary school teachers.

What assessment tasks do teachers use? A sample of Year 4, 6, 8, and 9 teachers who responded to a survey on assessment practice claimed that their most commonly used assessment techniques include:

- teacher made tests;
- diagnostic tests or tasks;
- assignments or projects,
- teacher questioning during lesson; and
- teacher observation of students at work during lessons.

The first three of these are more formal assessment tasks that may contribute to a summative judgement of the quality of students' work, while the last two are informal techniques that teachers use to monitor students' developing understanding and adjust their teaching strategies in order to improve learning.

These five assessment techniques were also judged by more than half the teachers to provide quality evidence of students' learning. Other techniques that met this requirement were:

- discussion of work in progress with students,
- student oral presentations,
- practical work,
- student audio-visual presentations, and
- student reflective writing.

Student reflective writing and student self-assessment were techniques that were judged to provide quality evidence but were rarely used by teachers. That these additional techniques were not used more frequently may reflect a perception by teachers that they are too time-consuming to implement as a part of day-to-day classroom activities, despite the quality evidence that they may provide and the role of these techniques in helping students gauge their own progress. This temporal factor of feeling "time-poor" is part of the current audit culture and needs to be reflected upon by school leaders and addressed if quality pedagogy and assessment is to be enacted in classrooms.

Teachers who responded to the survey claimed they most commonly used an assessment rubric, criteria sheet, or standards scheme to judge the quality of students' work. Interestingly, this response was not borne out by data collected in the schools visited by the research team. Teachers in these schools seldom provided criteria sheets to accompany the assessment tasks that were collected as exemplars. Surveyed teachers reported that common assessment tasks and assessment rubrics were the most frequently used strategies for achieving consistency and comparability of judgements. Moderation meetings were seldom used, even though teachers indicated they would like to use this strategy.

Three years after this baseline evaluation, a follow up evaluation found evidence that QCAR had improved the consistency of assessment across classrooms (Mills et al., 2012). This was largely due to the increased use of criteria sheets in primary schools and the use of consistent terminology for describing assessment criteria and standards in both primary and secondary schools. Interviews with principals and teachers indicated that QCAR had worked to improve the comparability of assessment judgments within and across schools. Moderation appears to have been the most significant factor in contributing to this view, with most schools now reporting that moderation meetings were commonplace.

Assessment literacy, therefore, develops within a culture where there is engagement by teachers in focussed professional discussions about students' learning and how to assess it authentically and fairly. This culture emerges where teachers make consequential decisions and take responsibility for both formative assessment (*for* learning) and

summative assessment (*of* learning). Assessment literacy will include familiarity with common assessment practices and insight regarding the relationship between assessment tasks and the different purposes of assessment.

Formative and summative assessment

Traditionally, there have been two distinct practices: the activity of instruction and the activity of assessment, with the two practices rarely coinciding (Even, 2005, p. 46). Shepard (2000) refers to the work of Beth Graue who suggested "assessment and instruction are often conceived as curiously separate in both time and purpose" (p. 4). However, research suggests there is benefit in combining the two practices, in that formative assessment, especially the feedback associated with such assessments, can improve student learning outcomes (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Black & Wiliam, 1998; Hattie & Timperley, 2007; Hill, 2011; Kirkup, 2006; Quint, Sepanik, & Smith, 2008). Black and Wiliam (1998) identify formative assessment as that where the evidence from the assessment is used by teachers to "adapt their teaching to meet student needs" (p. 140). An OECD (2005) report, *Formative assessment: Improving learning in secondary classrooms*, indicated the following practices were successful in formative assessment:

- Helping students feel safe and confident in the classroom,
- Recognising individual and cultural differences,
- Planning for student learning, rather than merely planning activities,
- Tracking student progress,
- Adjusting learning goals,
- Using diagnostic assessment,
- Questioning,
- Scaffolding learning,
- Helping students to develop a repertoire of learning strategies,
- Building skills for peer- and self-assessment, and
- Enhancing students' roles in peer- and self-assessment. (OECD, 2005, pp. 55-68)

However, the same report identified barriers to the practices of formative assessment. These included the following:

- The tension between classroom-based formative assessments of student learning, and high visibility summative tests – that is, large-scale national or regional assessments of student performance that are intended to hold schools accountable for meeting standards, and that may hold particular consequences for low or underperforming schools. Too often, highly visible summative tests used to hold schools accountable for student achievement drive what happens in classrooms.
- A lack of connection between systemic, school, and classroom approaches to assessment and evaluation. Too often, information gathered through national or

> regional monitoring systems, or even in school-based evaluations, is seen as irrelevant or unhelpful to the business of teaching. Too often, information gathered in classrooms is seen as irrelevant to the business of policy making. (OECD, 2005, p. 24)

Black and Wiliam (1998) also identified a number of barriers, suggesting there is a “poverty of practice” in relation to assessment practices:

- While marking is usually conscientious, it often fails to offer guidance on how work can be improved.
- Often teachers only pay lip service to [formative assessment] but consider the practice as unrealistic. (Black & Wiliam, 1998, p. 141)

Additionally, their research suggests that assessment practices are often linked with three difficulties (Black & Wiliam, 1998):

Effective learning:

- The tests used by teachers encourage rote and superficial learning even when teachers say they want to develop understanding; many teachers seem unaware of the inconsistency.
- The questions and other methods teachers use are not shared with other teachers in the same school, and they are not critically reviewed in relation to what they actually assess.
- For primary teachers particularly, there is a tendency to emphasize quantity and presentation of work and to neglect its quality in relation to learning.

Negative impact:

- The giving of marks and the grading function are overemphasized, while the giving of useful advice and the learning function are underemphasized.
- Approaches are used in which pupils are compared with one another, the prime purpose of which seems to them to be competition rather than personal improvement; in consequence, assessment feedback teaches low-achieving pupils that they lack "ability," causing them to come to believe that they are not able to learn.

Managerial role of assessments:

- Teachers' feedback to pupils seems to serve social and managerial functions, often at the expense of the learning function.
- Teachers are often able to predict pupils' results on external tests because their own tests imitate them, but at the same time teachers know too little about their pupils' learning needs.
- The collection of marks to fill in records is given higher priority than the analysis of pupils' work to discern learning needs; furthermore, some teachers pay no attention

to the assessment records of their pupils' previous teachers. (Black & Wiliam, 1998, pp. 141-142)

The feedback component of formative assessment is therefore highlighted as a significant aspect of classroom data.

Assessment feedback

Other research suggests the format of this feedback is very important (Black et al., 2004; Kirkup, 2006). Black et al. (2004) note that, "while student learning can be advanced by feedback through comments, the giving of numerical scores or grades has a negative effect, in that students ignore comments when marks are also given" (p. 13). Here, the suggestion is that individualised feedback is more effective than numerical data. Overall, whether feedback is given via grades or commentary, the suggestion is that it should cause "thinking" to take place (Black et al., 2004, p. 14). Peer and self-assessment is one way the authors suggest this can occur, as such strategies enable student to become familiar with their learning goals. Additionally, there is the understanding that summative testing should become a positive part of the learning process and one way of accomplishing this is to use summative tests for formative purposes. Black et al. (2004) suggest:

- Students can be engaged in a reflective review of the work they have done to enable them to plan their revision effectively.
- Students can be encouraged to set questions and mark answers so as to gain an understanding of the assessment process and further refine their efforts for improvement.
- Students should be encouraged through peer assessment and self-assessment to apply criteria to help them understand how their work might be improved. This may include providing opportunities for students to rework examination answers in class. (Black et al., 2004, p. 16)

Hattie and Timperley (2007) distinguish between four levels of feedback:

- Feedback about the task (FT)
- Feedback about the processing of the task (FP)
- Feedback about self-regulation (FR)
- Feedback about the self as a person (FS)

They argue that FS is the least effective level of feedback, while FR and FP are powerful as tools of "deep processing and mastery of tasks", while FT is "powerful when the task information subsequently is useful for improving strategy processing or enhancing self-regulation" (Hattie & Timperley, 2007, pp. 90-91).

Kirkup (2006) reviewed previous research that suggests formative assessment practices have been devalued as a consequence of the dominance of external, summative, high-stakes testing programs and that these programs have a negative impact on students' motivation for learning (see Theme 1). Hattie and Jaeger (1998) suggest that the value of testing resides with the degree of feedback it can provide teachers and students so that they can review their practices. However, Hattie and Jaeger (1998) also observe that testing is often not used as a mechanism for feedback, but rather a measurement of change.

FEEDBACK SYSTEMS

Some research suggests there is a need for formative feedback systems that identify the "networks of structures, people, and practices that help teachers and administrators translate testing data into practical information for everyday use" (Halverson, 2010, p. 131). Halverson (2010) indicates, "data-driven instructional improvement relies on developing coherent systems that allow school staff to generate, interpret, and act upon quality formative information on students and school programs" (p. 130). The model is based on a system of feedback where loops of instruction, assessment and actuation allow practices to be documented which in turn, allow for further understanding on how to organise feedback systems within schools (Halverson, 2010, p. 145).

Authentic assessment

Darling-Hammond, Ancess, and Falk (1995) suggest that schools should aim to develop 'authentic' assessments where intellectual and practical skills are "transferable" to "real-life" social settings and work environments. While Hargreaves, Earl, and Schmidt (2002) question the notion of "authentic experiences", they do acknowledge that many of the "newer" assessment techniques provide powerful and productive learning experiences for students (p. 70). Using the Canadian context, they identify the new curriculum policies as being associated with the three closely related components of outcomes, integrated curriculum, and assessment. This has similarities to the Queensland-based Productive Pedagogies that use the three message systems of pedagogy, curriculum, and assessment alignment (Hayes et al., 2006).

The "new" curriculum is intended to motivate students to take greater responsibility for their learning, and to make assessment an integral part of the learning experience by encouraging students to create and apply rather than memorise and focus on basic skills (Hargreaves et al., 2002, p. 70). For example, a "new" assessment technique was identified as the "portfolio-based assessment" (Hargreaves et al., 2002). It was reported that many teachers liked the portfolios as they assisted students in developing independence by setting up their own learning plan (Hargreaves et al., 2002, p. 78). However, Hargreaves et al. (2002), using a postmodern analytic perspective, warned that "authentic" assessments "simulate reality as much as they create it, producing beautiful 'fakes'" (p. 89). They add:

> Perhaps few things are more contrived and less authentic than authentic assessment, where there is a constant sorting, sifting, and reflecting on one's achievements in a portfolio, assessing one's peers using complex grids of criteria, or engaging in stage-managed three-way interviews with parents and students. Little could be more artificial or manufactured than this. (Hargreaves et al., 2002, pp. 89-90)

A New Zealand study has highlighted the importance of student engagement in self and peer assessment as "authentic ways in which students can develop evaluative and productive knowledge and expertise, necessary prerequisites if they are to become autonomous learners" (Dixon, Hawe, & Parr, 2011, p. 365). These student-centred practices are grounded in principles of assessment *for* learning that foreground student autonomy and agency (Dixon et al., 2011) and develop students' self-monitoring of their learning. However, research by Dixon et al. (2011) suggests there is significant variability and inconsistency in both the uptake and the implementation of assessment reforms, as teachers' beliefs are mediating factors in this context (p. 365).

In refocusing the argument regarding authentic assessment, research (Hamilton et al., 2009; Stiggins, 1995) contends that assessment literacy is of paramount importance. Stiggins (1995) suggests:

> Without a crystal clear vision of the meaning of academic success and without the ability to translate that vision into high-quality assessments … we would remain unable to assist students in attaining higher levels of academic achievement. (p. 238)

He adds that in order to develop teachers with high levels of assessment literacy, there needs to be time for professional development (see Theme 3) and time to integrate the ideas learned into instruction (Stiggins, 1995, p. 243).

Assessment for learning

Within the theme of assessment literacy, as well as notions of formative assessment and authentic assessment, assessment *for* learning is a related concept. However, Swaffield (2011) is quick to point out that assessment *for* learning is not synonymous with formative assessment, highlighting points of difference:

- Assessment for learning is a learning and teaching process, while formative assessment is a purpose and some argue a function of certain assessments;
- Assessment for learning is concerned with the immediate and near future, while formative assessment can have a very long time span;
- The protagonists and beneficiaries of assessment for learning are the particular pupils and teacher in the specific classroom (or learning environment), while formative

assessment can involve and be of use to other teachers, pupils and other people in different settings;
- In assessment for learning pupils exercise agency and autonomy, while in formative assessment they can be passive recipients of teachers' decisions and actions;
- Assessment for learning is a learning process in itself, while formative assessment provides information to guide future learning; and
- Assessment for learning is concerned with learning how to learn as well as specific learning intentions, while formative assessment concentrates on curriculum objectives. (Swaffield, 2011, p. 443)

Additionally, he uses the term "authentic assessment for learning", but is not using the word authentic in the same way as authors in the previous section, that is, he is not implying "real life" experiences, but rather is focused on the student and teacher participants in the assessment process. Swaffield (2011) identifies the characteristics of assessment *for* learning as focusing on learning; conceptualising the learning objectives; and a focus on roles and relationships (Swaffield, 2011, pp. 437-441).

Stiggins (2002) suggests that there is an assessment crisis in the US, as a result of a flawed vision that focuses on informing decisions of policy makers, giving weight to meeting their information needs, rather than those of teachers and students (p. 760). Instead, assessment should be for learning, where the flow of information about student achievement is used by teachers not only to check on student learning, but also to improve it by:

- understanding and articulating in advance of teaching the achievement targets that their students are to achieve;
- informing their students about those learning goals, in terms that students understand, from the very beginning of the teaching and learning process;
- becoming assessment literate and thus able to transform their expectations into assessment exercises and scoring procedures that accurately reflect student achievement;
- using classroom assessments to build students' confidence in themselves as learners and help them take responsibility for their own learning, so as to lay a foundation for lifelong learning;
- translating classroom assessment results into frequent descriptive feedback (versus judgmental feedback) for students, providing them with specific insights as to how to improve;
- continuously adjusting instruction based on the results of classroom assessments;
- engaging students in regular self-assessment, with standards held constant so that students can watch themselves grow over time and thus feel in charge of their own success; and

- actively involving students in communicating with their teacher and their families about their achievement status and improvement. (Stiggins, 2002, pp. 761-762)

However, research shows that changing teachers' assessment practices, particularly in secondary schools, is difficult (Hill, 2011). As Timperley et al. (2007) suggest in their research, secondary schools are:

> Typically large, complex, and loosely-coupled organisations. They are usually balkanised into subject-based departments, each with its own distinctive culture … It is difficult to imagine a less promising institutional structure for being responsive to external pressure for change and improvement. (p. 208)

Hill (2011) indicates that secondary teachers are more deeply situated in a performativity context than primary teachers and the micropolitics of the secondary school subject departments is more resistant to change (p. 359). Additionally, Black and Wiliam (1998) suggest, "There is no quick fix that can alter existing practice by promising rapid rewards" (p. 146). Hill (2011) reviews research on strategies that use cycles of 'planning, action and review', suggesting that teachers need to understand how assessment for learning is able to improve learning (p. 350) (also see Theme 3). To achieve this, Hill (2011) suggested,

> The principal and senior management team's role was to work with the assessment-literate Assessment for Learning facilitators to decide and plan how best to engage the teachers in this learning … [and] school systematically built in ways for teachers to spend time on professional learning. These included literature study groups, action research teams who tried out new strategies and reported back on their success or otherwise, and other inquiry activities within and across schools. (p. 360)

Shepard (2000) conceives such processes, including assessment, as part of the learning process and as developing a *'learning culture'*. Shepard (2000) also argues that assessment should:

- be *dynamic and on-going*, so that assessment is moved to the middle of the teaching and learning process, rather than being postponed to the end;
- establish students' *prior knowledge* through checklists or pre-tests;
- provide effective *feedback*;
- reveal whether students are able to *transfer* and use new knowledge in new situations;
- make use of *explicit criteria* where students can learn to evaluate their own work;
- include *self-assessment* and increased student responsibility for learning; and
- support *evaluation of teaching* practices. (pp. 10-12)

Theme 3: Data and numerate teachers

Matters (2006) suggests, "Data shape the landscape of our [teachers'] professional lives. Or if they don't, they should, given that education is a profession" (p. 7). Despite this pronouncement, there is a tendency amongst teachers to distrust data, in particular statistical data (Ingram et al., 2004; Matters, 2006). As well as a distrust of data, Wu (2010) suggests that too often the "statistical complexity [of the data] prevents the non-technical stakeholders from fully appreciating the caveats in the results, leading to misinterpretation, over-interpretation and even worse, making inappropriate policy decisions" (p. 24). Additionally, a recent US government report indicates little change as these data are having little effect on teachers' daily instructional decision making (Means, Padilla, DeBarger, & Bakia, 2009, p. viii). Therefore, it is important that teachers develop their data knowledge and develop as numerate teachers.

It is perhaps noticeable, however, that the capacity of teachers to interpret quantitative data has increased following the introduction of NAPLAN. Brunner et al. (2005) suggest that this is one of the benefits of the accountability movements; that is, teachers, schools, and districts are being asked to use data to inform a range of decisions from resource management to instructional practice (Brunner et al., 2005, p. 243). Within the NAPLAN data, the notion of value-added learning has become visible in the display of longitudinal changes in test performance for specific cohorts of students. Comparison of like schools, though controversial, reveals comparative performance of schools serving apparently similar populations. Representation of central tendency and variation via means and standard error bars provides information to teachers about average performance in the class and the extent of variation amongst students in test performance. In some schools students just below certain competency levels of performance, (called 'bubble kids' in the US; see *Text box 1: Bubble kids*) have become the focus of intense instruction in order to create a positive view to parents and system administrators. These numerate skills are necessary for all teachers in order to translate data into meaning information for making pedagogical decisions.

Numerate teachers as a theme is also relevant to the current context where data-driven decision making within schools and classrooms is more and more prevalent. There is an extensive literature on this approach that will be further reviewed.

Data-driven systems

Supovitz and Klein (2003) suggest that while students produce a large volume of work every school year, "only a fraction of those data are mined for instructional guidance" (p. 13). The purpose of classroom data should therefore be understood as a means of diagnosing problems and analysing solutions rather than simply being about the evaluation of students (Bedwell, 2004, p. 19). As part of daily classroom practice, Bedwell (2004) however, notes,

"What is needed is for teachers to become more systematic in the collection, analysis, and interpretation of data in order to facilitate high-quality decisions more consistently" (p. 9). Datnow et al. (2008) agrees, suggesting the "'data-driven' teacher uses formative assessment data on a regular basis to make adjustments to his or her instructional plan" (Datnow et al., 2008, p. 5). Additionally, research suggests that "high-performing schools and school systems use student data in all facets of their work to continuously inform and improve their instruction" (Datnow et al., 2008, p. 5).

A US study by Supovitz and Klein (2003) indicated that while school leaders were of the opinion that both external and internal data were useful, the internal data were of greater value in relation to the provision of instructional guidance (pp. 12-13). *Table 3: Sources and uses of student performance data*, outlines examples on external and internal data.

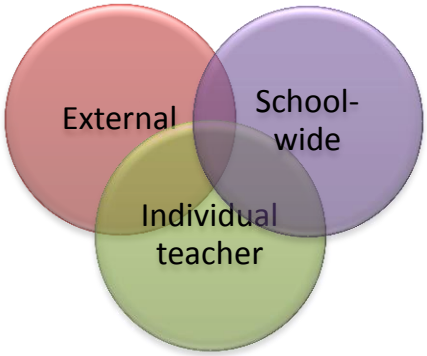
TABLE 3: SOURCES AND USES OF STUDENT PERFORMANCE DATA

Source	Examples	Uses
External Assessments	State & District Assessments	• Benchmarking against similar schools • Providing initial direction • Aligning instruction with external content • Setting annual goals • Planning initial professional development • Identifying low-performing students and developing assistance plans for them • Celebrating accomplishments • Developing a culture of inquiry
School-wide Assessments	Running Records Theme Tests Uniform Writing Examples Grades	• Providing cross-grade/subject guidance throughout the school year • Refining professional development • Refining assistance plans for low-performing students • Reinforcing culture of inquiry
Individual Teacher Assessments	Portfolios Writing Folders Conference Logs Reading & Writing Journals	• Providing quick and flexible feedback throughout the year • Allowing for opportunistic adjustments in instruction and targeted assistance • Individualized to particular style and needs of classroom teacher

SOURCE: Supovitz and Klein (2003, p. 40)

Additionally, the findings in the study by Supovitz and Klein (2003) indicated that in effective school data systems, the interplay between these three data sources creates an interwoven evidence base. The external, school-wide, and individual teacher data sources are equally significant and mutually reinforced. *Figure 3: Interplay of the three data sources in effective school data systems*, demonstrates the nature of such systems, showing each data source as the same sized circle, and each circle overlapping.

FIGURE 3: INTERPLAY OF THE THREE DATA SOURCES IN EFFECTIVE SCHOOL DATA SYSTEMS



SOURCE: Supovitz and Klein (2003, p. 41)

TYPES OF DATA SYSTEMS

Research suggests there are a number of common types of data systems (also see Theme 4), including:

1. student information systems that provide real-time accounting of daily school function (e.g., attendance, schedules) but are typically not designed to provide analysis or access to data beyond the current school year,
2. assessment systems that rapidly organize and analyse frequent benchmark assessments but are typically not designed to provide access to such data over time, and
3. data-warehousing systems that provide access to historic data of all types but are typically not designed for immediate turnaround of new data (Wayman, 2005, p. 298).

Within such data systems, the types of educational data include:

1. student achievement data such as teacher observational notes of students' performance in class, samples of students' class work, student portfolios, results of formal and informal classroom assessment, report cards or large-scale assessment results;

2. other student data relevant to the students such as student mobility, attendance data, behavioural incident data and homework completion; and
3. contextual data that are not under the direct control of the teacher (such as students' linguistic background, gender or community socio-economic factors) but are important to consider when planning for improved student achievement (van Barneveld, 2008).

Data-informed decision making and improving student learning

Evidence-based decision making (Hattie, 2012; Tozer & Holmes, 2005), evidence-informed teaching decisions (Timperley & Parr, 2004), data-driven instruction (Bedwell, 2004), data-based decision making (Feldman & Tung, 2001; Schildkamp, Lai, & Earl, 2013), and data-informed decision making (Means et al., 2009; Pettit, 2010; Wayman et al., 2007) are all concepts identified in the research literature to describe the systematic use of evidence by teachers, schools, and districts to improve instruction, student learning, and other school practices. Timperley and Parr (2004) identify five key principles for evidence-informed teaching (see *Table 4: Five principles for Evidence-Informed Teaching*).

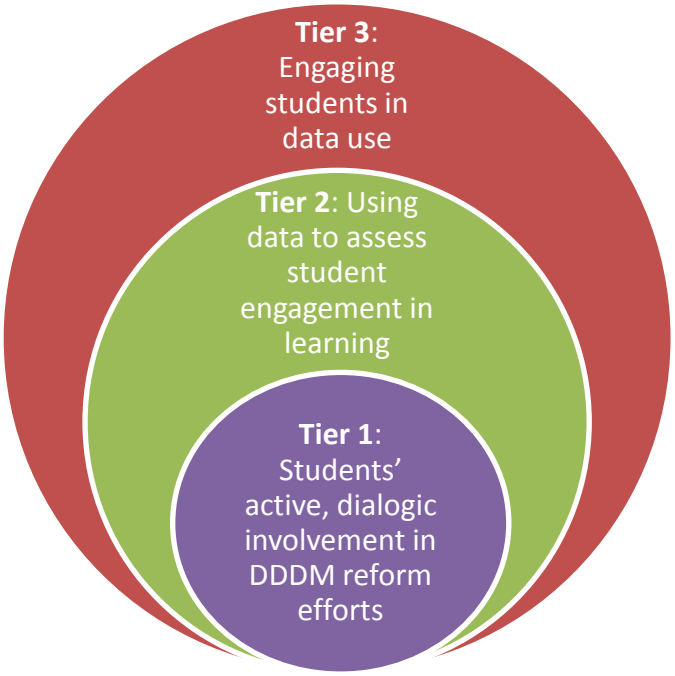
TABLE 4: FIVE PRINCIPLES FOR EVIDENCE-INFORMED TEACHING

Principles
Principle 1: The process of making teaching decisions involves a consideration of both the curriculum and the evidence of student achievement with regard to specific learning intentions.
Principle 2: The focus should be on the effectiveness of day-to-day teaching activities, not additional programmes.
Principle 3: The collection of evidence needs to be ongoing and should be used both to identify student needs and to monitor the effectiveness of the intervention.
Principle 4: Best practice is established by examining the data by class and finding the most successful teacher or teachers who can then assist others.
Principle 5: The process should be an inclusive one at all points. Achievement information is analysed together and interpretations and decisions are collectively owned.

SOURCE: Timperley and Parr (2004, pp. 103-104)

As the goal is to improve student learning, Kennedy and Datnow (2011) suggest that student voice needs to be included in the process. They identify a three-tiered typology of student engagement in data-driven decision making (see *Figure 4: Three-tiered typology of student engagement and data-driven decision making*).

FIGURE 4: THREE-TIERED TYPOLOGY OF STUDENT ENGAGEMENT AND DATA-DRIVEN DECISION MAKING



SOURCE: Kennedy and Datnow (2011, p. 1249)

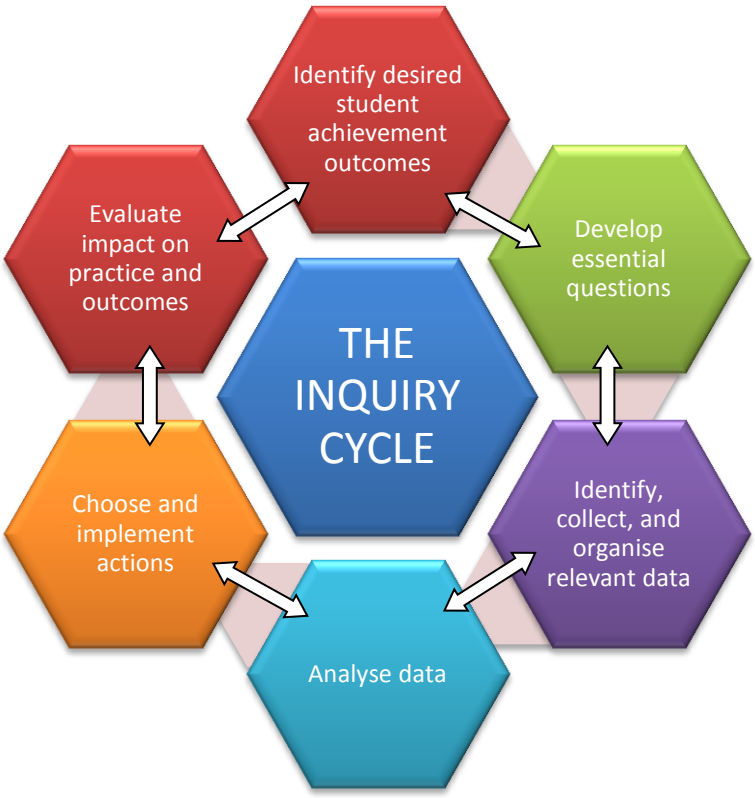
Tier 3 was the most evident typology of student engagement while Tier 1 had the most potential for effective interactions. Kennedy and Datnow (2011) add:

> If students are active and the endeavor seeks to build the school community, the interactions are dialogic. Students and teachers speak and listen to each other; student narratives and needs become integrated into the organization. As school personnel listen to students, they better understand how students learn, what students need, and how the organization can better respond. (p. 1251)

Cycles of continuous improvement

In terms of improving student learning, there is strong support within the literature for school systems to have a cycle-based focus where "performance data is constantly gathered, shared, analysed, and used to inform what is taught and how it is taught" (Barnes, 2004; Datnow, Park, & Wohlstetter, 2007, p. 18). The Annenberg Institute for School Reform (Barnes, 2004) developed a continuous, non-linear inquiry process comprised of six essential activities (see *Figure 5: The Inquiry Cycle – A philosophy of continuous improvement*).

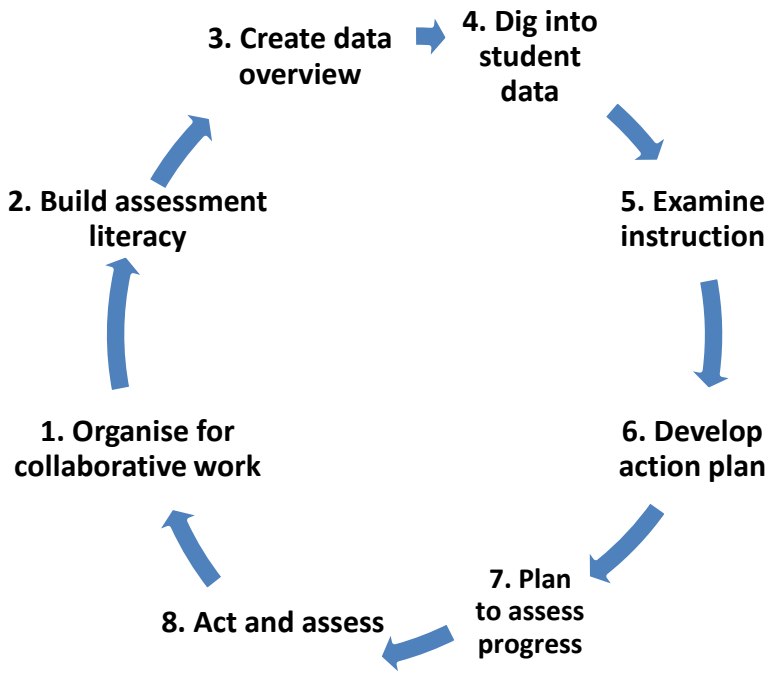
FIGURE 5: THE INQUIRY CYCLE – A PHILOSOPHY OF CONTINUOUS IMPROVEMENT



SOURCE: Barnes (2004, p. 4)

Another example of a three stage inquiry cycle was developed by *Data Wise* project from the Harvard Graduate School of Education (Boudett et al., 2006). This cycle of inquiry is summarised in *Figure 6: Data Wise Improvement Process* and includes teachers to prepare, inquire, and act.

FIGURE 6: DATA WISE IMPROVEMENT PROCESS



SOURCE: Boudett et al. (2006, p. 54)

Other examples of inquiry cycles are referred to in the literature, for example, Timperley et al. (2007) refer to a cycle of teacher inquiry and knowledge-building to promote valued student outcomes (p. xliii). What is interesting about this cycle is the inclusion of the teachers' own learning needs, as part of the process (also see professional learning section).

Datnow et al. (2007) identify the following key strategies as useful to sit alongside the cycle of inquiry and enable educators with their use of data. These four strategies are:

1. investing in professional development;
2. providing support for staff in how to use data and modelling data use and data discussions;
3. providing time for teacher collaboration; and
4. connecting educators across schools to share data and improvement strategies (Datnow et al., 2007, p. 7).

Additionally, research suggests that establishing meaningful and challenging systemic, school, and classroom goals are a precondition of data-informed decision making. That is, by establishing key goals, school systems have tangible student achievement goals that enable them to orient their use of data towards the established outcome (Datnow et al., 2007, pp. 20-22).

The benefits associated with data-informed decision making are expressed by Datnow et al. (2008) as increasing a school's ability to become a learning organisation by:

1. informing instructional strategies;
2. helping to set and refine goals;
3. fostering a culture of inquiry, reinforcing school priorities, and aiding communication between stakeholders; and
4. improving teachers' expectations of their students.(Datnow et al., 2008)

In particular, the researchers suggest that while school goals could include aspects of national targets and standards, schools should also develop their own goals. Additionally, there is a focus on supporting teachers within schools to become confident and numerate in their use of data. As an example, "data teams" are a strategy used in schools to support teachers (see *Text box 3: Data teams*). Hattie (2012) conceptualises such data teams within a four-step model of a repeating cycle:

1. Collecting and charting the data, with the aim of making the data visible;
2. Use the evidence to prioritise and set, review, and revise goals;
3. Reviews instructional strategies and how they impact on students, what needs to change, and using the data as 'indicators' to make mid-course corrections; and

Data teams

This is an example of a strategy used by data-driven schools to develop teachers' confidence and competency with the use of data.

The data teams were comprised of volunteer "teachers and administrators who engage in site-based data collection and research for the purpose of supporting standards-based instruction in the classroom and data-driven decision making" (Datnow et al., 2008, p. 24).

The responsibilities of this team included:

- Create a mind-set that decisions are made on data, not instinct;
- Offer professional development for principals and teachers on the effective use of data;
- Ensure that regular formative and summative assessments are given to monitor student progress and to facilitate the adjustment of instruction and curricular programs as necessary;
- Ensure that an individual student's data will remain confidential and only be used for purposes of planning instruction and communication with the child's parents or guardians; and
- Fostering a culture of inquiry that supports the use of data at all levels leading to a culture of continuous improvement.

SOURCE: Datnow et al. (2008, pp. 24-25)

TEXT BOX 3: DATA TEAMS

4. Monitor the impact of the strategies on students and student learning. (p. 61)

Leadership

It is commonly understood that effective leadership is an important factor in data-informed decision making reforms (Armstrong & Anthes, 2001; Feldman & Tung, 2001; Kerr, Marsh, Schuyler Ikemoto, Darilek, & Barney, 2006; Lachat & Smith, 2005; Marsh, 2012; Stiggins & Duke, 2008; Timperley, 2005; van Barneveld, 2008; Wayman, 2005). While Stiggins and Duke (2008) suggest that principals play a pivotal role within data-informed systems, Timperley (2005) proposed that leadership involved many people, rather than a single visionary such as the principal. Data teams can take on such leadership roles within school organisations, in particular, in combating low staff buy-in to data reforms that is often identified as a significant challenge to data-based decision making (Kerr et al., 2006, p. 499).

The role of the leader is to model data use, but also to establish the conditions that support and encourage teachers' use of data and data systems (Wayman, 2005), in particular, guiding the process of data investigation that results in improved student outcomes (van Barneveld, 2008). Stiggins and Duke (2008) outline 10 leadership competencies related to assessment (see Table 5: 10 Leadership competencies in assessment).

TABLE 5: 10 LEADERSHIP COMPETENCIES IN ASSESSMENT

10 Leadership competencies in assessment A well-qualified principal has 10 specific competencies in assessment:
• Understands the principles of assessment for (that is, used in support of) learning and works with staff to integrate them into classroom instruction
• Understands the necessity of clear academic achievement targets and their relationship to the development of accurate assessments
• Knows and can evaluate the teacher's classroom assessment competencies and help teachers learn to assess accurately and use the results productively
• Can plan, present, or secure professional development activities that contribute to the use of sound assessment practices
• Accurately analyses student assessment information, uses the information to improve curriculum and instruction, and assists teachers in doing the same
• Can develop and implement sound assessment and assessment-related policies
• Creates the conditions necessary for the appropriate use and reporting of student achievement information, and can communicate effectively with all members of the school community about student assessment results and their relationship to improving curriculum and instruction
• Understands the standards of quality for student assessments and how to verify their use in their school/district assessments
• Understands the attributes of a sound and balanced assessment system
• Understands the issues related to the unethical and inappropriate use of student assessment and protects students and staff from such misuse

SOURCE: Stiggins and Duke (2008, p. 287)

Professional learning

Teacher professional learning is considered to be an important aspect of data-informed decision making and supporting the development of numerate teachers (Timperley et al., 2007; van Barneveld, 2008; Wayman, 2005). Professional learning is associated with collaboration that improves individual teachers' growth (Huffman & Kalnin, 2003) and active reflection for improving teacher practices (see *Text box 4: Active reflection*).

Timperley et al. (2007) suggest there are seven elements within the professional learning context that are considered core ideas and important in promoting professional learning so as to positively impact on student outcomes:

- providing sufficient time for extended opportunities to learn and using the time effectively;
- engaging external expertise;
- focusing on engaging teachers in the learning process rather than being concerned about whether they volunteered or not;
- challenging problematic discourses;
- providing opportunities to interact in a community of professionals;
- ensuring content was consistent with wider policy trends; and
- in school-based initiatives, having leaders actively leading the professional learning opportunities. (Timperley et al., 2007, p. xxvi)

Additionally, when dealing with professional learning associated with computer systems, Wayman (2005) suggests small-scale sessions, where teachers obtain first-hand experiences of

Active reflection

Central to the professional development was the use of active reflection as a tool for inquiring into and improving teaching practice.

Both teachers and students routinely reflect, and talk reflectively, about what is intended to be learnt, where they have got to, and where they will go next. They also routinely reflect about the learning process. This may often be seen as a formal plenary session, or a learning diary or peer reflection or student conference.

Reflection was more than a vague musing about one's practice; it was thinking about it in relation to six dimensions:

- reflection about learning,
- self- or peer-assessment,
- reflection about the level of student engagement,
- reflection about sense of partnership,
- professional reflection, and
- students being taught to be routinely reflective.

SOURCE: Timperley, Wilson, Barrar, Fung, and University of Auckland (2007, pp. 246-247)

TEXT BOX 4: ACTIVE REFLECTION

the data, are most effective.

Professional judgement

It is commonly accepted that teacher professional judgement is central to all areas of teachers' work (Allal, 2013; Wyatt-Smith & Klenowski, 2013). Allal (2013) elaborates suggesting this includes:

> When they [teachers] plan and prepare learning activities; when they conduct lessons and decide which students to call on or how to adapt their initial lesson plan; when they interact with individual students and offer various forms of assistance; when they meet with parents to discuss a student's progress; when they carry out formative and summative assessments in the classroom. (p. 20)

Because teacher judgements can also be viewed as anecdotal or intuitive, a preoccupation has emerged with developing mechanisms, such as assessment criteria, that seek to strengthen these judgements and provide public confidence through improved reliability and consistency (Wyatt-Smith & Klenowski, 2013, p. 35). Sadler (2013) suggests,

> The goal is for academics to be confident in their own informed and calibrated judgements, and able to trust their colleagues' abilities to make routine appraisals of student works with an appropriate degree of detachment and self-regulation. (p. 18)

While this is not a new concept, the notion of teachers collectively reviewing student work samples (see *Text box 5: Review of student work*) is one example of a collaborative, inquiry-based practice that has the potential to improve teachers' professional judgements as well as serving as a professional learning activity (Little et al., 2003).

Collective and collaborative review of student work

The common elements of this practice include:

- Bringing teachers together to focus on student learning and teaching practice.
- Getting student work on the table and into the conversation.
- Structuring the conversation through procedural steps and guidelines- to organise discussions and structure participation.

SOURCE: Little, Gearhart, Curry, and Kafka (2003)

TEXT BOX 5: REVIEW OF STUDENT WORK

Part C: Strategies

This final section of the literature review deals with strategies for sourcing and interpreting data that can inform teaching.

Theme 4: Using data

Kirkup, Sizmur, Sturman, and Lewis (2005) identify the following as examples of how the analysis of data can be used to:

- inform accurate curricular targets for individual pupils;
- highlight weaknesses in specific topics for the class;
- highlight specific weaknesses for individual pupils; and
- provide evidence to support decisions as to where to focus resources and teaching.

Based on their study, they add that there are a number of perceived negative outcomes of the use of data:

> Data can easily translate into numerical targets that are, in themselves, meaningless. Numerical data only becomes meaningful if it serves to pose questions about the actual learning that is (or isn't) taking place and how it can be developed further. (Kirkup et al., 2005, p. 49)

Love (2004) approaches the topic of using data from a macro level suggesting there should be less emphasis on some uses and more on others, as summarised in *Table 6: Emphasis placed on data use*.

TABLE 6: EMPHASIS PLACED ON DATA USE

Less emphasis	More emphasis
External accountability	Internal and collective responsibility
Premature data-drive decision making	Ongoing data-driven dialogue
Data use as specialty of a few	Widespread data use and literacy
Data as carrot and stick	Data as feedback for continuous improvement
Data in isolation	Data through collaborative inquiry
Data to sort	Data to serve

SOURCE: Love (2004, p. 24)

Data sources

There are endless ways in which data sources can be categorised. For example, Armstrong and Anthes (2001) divide data sources into:

- Demographic data: background information,
- Achievement data: including students' results, and
- Instructional process data: related to the curriculum. (p. 1)

In another example, Marsh et al. (2006) categorise data sources as:

- Input data: expenditure, demographics of student population;
- Process data: financial operations, quality of instruction;
- Outcome data: test scores, drop-out rates; and
- Satisfaction data: teacher, students, parents and community opinions. (pp. 2-3)

These data sources operate within a framework of continuous improvement (Bernhardt, 2013) (also see Theme 3: Cycles of continuous improvement).

This report provides examples mainly from the achievement data category in the first example or the process and outcome data categories in the second example. An important distinction is between the data that arise specifically from the assessment process and data arising from the teaching process, hybrid forms of teaching and assessment, and systemic forms of data.

A. Data from the assessment process might be generated by:

- diagnostic tests and tasks
- assignments, projects, and quizzes
- student audio-visual presentations
- dynamic assessment of potential learning

B. Data coming from the teaching process might be generated by:

- teacher questioning during lessons
- teachers observing students at work during

School improvement plans

Such plans help educators focus their attention on student learning. School improvement plans serve the purpose of identifying areas for improvement, selecting interventions or new approaches, and collecting data to see how well they were doing. By analysing the school's demographic, achievement and instructional data and matching them to the goals, the plan's effectiveness can be evaluated.

This process also engages the entire team of staff in the data analysis, provides time and resources to plan, and highlights areas in which improvement is needed (for example, mathematics or reading).

SOURCE: Education Commission of the States (n.d., p. 3)

TEXT BOX 6: SCHOOL IMPROVEMENT PLANS

lessons
- teachers discussing work in progress with students
- teachers listening to student oral presentations
- teachers observing and judging practical work

C. Data from the hybrid process of teaching and assessment might be generated by:

- rich tasks
- QCATS
- challenging tasks with scaffolded support
- use of the negotiated curriculum model – What do you know? What do you want to know? How can you find out? How can you show others your new knowledge?

D. Data from systemic processes might be generated by:

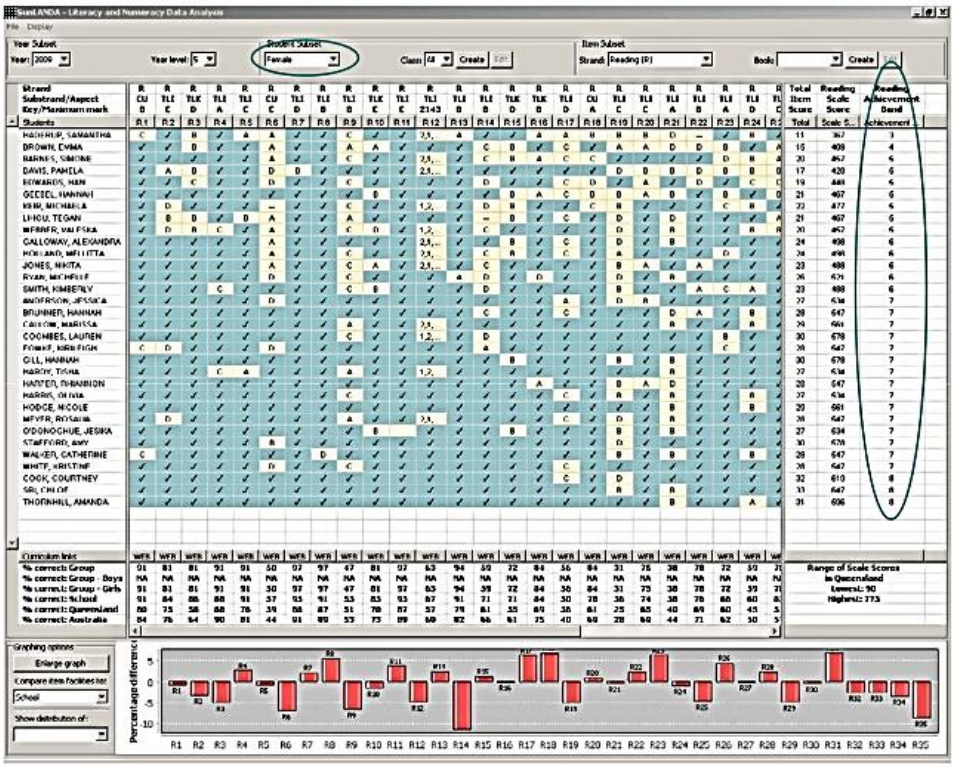
- standardised tests, for example, NAPLAN.

However these examples are categorised, such data can assist schools with developing school improvement plans to monitor progress and set targets (see *Text box 6: School improvement plans*).

Numeracy and literacy data

Various reports have focused on the use of data from numeracy and literacy testing (Northern Territory Government, 2012; Queensland Studies Authority, 2012). These reports are aimed at teachers to help them understand and use the NAPLAN data. The Queensland Studies Authority (2012) suggests schools should use NAPLAN data within the context of existing school assessment data, indicating that formal and informal school testing results should be consistent with NAPLAN results (p. 2). Additionally, the Queensland Studies Authority (QSA) encourages the use of analysis software, SunLANDA, to analyse student performance of the NAPLAN tests (see *Figure 7: SunLANDA data analysis*).

FIGURE 7: SUNLANDA DATA ANALYSIS

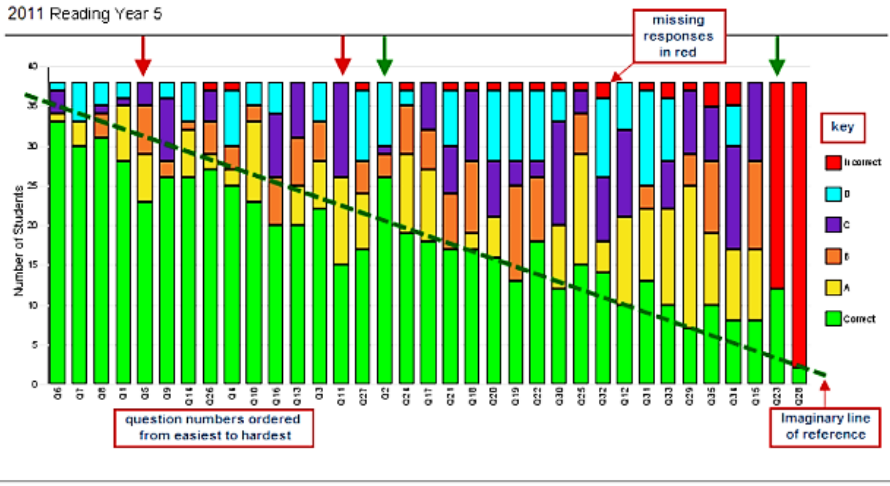


SOURCE: http://www.qsa.qld.edu.au/downloads/p_10/sunlanda_manual.pdf

The report suggests that NAPLAN data can be analysed in the following ways: using the marking keys and item descriptions in the school NAPLAN report; using test results for individual students; using test results for groups of students; and using test results for school planning (Queensland Studies Authority, 2012, p. 14). The SunLANDA handbook also provides information regarding the analysis of NAPLAN data using this software.

The Northern Territory government report also promotes the use of analysis software, RAAD (Reporting and Analysing Achievement Data), to analyse NAPLAN data. *Figure 8: Reporting and Analysing Achievement Data sample* demonstrates a graphical analysis of the Year 5 reading data.

FIGURE 8: REPORTING AND ANALYSING ACHIEVEMENT DATA SAMPLE



The green dotted line above shows an approximation of the national profile of performance. The red arrows indicate questions where the students performed lower than the national level and conversely, the green arrows indicate questions where the students' achieved a better result than the national profile.

SOURCE: Northern Territory Government (2012, p. 22)

Additionally, the Northern Territory government suggests teachers use a "data sources and question matrix" (see *Table 7: Data sources and questions matrix*) to identify responses to three driving questions that enables a significant analysis of the data.

As well as literature that demonstrates how NAPLAN data can be analysed, Klenowski and Funnell (2013) indicate that the "analyses of NAPLAN data alone are limited and insufficient to understand how to address issues of equity and more specifically, how to increase Indigenous students' participation in learning" (p. 35).

TABLE 7: DATA SOURCES AND QUESTIONS MATRIX

DATA SOURCES	DRIVING QUESTIONS		
	What? What do learners already know? What concepts are already in place? What 'gaps' are evident?	**So What?** Where do learners need and want to be? What skills do students need to develop? What are they ready to learn next?	**Now What?** How do learners best learn? What approach is working? What strategies can we put in place? What professional learning is needed to improve practice? What resources does the school need?
NAPLAN test results			
Australian Curriculum - **Teacher observations, tests, projects, performances, tasks etc.**			
Commercial test results			
Students' learning logs, reflections and self-assessment rubrics			

SOURCE: Northern Territory Government (2012, p. 29)

A mathematics-based example

Analysis of student assessment data has been shown to be a major contributor to change in teacher practice and enhanced student learning outcomes (Dole, Hilton, Hilton, & Goos, 2013; Hilton, Hilton, Dole, & Goos, in press). In a major project involving approximately 100 teachers and their students, a diagnostic assessment of Grades 4-9 students' proportional reasoning provided data to teachers that highlighted the breadth of proportional reasoning in the school curriculum and students' capacity to deal with situations that required proportional reasoning. The assessment instrument comprised 12 two-tier, multiple choice items. Two-tier instruments (see *Text box 7: Two-tier questioning*) have been used successfully in science education as a means to simultaneously diagnose students' difficulties in a range of topics and inform pedagogical strategies (for example, Halsam & Treagust, 1987; Tuysuz, 2009). The first tier of each item is a question that requires of students a dichotomous response (yes/no; true/false). The second tier provides possible reasons to explain the first response. Students select the reason that best matches their own thinking in relation to their response for that question. Items for the two-tier assessment in this project drew on well-documented students' difficulties and common misconceptions on proportional reasoning. Collated data from 2500 students were presented to the teachers early in the project. Teachers were also presented with individual reports of their students' achievement on this task.

Two-tier questioning example

The question:

George runs 100 metres in 20 seconds. If he runs the same distance at twice the speed, he will take twice as long.

First-tier response:

True or false?

Second-tier response:

Choose the best reason:

1. *If you double the speed, you must double the time*
2. *If you double the speed, you must halve the time*
3. *The distance doesn't change*
4. *If you run faster, it will take less time*

TEXT BOX 7: TWO-TIER QUESTIONING

This two-year project involved teachers meeting together eight times for professional development workshops. The professional development workshops were framed around research imperatives in the field in relation to teacher knowledge for teaching proportional reasoning: a deep understanding of multiplicative concepts; the capacity to use multiple representations and experiences to develop associated concepts; the ability to distinguish between and characterise additive and multiplicative reasoning; provision of a range of contexts in which students may reason multiplicatively; and understanding that

proportional reasoning is developmental but is enhanced through deliberate and appropriate, conceptual-based teaching and learning approaches. While measurement of student performance and consideration of students' reasoning have been suggested as important aspects of planning professional development, there is a lack of documented evidence on the effect of teacher professional development on student learning outcomes (Osborne, Simon, Christodoulou, Howell-Richardson, & Richardson, 2013; Sowder, 2007; Watson & Beswick, 2011).The design of the professional learning adhered to principles of effective teacher professional development that includes measures of student performance, providing teachers with information about their students' reasoning; allowing teachers time to reflect on their students' learning needs; consulting teachers about their perceived needs; collaboration between teachers and mentors or experts; acknowledging teachers' local context in the design of professional development; presenting teachers with a range of information, including theoretical aspects; and providing teachers with opportunities to reflect on their own practice (Sowder, 2007).

At the second teacher workshop in the first year of the project, data from the assessment instrument were presented and discussed. Data showed that many students were often able to employ algorithmic approaches to solving proportional situations particularly in Grades 8-9, however, they appeared to have difficulty with the underlying concepts. The two-tier nature of the assessment instrument provided teachers with ready snap-shots of students' conceptions and misconceptions associated with proportional reasoning. The data served to draw teachers' attention to the learning needs of their students, and provided the researchers with an evidence base to frame workshop tasks and activities that would hence support teachers to focus on practices that might assist them in addressing their students' learning needs in their classrooms.

At the end of the first year of the project, the diagnostic assessment task was administered again. Results indicated large increases in scores, to the extent that they were beyond the first assessment of students at least two years older. Students showed a greater application of appropriate multiplicative thinking as required for proportional situations, rather than inappropriate additive thinking that had been the case for the pre-assessment. These data suggested that involvement in the professional development and the resulting changes in teachers' knowledge and classroom practices enhanced the students' proportional reasoning skills. Teacher data showed a greater teacher awareness of proportional reasoning demands and opportunities, not only in mathematics but in all curriculum learning areas. This project demonstrates the power of using student assessment data to support the development of teacher knowledge and resulting change in teaching practice. However, teacher knowledge development and pedagogical change was not merely a result of student data. This was mediated by researchers who could draw upon the research background of the topic to identify appropriate teaching strategies and then design the professional development that introduced these strategies to teachers, as well as the initial diagnostic instrument. The complexity and intermingled nature of factors affecting teacher

professional learning, particularly in relation to effective professional development programs as outlined by Sowder (2007), are highlighted in this study. This is important because data alone cannot make a difference to learning or teaching. Teachers need to work out (perhaps with help from researchers, as in this example) what the data reveal about student learning and how to modify their teaching approaches so as to address students' learning difficulties.

Section 2: Descriptive accounts

The descriptive accounts have been developed following consultations with a range of stakeholders across Queensland school sectors. These are framed around Standard 5:

- Assessing student learning
- Providing feedback to students on their learning
- Making consistent and comparable judgments
- Interpreting student data
- Reporting on student achievement

These accounts focus on systemic and school practices relating to the use of data within government, Catholic and Independent education and school authorities. As such, the accounts in this section were constructed as "mandated" or "required" practices related to the use of data within some of the school contexts. These are by no means indicative of practices across all education and school authorities and sectors.

This section of the report is structured using the five key elements of Standard 5. These are layered with the elements of the analytic framework (see *Table 2: Standards and analytic framework for this project*) to form a matrix of possible understandings of the uses of data, within classrooms, as well as in school and systemic contexts. *Table 8: Summary of descriptive accounts of using classroom data* outlines these practices in relation to the analytic framework used in this study (see *Table 7: Data sources and questions matrix*).

The table illustrates that the concentration of descriptive accounts centre on accountability, and alignment and differentiation. Accountability practices focus on teachers making consistent and comparable judgements, interpreting student data, and reporting on student achievement, while *alignment* and differentiation practices are focused more on assessing student learning and interpreting student data. Also of note was that some elements of the Standard, for example, *Providing feedback to students on their learning*, was not identified in isolation within the descriptive accounts across the sectors. That is, this element of the Standard was spoken about in a way that overlapped other aspect of the Standards, for example, there are elements of feedback within *tracking student progress* (see Interpreting student data) as well as *academic reporting* (see Reporting on student achievement).

Access to useful data

Stakeholder perceptions outlined by education officers and principals centred on notions of access to useful data. The stakeholders acknowledged the magnitude of data available to

education authorities and schools, suggesting, as does the literature, that the availability and diversity of these data is unprecedented (Wayman, 2005). A principal indicated:

> We've never had a time when we've had access to as much data as we do now but the emphasis I think has got to remain within schools around what are the actions that it's leading to? What's the data telling us that then leads to the strategy that we're then implementing?

Additionally, an education officer noted the importance of acknowledging that data is more than just "numbers", stating:

> We were confronted with this real thing about putting *faces* on the data. So it was not just about the *numbers*, but these numbers represented little people. So what are we doing for those little people?

While there may be access to diverse and plentiful data, this account suggests that the uses of data in schools must acknowledge that data is not "faceless", nor are its purposes or applications solely systemic.

This is not to say that district-wide decision making does not benefit from the use of data to chart success as well as identify challenges. For example, an education officer indicated,

> We realised how important it is for us to be collecting data so that we can make decisions about what happens at a system level to say these are strategies and practices that we know have an effect, because we've collected data on that ... So we become a lot more aware of how powerful it is to have something that you can measure so that you can show that as evidence of success.

Instead, the perception was that data, as well as being easily accessed, needed to be useful and meaningful for individual teachers rather than only having systemic value. An Education Officer stated:

> So instead of the data always just being something that you collected for the system, the data actually became this useful tool for them [teachers], for planning at all levels … It also became the opportunity to celebrate … where they could see the big changes.

When data are used during cycles of planning, teaching, assessment, and reflection (see Theme 3), opportunities arise to celebrate the achievements of the staff and students.

TABLE 8: SUMMARY OF DESCRIPTIVE ACCOUNTS OF USING CLASSROOM DATA

Standards framework	Analytic framework				
	Accountabilities	P-12 structure	Alignment & differentiation	Students' self-assessment	Challenging tasks
Assessing student learning			• Whole-school frameworks • Classroom data • Diagnostic tools • Conversations		
Providing feedback to students on their learning		• See * and ^			
Making consistent & comparable judgments	• Professional judgments • In-school support for teachers • Moderation – external and internal • Professional learning				
Interpreting student data	• Data inquiry models and cycles • Attendance data		• Tracking progress * • Standardised test data – NAPLAN • Pedagogy		
Reporting on student achievement	• Communication with parents • Academic reporting ^ • Collating and displaying data				

Assessing student learning

The stakeholders discussed the Standard, *Assessing student learning*, in different ways, however, generally in relation to alignment of pedagogy and assessment, with a lesser focus on curriculum. The purposes of assessment tools were generally framed within a whole-school approach to assessing student learning, outlining *alignment* and some *differentiation* opportunities in relation to the use of data in schools. When asked about differentiation with regard to student learning and assessment, one principal quite honestly and frankly responded, "I would say it's probably done very poorly at this school". One sector also indicated they made diagnostic assessment such as the *Developmental Reading Assessment* (DRA) available to their schools, should they express an interest in utilising such formative assessment in relation to student learning and for alignment and aspects of differentiation. That is, they deployed specific assessment instruments for use in schools[2] in order to identify groups of students for particular instruction, or to individualise assistance given to students, or create other types of adaptations to meet students' different strengths and needs.

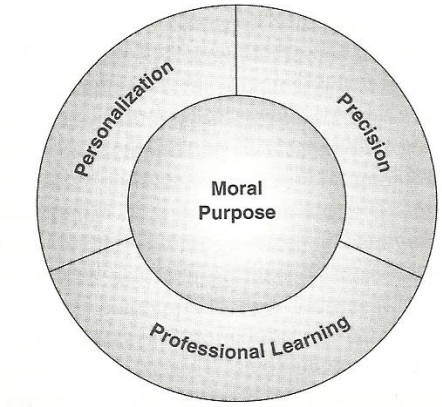
Alignment

Using frameworks

Establishing systemic and school goals was established in the literature as a strategy for effective decision making (see Theme 3). One stakeholder account indicated the systemic use of the "Breakthrough" framework, outlined by Fullan, Hill, and Crevola (2006), to reform schools practices. Central to the Breakthrough framework are the Triple P Components (see *Figure 9: The Triple P Components*).

[2] This was a school-based decision as to whether the DRA was used within particular schools. The stakeholder indicated that they made this available to schools and supported those schools that indicated they wanted to implement the DRA.

FIGURE 9: THE TRIPLE P COMPONENTS



SOURCE: Fullan et al. (2006, p. 15)

Personalisation places each learner at the centre of their education. Precision is linked to personalisation in that precision requires that schools cater to the learning needs of the individual, for example, through assessment *for* learning (see Theme 2) using data as a tool for improving teaching and learning (Fullan et al., 2006). Similarly, professional learning is linked to both personalisation and precision, as the authors suggest you cannot have either personalisation or precision without individual and collective daily learning on the part of the teacher (Fullan et al., 2006). Such frameworks are used by education systems to guide student assessment practices.

An education officer indicated that through their sector's use of this framework,

> It became really evident that the weakest link we had was the assessment to instruction piece ... This tool can help with understanding the students' needs, understanding what you need to do for instruction. But it's not the only thing you can use … There has been the use of *assessment for reporting*, as opposed to the use of *assessment for understanding*.

A principal agreed with this position, suggesting that data gathered at schools were also primarily for reporting rather than learning. The principal stated:

> There's a lot of data gathered around reporting ... I think probably over the last two years, the data has been used as a *reporting tool*, not as a *learning tool*. So I think that's the journey that we're on - to make sure that we're using the data as a learning tool, rather than a reporting tool.

With regard to *assessment for reporting*, assessment practices become more articulated and coordinated across the school, accountability reporting horizontally to parents and vertically to the system also becomes more detailed. Having a more individualised and

precise sense of children's progress increased the confidence of teachers in reporting to parents and their supervisors.

A principal also indicated how they use a framework, suggesting:

> Our pedagogical framework helps us determine how are we testing students, and not in the formal sense of "do an exam", but how are we testing students' knowledge of a particular subject whilst we're teaching it?

Such frameworks are able to provide a structure for school reform, outline and clarify the multiple purposes and audiences of assessment information, and identify the importance of feedback.

Classroom data

Feedback provided through formative assessment is understood to be effective in improving student learning outcomes (Hattie & Timperley, 2007; Hill, 2011; Kirkup, 2006; Quint et al., 2008) (also see Theme 2). Some stakeholders indicated systemic support for classroom assessment practices which focused on providing formative assessment data. Additionally, there are various websites (see *Text box 8: Assessment-focused websites*) that provide useful information regarding the use of formative assessment and assessment *for* learning (see Theme 2).

Assessment-focused websites

In relation to assessment resources, there are a number of websites that provide useful information regarding assessment strategies. These include the Australian Curriculum, Assessment and Reporting Authority website (ACARA, 2011), the Education Services Australia website on assessment for learning (Education Services Australia, n.d.), and the New Zealand Ministry of Education website on assessment (New Zealand Ministry of Education, 2013).

TEXT BOX 8: ASSESSMENT-FOCUSED WEBSITES

A principal provided the following narrative regarding the usefulness of various types of data, with a particular focus on the role of classroom data:

> I also think that in most cases we would like to think that from a teacher's perspective, the data or information that they collect and that they can access through reporting processes and NAPLAN and diagnostic tests and then all of the elements that bring the information in, should be about *reaffirming what they already know from their practice in the classroom*.

This comment and the one below suggests that teachers need to integrate data from more "objective" sources such as NAPLAN, with their own assessment of students' progress that arises from engagement in the classroom:

> All of that classroom information and classroom data is, I think, just as valuable as the whole school stuff that we collect at the end of the term. Ideally we'd like to think that teachers are not surprised at the end of the term when they see data, that they've already got an understanding that Fred struggles with his reading because they've had structures and processes in the class that that's become apparent.
>
> Now that might be a little bit utopian in the expectation that the classroom teacher knows and understands the 28 kids in their class and that the data is a reaffirmation of that information. In some cases it might draw out some more specifics, and particularly with some targeted collection of information that would certainly be useful, but it is then about the process to implement a different approach to increase that understanding.

Again the emphasis from this respondent is on affirming teacher knowledge of student achievements based on classroom assessment data with other assessment data and implementing pedagogical change on the basis of that diverse assessment data.

Diagnostic tools

One sector gave an account of the use of a diagnostic assessment, the *Developmental Reading Assessment* (DRA) that was being used as a tool to monitor students' progress from Prep to Year 9 (also see Section 3). The education officer indicated:

> It is a wonderful catalyst for change … and teachers realised that rich information they were gaining from that assessment tool, and how they could use it to guide their instruction.

Additionally, the tool gave staff the opportunity and the impetus to undertake significant conversations regarding teaching and learning practices related to reading and consequently improve their pedagogy.

Developmental Reading Assessment (DRA)

The *Developmental Reading Assessment* (DRA) is a commercially available, individually administered diagnostic assessment tool that indicates a child's reading level, accuracy, fluency, and comprehension (www.pearsonschool.com).

TEXT BOX 9: DEVELOPMENTAL READING ASSESSMENT

Evidence of reading progress from the tool was often displayed in spreadsheets (see Section 2: Collating and displaying data, and Section 3: Data walls) that became the focus of

whole staff discussions about reading development of students across grades. While individual teachers were initially defensive abut displaying their class data, the education officer reported that honest appraisal of the whole school approach helped establish a culture of shared responsibility for learning and a sharing of knowledge and resources.

Conversations

Conversations around data allow teachers to develop a meta-language around assessment, teaching and learning. Johnston (2003) argues that "productive assessment conversations" "cannot be about who is more or less competent but about how to make teaching, learning and interpretations better" (p. 92). The following example identified a situation in one of the sector's schools where conversations were prompted following the reporting to the teachers of the results of students' DRAs. An education officer stated:

> It's the starting point for their conversations. What happened was where they may have been sitting back, going "Yeah, yeah, we're okay". Suddenly, they were hit in the face that they didn't have one kid in Year 6 reading at Year 6 level, according to this standard [DRA], which is a fairly high standard actually. It's not a NAPLAN kind of standard, that's fairly low in terms of national minimum standard. So it was quite confronting, and challenging. So there were times when there were tears and there were statements, "This can't be right".

Consequently, the use of the DRA testing identified a problem and teachers were challenged by the results. Conversations regarding classroom practices ensued and pedagogy was altered to improve students' reading outcomes.

In another situation, an education officer gave an example of how formative and diagnostic assessments such as the DRA were able to generate conversations amongst teachers to improve reading outcomes. In this example, the data from the DRA was also mapped on a data wall (see Section 3). The education officer indicated:

> In one of the schools, one of the Year 9 boys … was reading at Year 4. This is amazing too. You've got a group of 10 teachers standing, looking at this wall, having a conversation. That doesn't happen very often, does it, about data? Even though - sometimes - they were challenging conversations. Because it suddenly became, "Holy hell, this kid is in Year 9 and his card [on the data wall] is down there at Year 4. How did that happen?" There were some really uncomfortable conversations. To the point then, the Learning Support Teacher was actually saying, "That can't be right. That's wrong".
>
> This kid had beautifully masked his difficulty. Everybody just had kept going, "Oh yeah, he's okay". But they didn't have mechanisms in place to properly

track and monitor. Each year, this child had gone through. So it's been a really powerful mechanism as well for them.

This comment highlights the importance of cross-grade tracking of student learning and ensuring that specific learning difficulties of individual children are identified and addressed. In this example, assessment is used to identify those who are having difficulty, in this case in reading. When used as a formative tool, that is when such a tool or other similar tools are used in an ongoing manner during learning to monitor progress, provide feedback, and differentiate instruction and assessment, they provide teachers with precise and timely information so that instruction can be modified – differentiated – to suit individual students' strengths and needs. Such formative assessment tools also allow both the teachers and students to set new learning goals or targets and allow teachers to select new and appropriate pedagogical practices or interventions.

When such a tool, or similar tools are used diagnostically, that is, usually prior to instruction, to set learning goals and plan instruction and assessments that are differentiated and personalised, then they assist teachers by providing information about students' existing abilities and skills, and allow teachers (and other professionals, for example, support teachers) to examine in close detail where students' difficulties are occurring in order to provide a starting point for intervention or new learning.

Providing feedback to students on their learning

At a systemic level, stakeholders generally discussed this element of the Standard in a way that was embedded in discussion regarding other elements of the Standard, and identified the "formal" and systemic practices for providing feedback to students, for example, within understandings of *Interpreting student data* (tracking progress) and *Reporting on student achievement* (academic reporting). However, teachers discussed feedback more specifically in terms of providing frequent feedback to their students, both formally and informally. This included discussing marks and grades and relating them to standards on criteria sheets; providing annotations on their assignments or other assessment tasks; and providing oral feedback during lessons and as part of a process of returning assignments and assessment tasks to students.

Making consistent & comparable judgments

The stakeholders suggested that at the core of Standard, *Making consistent and comparable judgements*, is not just about consistency and comparability, but also about equity (Maxwell, 2002). Maxwell (2002) explains,

> Characteristics of the task and the context are therefore of critical importance in interpreting the student's performance and judging the standard reached. Moderation buttresses equity by checking that these characteristics have been properly considered in interpreting the evidence and that the student's performance has been appropriately compared with the standard. (p. 17)

While the notion of making consistent and comparable judgments is grounded within practices of equity, these practices can also be framed around understandings of vertical and horizontal accountability.

Accountability

Professional judgements

In Theme 3, teacher professional judgements were identified as central to all areas of teachers' work (Allal, 2013; Wyatt-Smith & Klenowski, 2013), especially when assessing student learning. These judgements provide the system and the public with a mechanism for ensuring trust and integrity in the assessment processes.

A principal gave the following account of teachers' assessing student learning suggesting:

> We have an outstanding [Queensland moderation] system that provides opportunities for teachers to develop the skills. We've got lots of failsafe measures in there. We've got lots of opportunities that really develop our profession in a positive way.

Therefore, while making comparable and consistent judgments is about doing the best by the students and their work, that is, comparable and consistent equity, it is also about teachers' depth of skills and their development of an understanding of the standards of the criteria representing those standards and exemplars, making judgements, and comparing judgements. The discussions amongst teachers that lead to a convergence of assessment judgements associated with students' examples during the moderation process can be viewed as authentic professional learning (Maxwell, 2002). The Principal added:

> At the moment it seems like the alternative to that [Queensland's moderated assessment system] is to go to a HSC type system or a system where students are able to complete an exam online and get immediate feedback. It removes a big chunk of what is important about being a teacher.

The "big chunk" that is important to this principal is the provision of feedback to teachers from their peers on the quality of student learning at a particular school. However, as one principal indicated:

> With any human process like that [assessment], it's never going to be 100 per cent consistent. I love rugby league and the referees within rugby league are the perfect example of that. They're getting paid lots of money; they have all the technology in the world and there's no consistency there. In all of life, whenever there's human decision-making involved, you're not going to get 100 per cent consistency. So whilst I think we've got some really good processes in place to make it as good as we can, if we're driving for or expecting 100 per cent consistency in that process, we're going to be disappointed. I think sometimes where maybe people are punching holes in their processes because that's where - we're never going to get that.

Here, the principal is discussing the assessment of student learning in relation to teacher professional judgements. This also relates to another aspect of the Standard, making consistent and comparable judgements, where examples of practices such as moderation will be discussed later in this section. There is a perceived concern in relation to accountability and the public perception of teachers' consistency in relation to assessing student learning.

In-school support for teachers

Various sectors identified different practices for providing in-school support for teachers, specifically in relation to making consistent and comparable judgements. One sector identified a strategy where teachers were trained as mentors at their "Coaching Academy". These staff members were then embedded in their school as support personnel. Other sectors indicated the availability of "education officers" who were external to the school, and available for consultation and advice when required.

MENTORING TEACHERS – COACHING ACADEMY

The Coaching Academy, identified by one sector, was developed to mentor teachers in relation to literacy and numeracy. An education officer recalled the inception of the program:

> We got to the point where we realised our weakness was that the schools would always be waiting for the outside person to come in and give them some guidance. So we realised that we had to have that person as somebody within their school. From there, our literacy and numeracy Coaching Academy was developed.

This sector now has 150 schools that have signed up at the Coaching Academy with 186 coaches embedded in these schools. The education officer identified the school-based position as significant in terms of the success of the mentoring program. The education officer stated:

> Unlike other coaching models, ours was very much job-embedded. Then contextualised and chosen from someone within the school. So we now work with the coaches, who now do all of that training. We make everything available to the coaches within the school.

The education officer elaborated on the role of these school-based mentors:

> Their role is helping the teachers through that process. So they would actually help - well ideally, they work with the teachers - to help them. Like if they've got this scenario here, how do I plan a critical learning instructional pathway for these students? Or it could be that then the teacher is saying, "Well I've got no idea how to do that." So the coach might actually give them advice on how to implement that; they are a resource person.

EDUCATION OFFICERS

The education officers were another source of in-school support for teachers, however, their positions were not school-based. As such, their availability may vary and there may be a time delay between when teachers need support and when they are able to obtain it. While the various roles of the education officers can be seen as accountability-focused, the education officers in this study identified their role as one of mentoring the teachers, helping them review student data and make decisions regarding pedagogical practices. Take for example this scenario identified by an education officer:

> The other day I was working in a school, we were looking in our planned results and we were comparing the NAPLAN results - we looked at reading, writing, and spelling, and numeracy - and the numeracy results were lower than some of the other areas. So we were having conversations around, what's the pedagogy in your other learning areas? What's happening there that's not happening in numeracy? They were the questions that we were having. What's the difference between those classes and these classes, or what's happening, what do you think is not happening? Those sorts of things. They were going away to reflect on that, think about what is going on there that we haven't brought in to here. What's something good that we can take and trial.

Here, the role of the education officers was also to help teachers reflect on the alignment of pedagogy and the curriculum, comparing practices across reading, writing, spelling and numeracy.

Moderation

External and internal school moderation practices were identified by stakeholders across the sectors as strategies to ensure the consistency and comparability of teachers' judgements. Queensland has a process of external moderation for Years 11 and 12 (see *Text box 10: Queensland's Year 11 and 12 Moderation process*). Registered schools from all sectors participate in this annual process. Additionally, one sector had an internal system of moderation, identified as the Consistency of Teacher Judgement (CTJ) day. This process is internal to the schools within that sector.

Queensland: Year 11 and 12 moderation

Queensland's system of externally moderated school-based assessment is a highly regarded model for the quality assurance of educational standards. It is a system with many benefits, but above all it promotes authentic pedagogy and confirms the role of teachers as professionals (QSA, 2013).

TEXT BOX 10: QUEENSLAND'S YEAR 11 AND 12 MODERATION PROCESS

EXTERNAL MODERATION

Queensland currently operates a school-based assessment system that is externally moderated, but treats teachers as trustworthy professionals, giving them the flexibility to choose relevant assessment practices. Documentation by the QSA about the Queensland system indicates:

> When authentic pedagogy is practised, the teachers do not teach and then hand over the assessment that 'counts' to external experts to assess what the students have learnt. Authentic pedagogy occurs when the act of 'teaching' involves placing high-stakes judgments in the hands of teachers. (QSA, 2010, p. 5)

The specific roles within the moderation process associated with teachers, district review panels and state review panels are outlined in *Text box 11: Moderation roles*.

A principal supports the role of the moderation process and teachers making consistent and comparable judgements about student assessment. The principal stated:

> I think that the Queensland moderation process has served us as a teaching profession exceptionally well. What that process has done, around exactly what you're talking about with the judgements made by teachers and the processes around that.

Additionally, the principal indicated that their school has assimilated many of the moderation practices into their school-based practices, and broadened the range of year levels involved. The principal indicated:

> I think we, like many other schools, have been working over the last, probably four or five years, to bring some of those processes into the junior secondary part of the school.

Consequently, many of the external moderation practices become adopted as internal, school-based practices.

INTERNAL MODERATION

Another example of an internal moderation process undertaken by one sector focuses on an annual day where teachers come together to discuss their assessment judgements, curriculum and pedagogy. An education officer explained:

> It's a chance for schools to come together to discuss assessment and making judgements. But consistency of teacher judgement is actually a [multiple] pronged approach. It's about understanding the curriculum and curriculum alignment, it's ensuring - and one of the four is moderating practice.

Moderation roles

Teachers assess student progress throughout Years 11 and 12. At the end of Year 12, teachers decide the exit levels of achievement to be awarded to their students. Teachers' judgments about the standards achieved by their students are moderated by the QSA, using trained expert panels of teachers from schools.

District review panels are appointed and trained by the QSA for each subject in each of the QSA's 13 districts. Each district panel comprises practising teachers and a chair, with one member for every two schools offering the subject in the district.

State review panels are established for each subject. Each state panel comprises practising teachers and a chair, with membership based on the number of districts with schools offering the subject. (QSA, 2010, p. 7)

TEXT BOX 11: MODERATION ROLES

This sector provides publicly documented information about the process, suggesting the:

> CTJ [Consistency of Teacher Judgement] is the ongoing process where teachers develop common understandings about (Years 1 to 10) learning outcomes as they make decisions based on student demonstrations … The CTJ process also

> enhances the climate of collegiality and professionalism within and between schools. (Pentti, 2004, p. 18)

The education officer elaborated on the CTJ process explaining:

> The day is once a year, but schools work within their own school first before the come to meet with other schools. So in effect they're doing that last day twice because they look at the student work from within their own schools, so then P to 7 will get together and look at what they've been collecting and what they've been working on, together before they go and meet with other people in other schools. So that particular part of the process happens a couple of times.

However, the process is unlike the external moderation system in that the group of teachers do not operate as an "authority" that regulates the process and generates changes in students' assessment results. An education officer explained:

> They'll actually send in some work samples to say well this is the standard our students are at and then we - that's going to inform our work in the organisation as well in terms of well, is the alignment there, is there consistency throughout clusters. So it's a bit like - we've seen years across Queensland where you have moderation, but we don't have any arbitrator. I mean, we're not going to go to schools and say, look you just said that child's well above standard and we don't agree with you. It's none of that because we're not playing for our sheep stations here. So it's just a way of seeing whether people across the organisation are interpreting the curriculum in a consistent way.

Additionally, the CTJ process is more than a moderating process that focuses on teachers' judgements. It also acts as a professional learning activity for teachers. An education officer suggests, "Some people find it's just a burden and it's something they've got to do. Other people see it as an opportunity for professional development". As well as an opportunity for professional learning and development, another education officer suggested the CTJ process was an opportunity for teachers to focus on aligning pedagogy, curriculum and assessment (Hayes et al., 2006), suggesting:

> It's more than moderating because then before we can make a decision on what it is, we need to go back and understand the intent of the curriculum and a shared understanding of what things are and on it goes … Because I think we are one of the few organisations around Australia actually, that has something on a systemic level where we're comparing work across schools.

The CTJ process is also about encouraging reflexivity on pedagogy, curriculum and assessment, based on the data available, and as part of an ongoing cycle of continuous improvement (see Theme 3). An education officer explained:

> So you'd hope they'd [teachers] use that data and if they use all the information, so there's your data again in evidence, so whatever they were doing next year with this, they'd think about it all and they'd think, okay if some of my year 6s, if this was a multi age class, some of my year 6s got and my year 7s didn't, well maybe it's not the task. Maybe again now I've got to think about my approach to teaching this and getting students to understand it so they're all successful at it.

While practices such as moderation are tools that promote vertical accountability and public confidence, they are also effective practices that encourage reflexivity and teacher professional learning opportunities.

Professional learning

Theme 3 suggested that teacher professional learning is an important aspect of data-informed decision making and supporting the development of numerate teachers (Timperley et al., 2007; van Barneveld, 2008; Wayman, 2005) who are then more likely to make consistent and comparable judgements. A principal indicated that professional learning was a significant part of their whole-school strategy for developing teachers' skills in both interpreting data and developing and implementing appropriate strategies to improve learning outcomes. The principal stated:

> A lot of our work that I would probably argue is work around data is actually work around staff with the skills to be able to implement various strategies that they can use once they know more about their kids.

Another principal provided an interesting analogy to explain the significance of teachers' professional learning. The principal suggested:

> I said [to a teacher] the improvement in the children, the program you put in, to me, that's the *side salad* for the moment. The *main dish* was what you learnt. I said, so let's talk about your learning, rather than what the kids learn. That took him by surprise!

This principal placed teachers' professional learning as a central aspect of teaching. An education officer added that it was important to ensure the teacher professional learning was personalised and linked to the student data. The education officer suggested, "They [schools] collect data on - just the student data, to inform what they're doing in terms of

professional learning". This is how this sector personalised their teacher professional learning, thereby ensuring both vertical and horizontal accountability. The education officer elaborated on this process, stating:

> What we have really done is we've walked the talk. So if we were expecting them to personalise what they were doing, and use their data and all the rest of it, we had to do the same. Which was okay, it's not just this one size fits all, that you're all going to get a dose of this PD. What do you need? So based on what you're seeing with your students, what do you need?

Additionally, some sectors indicated their preference for making professional learning activities for teachers available online. An education officer indicated:

> A lot of our PD, we've actually started calling it "Point of Need", is delivered online or virtually. We do them from 7:00 in the morning - 7:00 til 8:00, and then 3:30 til 4:30 and we double up. We record them, so that they can access them online afterwards. As they are recorded and added online, they [teachers] can just get on there and play that again. Any of the PowerPoints that we've used, any of the videos we use, everything goes up there. So they can do all of that back in their own schools. Then we've been encouraging the coaches[3] to add their own stuff and share. This whole site is just full of all the resources and everything that they need.

This online resource is a repository of professional learning resources that teachers can access as required, or as determined by the individual teacher. Professional learning activities were not generic activities mandated for all staff to attend or participate, instead, they were small-scale and individualised making such activities more meaningful to teachers (Wayman, 2005).

Interpreting student data

This part of the Standard, *interpreting student data*, focuses on the use of both internal and external student assessment data to improve pedagogical practices. The practices identified across the sectors are grouped into accountability practices, and alignment and differentiation practices within the P-12 structure form this analysis.

[3] This is referring to the Coaching Academy coaches identified by one of the sectors. See the next section on In-school support for teachers.

Accountability

Data inquiry models and cycles

As identified in Theme 3, schools often operate within inquiry cycles, guided by models or frameworks, for the continuous improvement of teaching and learning. One sector identified a specific framework for incorporating the use of data within the inquiry process. The Collaborative Data Inquiry Model is a publicly-documented model for the effective analysis of student data (Education Queensland, 2013). The model cannot be reproduced within this report, due to explicit copyright instructions on this sector's website. The model is displayed as a figure-eight, with goals and targets at the centre of the process. This is followed by a sequence of steps – collect, interrogate, infer, and verify forming one side of the figure-eight, followed by – plan, implement, assess and reflect forming the other side of the shape. This model is available as a professional learning resource for teachers and schools within the sector (for other examples of cycles of inquiry see Theme 3).

Attendance, suspension and exclusion data

In one sector, attendance, suspension, and exclusion data is often included in the schools' publically-available annual reports (see *Figure 10: Attendance data available through school annual reports* as an example).

FIGURE 10: ATTENDANCE DATA AVAILABLE THROUGH SCHOOL ANNUAL REPORTS

Student attendance	2010	2011	2012
The overall attendance rate for the students at this school (shown as a percentage).	87%	86%	83%
The overall attendance rate in 2012 for all Queensland state Primary schools was 93%.			

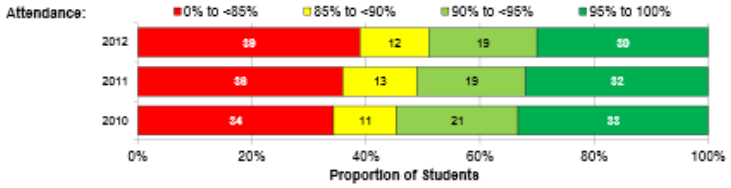
Student attendance rate for each year level (shown as a percentage)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
2010	86%	87%	84%	87%	87%	87%	86%					
2011	84%	87%	85%	85%	86%	84%	88%					
2012	81%	84%	83%	84%	84%	87%	81%					

DW = Data withheld to ensure confidentiality.

Student Attendance Distribution

The proportions of students by attendance range.



SOURCE: Withheld for confidentiality

Additionally, other school-based analyses were conducted through shorter and more frequent cycles of data collection. One principal indicated that they had a school-based position called a "data coordinator" who would review attendance data from the roll-marking software called ID Attend. The principal stated:

> The data coordinator that has no extra financial incentives but a weekly allocation of two additional free lessons, which are about 70 minutes long, so 140 minutes a week for the year, to coordinate our data collection. So that role incorporates our behaviour data and referrals that are recorded on [our Warehousing tool] for state schools. It includes ID Attend data which is the program we use for attendance and I guess the regular data elements within the school as well.

Students, and their parents, were made accountable for their attendance through the analysis of these data. Additionally, some schools opt to purchase additional systems that enable text messages to be sent to the students' parent or guardian to inform them of their child's absences.

These data can also be used for gap analysis, focusing on equity groups (see *Table 9: Attendance outcomes - All Indigenous students*) to ensure that gaps in attendance and learning achievement can be routinely monitored and used to inform school-wide policies and practises. For example, in *Table 9: Attendance outcomes - All Indigenous students*, one school tracked the effectiveness of a program to enforce the attendance of Indigenous students. While the data indicated significant reduction in the gap, the principal committed to further improvement and complete elimination of the "gap".

TABLE 9: ATTENDANCE OUTCOMES - ALL INDIGENOUS STUDENTS

Year	Percentage	Gap (Indigenous and non-Indigenous)
2010	72%	15%
2011	78%	7%
2012	79%	7%
2013	84%	5%

SOURCE: Withheld for confidentiality

Alignment and differentiation within the P-12 structure

Within the Standard, *Interpreting student data*, various strategies and practices were associated with alignment and differentiation within the P-12 structure. These practices included tracking student progress, utilising standardised test results, and differentiated pedagogy.

Tracking progress

Various sectors identified the practice of tracking student progress as a strategy operating in terms of vertical accountability, but also as a means of differentiating teaching instruction. The ways of tracking student progress vary within the P-12 structure of schooling. While many of the ways of tracking focus on documenting students' academic progress, there are some practices that focus on tracking students' career aspirations and consequent career pathways.

TOWARDS THE QCE AND OP – FEEDBACK TO STUDENTS

Academic reporting data was used to monitor Year 11 and 12 students' progress towards the Queensland Certificate of Education (QCE) and their Overall Position (OP). A Principal indicated that as well as monitoring students' progress, they used computer software, the

OP Analyser, to help young people understand their current predicted position in relation to their OP[4]. The principal indicated:

> For the Year 11 and 12 cohort it is around tracking progression towards attainment of a QCE, along with our OP tracking data, we use a program called OP Analyser that gives us an indication of the expected OP with some variables that we put in based on previous years' QCS[5] results. We use that information with students to explain to them where they're positioned and have them increase their own understanding. We do our rankings at the end of each reporting period as well and publish those for students to see.

While this is a descriptive account of how the school works towards interpreting student data, it is also an account of providing feedback to students. Wiliam (2011) suggests that such feedback practices provide information to the learner. As the Principal suggested, "explaining" to students where they are positioned and helping them increase the "own understanding", both clearly and explicitly provided feedback to the students that enabled them to move forward in their learning as well as encouraging the students to take responsibility for their own learning (Wiliam, 2011).

The principal elaborated on the process:

> Once a term, those students have a meeting with a mentor that's assigned to them. This is either a member of admin, head of department or one of our coordinators. We've got a range of subject area coordinators, student coordinators that are involved in that. So that's every Year 11 and 12 student will sit down once a term. If they're an OP student, the information will include each of their subjects and the OP Analyser sheet that not only has their level of achievement, but the data that goes into that to try and boost their understanding of the process around OPs.

This second descriptive account identifies mentoring as another feedback practice. These individualised mentoring sessions with the learners enable them to take a more active role in the learning and career goals (Wiliam, 2011).

[4] An OP is required by students seeking tertiary entrance. An OP 1 in Queensland was equivalent to an Australian Tertiary Admissions Rank (ATAR) of 99 (QTAC, 2013).
[5] The QCS is the Queensland Core Skills test, a common state-wide test designed for Year 12 students that contributes to a young person's OP.

TOWARDS IMPROVED ACADEMIC OUTCOMES - FEEDBACK TO STUDENTS

Some schools also use academic reporting data for tracking Year 8 to 10 students. A Principal explained, "Staff interrogating data, at the end of each reporting period, we target students that have failed three or more subjects. We have a process for our Year 8, 9, and 10 students". The principal elaborated on this process:

> Our head of department for these year levels collates the information that these are the students in Year 8 who've received a D or an E in three or more subjects. They then coordinate the process where information goes to teachers to inform them that they're teaching a student who requires an Academic Improvement Plan. The Academic Improvement Plan is about trying to target support for students who are in that position.

However, the principal provided the following warning, suggesting that such tracking practices needed to be less about compliance or accountability and more about helping the individual student. The principal indicated:

> [In the past] I think we've dipped a little bit too much into the compliance process of, let's complete the form to say that we've got something here for little Johnny because he's failed three or more subjects, as opposed to having … an intervention strategy for someone who's in need and not passing the subjects.

The principal suggested that currently, teachers were asked to discuss the academic progress identified in the tracking data with the students and their parents. Again, this aspect of interpreting student data is also a practice for providing feedback to be students and their parents. The principal indicated:

> The process that we've got at the moment includes an element where the teacher is required to discuss the problems of why little Johnny may not have passed with the student and with their parents, and then to develop a plan for action for the teacher to be able to implement - for the student to be able to implement and the parent to be able to support.

Consequently, this process, rather than one that is compliance-based, has operated more effectively within this school environment. The principal suggested, "We do have some really pleasing situations and data around students that have improved considerably through that process".

TOWARDS CAREER PATHWAYS

At times, stakeholders gave accounts of focusing on data associated with students' career pathways in Years 11 and 12. In one instance, a principal indicated that data was used to assist students with their anticipated career pathways. The principal stated:

> We also have their QCE information, access to their report cards and all of that information as to whether or not they're on track, whether it's on track to get into the university course they want to go to or on track to get their QCE or if they've got a particular interest or they want to head down a school-based traineeship pathway or employment pathway. Are they doing the things at school that's required to help them achieve their goals?

Additionally the principal indicated that schools use the academic reporting data and the tracking data to support students and provide guidance regarding career opportunities and pathways. The principal suggested:

> We discuss future employment options they might be interested in and we use that data then to target some of the support that we provide and the opportunities that we provide around traineeships and apprenticeships and work experience in that area.

Standardised test data

Within the Standard, *Interpreting student data*, stakeholders indicated standardised test data were frequently used for alignment purposes within the P-10 structure, and sometimes for differentiation. A principal indicated:

> We have taken our staff right through the data. Going from the *global view* of how the school is performing around - the global data, like NAPLAN data, and we collect PAT-R and PAT-M[6] data in reading and mathematics. So looking at that globally and then bringing that back down to a classroom level.

This appeared to be a common approach amongst the stakeholders.

FOR DIFFERENTIATED CLASSES

While this account indicates that data from NAPLAN testing has been used to compose differentiated classes, as a form of "streaming", the practice is discussed in terms of its ineffectiveness. A principal explained:

> We've previously used the data that we get from primary schools and from NAPLAN for our future Year 8 students, to help inform classes and groupings for Year 8. As I said, we are moving away from that a little bit at the moment.

The principal elaborated on this practice in relation to a differentiated class composed on NAPLAN data:

[6] PAT-R is the Progressive Achievement Tests in Reading and PAT-M is the Progressive Achievement Tests in Mathematics.

> This year for instance, we've got approximately 30 kids in our 8A class. Now some of those kids are performing really well and working really well in that area. Some of the kids aren't necessarily doing badly but they're not in the top 30 of the students in the cohort. We've got other students outside of that cohort that are performing very well in their other classes that aren't getting the same benefits that we provide to the 8A students.

Here, the Year 7 NAPLAN results were not a useful method for differentiating class groupings. The principal reflected on this, stating:

> I think the data and the information that we get from primary schools, whilst it's useful and worthwhile, isn't an exact indication as to how the kids are going to perform and I think we make some very serious and almost life-long decisions about class groupings based on data that's not 100 per cent reliable. I think we consequently make some decisions around - or have made some decisions around how we provide opportunities and run our classes in Year 8 based on that data.

Consequently, while still looking at using the NAPLAN data, class differentiation in the form of 'streaming' would not be practiced in the future at this school. The Principal stated:

> So next year we're altering that process a little bit. We'll still look at and use some of that information but we're looking at - instead of having our top 30 students isolated in an A class, that they'll be distributed down, as all the students will, across all of our Year 8 classes in that respect.

TIMING OF THE RELEASE OF NAPLAN DATA

An important commentary regarding the potential uses of the NAPLAN data related to the time lapse between when students take the standardised test and when the data becomes available to schools. This was a significant concern identified by teachers in a study by Pierce, Chick, and Gordon (2013), as well as by some of the stakeholders in this study. An education officer from one sector made the following comment:

> They get it too late. By the time they're getting their data in September - no, they're getting it - by the time they actually get to do anything with it, it's October. Those kids did that test in

Benchmarking

Achievement information can be benchmarked to compare the work of students to that of other classes or students within the same school, across schools, or across national profiles.

SOURCE: Timperley and Parr (2004, p. 93)

TEXT BOX 12: BENCHMARKING

> May. Why am I going to look at their writing? The spelling data is quite problematic. So no, they - I think it's pretty difficult to use it at a class level. Because we're wanting to link it to instruction. If we're waiting for NAPLAN, it's a bit late then to be linking that to instruction.

The timing of the release of the NAPLAN data posed problems for teachers seeking to use the data to improve teaching and learning. Regardless, this does not alter the situation that standardised test data, such and NAPLAN, is high-stakes (Berliner, 2011; Darling-Hammond, 2010; Stobart, 2008). An education officer noted this, stating, "Meanwhile, the pressure is on because NAPLAN - no matter what anybody says, NAPLAN has become high stakes. It became high stakes the minute they put it on My School".

SYSTEMIC USE OF NAPLAN DATA

Another sector indicated that NAPLAN data was used at a systemic level because of its perceived "reliability". An education officer gave the following account:

> Yes there are certainly trends we see through NAPLAN - is the only thing that, because again, it's the consistency of it. I think there we've got to be very careful of this. At a system level, we can probably only make decisions on reliable data and probably the most reliable - I'm not saying it's the best reliable - but the most reliable data is NAPLAN data because of what it is.

Here, the notion of reliability is identified as having degrees associated with it, that is, "reliable" data, "most reliable" data, and "best reliable" data. The notion of "reliability" of such testing and their "capacity to achieve their own objectives of impartial, reliable and unbiased reporting designed to facilitate student, school and system improvement" is questioned within the international literature (Polesel, Dulfer, & Turnbull, 2012, p. 4). While the "reliability" of high-stakes testing programs is questioned, a recent report also found that such testing regimes impact on the well-being of the children, with potential impacts including students' self-esteem, stress, anxiety, pressure and fear (Polesel et al., 2012). Additionally, such data is often used for benchmarking purposes (see *Text box 12: Benchmarking*).

Another sector added the following commentary about the systemic use of NAPLAN data, suggesting:

> But I think we're cautious about that in our messages about the NAPLAN anyway, it's only one thing. But that's what's driving so much of where our schools perceive themselves and all of that, to be honest.

Such calls for caution are commendable as the international literature suggests that high-stakes testing can impact on the quality of students' learning experiences (Polesel et al., 2012).

P e d a g o g y

Within the Standard, *Interpreting student data*, some stakeholders indicated that the notion of the daily interaction between teacher and students, as well as teachers' pedagogical understandings of their students, provided useful situations for data gathering and interpretation. In a sense, the students' daily progress became the data source. This was in contrast to NAPLAN data driving teaching and learning. One of the sectors indicated data obtained from the students' "daily learning journey" was valuable and in most cases preferable to NAPLAN data in relation to improving teaching and learning. An education officer gave the following account:

> I think from a pedagogical point of view, I think the day-to-day gathering of data of identifying where students are and where they are on their learning journey, and what to do with it … So yeah, they're asking questions about data all the time. I think they're probably pretty good at - well any good teacher would know after months with a group of students, they know the student's strengths and weaknesses, that's data.

When teachers undertake daily observations, use teacher-student conferences, and teacher-student dialogues around daily learning activities in association with the use of other formative assessment tools, teachers are able to obtain a range of data that they can use to inform their pedagogy and support students' learning. In this way particular pedagogical practices can be used that align with the students' prior knowledge, interests, motivation, and skills at that particular moment in one teaching-learning cycle.

A principal added:

> I think there's some good practitioners … that will look at that data and then use that for planning. You can certainly see that in terms of the results for their children. You can see the positive impact that has. Now that would be different from each year level, depending on the individual teachers.

While this principal has suggested that good teacher practitioners use day-to-day data, there is also the suggestion that students' results are linked to good teacher practitioners. While it is commonly understood that teachers make "a" difference to student learning, it is generally not understood that teachers make "the" difference to student learning (Gale, 2006; Hayes et al., 2006). Additionally, international research in the area of teacher quality and student achievement (Amrein & Berliner, 2002; Darling-Hammond, 2000) suggests

there is very little evidence to correlate a relationship between teacher quality and students' academic performance.

There were accounts of data being used in relation to pedagogy and the provision of assessment feedback to students, and pedagogy and the curriculum.

PEDAGOGY AND FEEDBACK

The practice of providing feedback is identified in the literature as an effective means of improving student outcomes and encouraging reflexivity in relation to students' individual learning (Black et al., 2004). An education officer commented on the notion of feedback (see Theme 2) as a significant aspect of alignment:

> I think one of the other things, we talk about - it's like when students have completed their piece of assessment, particularly in the secondary, what then? Often it's just, "Well then we're going to teach the next topic now".

This commentary perhaps suggests that the element of feedback in pedagogical practices is overlooked or not handled particularly well, that is, in relation to supporting the students' current learning and future improvement. The education officer suggested a "more cyclical and integrated approach" to providing feedback seemed more appropriate. Additionally, students' self and peer-assessment and reflection is also considered an effective strategy (Black et al., 2004), but not noted in the descriptive accounts provided by the stakeholders.

PEDAGOGY, ASSESSMENT AND THE CURRICULUM

An education officer gave an account of the importance of alignment between assessment and the curriculum. The education officer stated:

> So there are conversations starting to happen about whether the assessment was actually appropriate to curriculum. It's only about making that connection back to curriculum. Task design as well, is coming into that, to make it connect more closely to curriculum.

Data were able to assist these schools with aligning pedagogy, assessment and the curriculum. An education officer gave the following account of an experience in a school:

> The other day when I was having a meeting with some staff and we looked at their results, and their results were good, however, they were happier with reading and writing. So even though it obviously was good, they were saying we can be better, we can get our numeracy to the same results as our reading.

Reviewing classroom and NAPLAN data enabled the teachers at this school to begin conversations to improve pedagogy and student outcomes. The education officer elaborated:

> So we started with the conversation, well what's going on, what's happening in reading that's not happening in numeracy? How can we go away and think about this? They were starting to say things like, well in reading we really broke it down into these areas and we'd go away and we'd do these activities, and there'd be feedback, and we'd have times when we talk about what we're doing.

The education officer outlined a specific conversation that was had by the teachers at the school to help identify aspects of the situation and possible solutions:

> Maybe we're not doing that in numeracy, we're just doing these tasks, it's a bit more closed and they were recognising the different strategies. So they were going to go away and make a list of all the things that were happening in those other areas; what was happening in numeracy, and then they were going to see, what would work, what would be a strategy that would work from one area to the next. What was happening in numeracy that might not be the most effective practice that they think, well let's work on that. But they'd also had the education officer for numeracy working with them.

In this account, the classroom and NAPLAN data facilitated conversations between teachers that identified areas for improvement and possible solutions.

Reporting on student achievement

This part of the Standard, *Reporting on student achievement*, focuses on data obtained through communications with parents, data from academic reporting, and the collating, analysing and displaying of this and other data using warehousing and productivity systems. The practices identified across the sectors are grouped into accountability practices as part of this analysis as they are generally mandated practices within school systems. However, it should not be understood as the only reason for reporting. Reporting on student achievement will be discussed as part of a home-school partnership that encourages support, collaboration, and builds trust.

Accountability

Communication with parents

Communication with parents can take multiple forms, including online and social media formats. A principal gives the following account:

> The more communication we can have between our teachers and the parents, the better. It's wonderful if they're listening to things that I'm saying, and it's wonderful if they're checking our website or Facebook page or the school newsletter to see information from me but really what I would love more times over is that they're able to listen and hear from the teachers that are teaching their kids, where there's the direct impact.

The principal elaborated on the types of communication mediums that have been set up through the school:

> Email's an increasing communication tool that can be quite successful. There might be a little bit of a lag but that's been a positive for us. We sent text messages out every time we have our website updated so there's a reason for parents to go to it and not look at it once and leave it alone. We've got a Facebook site, we've got a Twitter feed. We've got a range of different strategies that we use.

The principal suggested parents and a teacher communicating with each other was more important than parents contacting the principal. Additionally, he acknowledged that the teachers needed to feel supported in their communications with parents. The principal stated:

> I guess that's the challenge for us, and part of that challenge is having staff feel comfortable, having those conversations. Part of that challenge is having staff have that time in their day to be able to make a phone call, and the parents having the time in their day to be able to receive the phone call and vice versa.

Academic reporting

A principal gave an account of using academic reporting on students' achievement. At this school, the principal made specific comment about the number of reporting periods. The principal stated:

> We report to parents four times a year at the end of each term, so we do a fair bit of work around our whole school results, our faculty results, our class results and individual student results with academic data. The other element

> that we report at the same time as that is effort and behaviour data and that's across all schools [in this sector] … We do emphasise that.

The principal suggested:

> I think we do a good job by adding in the fourth time, a lot of schools only report twice a year, and some three times. It's good to have the end of term reporting process to give information to parents and also to have that information within the school.

While four reporting cycles within a year may be an effective strategy for generating parental interest and support, it does raise the question of the intensification of teachers' work (Hargreaves, 1994) and the pressure this places on teachers' time. Additionally, this is an example of one school moving beyond the requirements of a mandated vertical accountability system in terms of reporting cycles. As the principal indicated, other schools operate under shorter reporting cycles, prescribed by their education authority.

Here we see reporting as a way of developing a home-school partnership, rather than as a measure of accountability. Providing regular information to parents about their child's progress suggests the development of a collaboration, or an alliance, between teachers and the parents. In part, it allows teachers to show the parents that they "know" their child within the context of their current place of learning, and can indicate how they are monitoring the progress of the child. It also provides teachers with the opportunity to invite and initiate a dialogue with parents about their children: What other information can the parents add? What can we do together to support your child? Are there any challenges we need to address?

COMMENT-FREE REPORTING

One sector principal indicated that they used "comment-free reporting" as a strategy at their school. The principal stated:

> We don't actually put comments on the report card. Partly because I think a lot of the comments, and certainly the generic comments that are available within the system - there's lots of words without saying a lot … So we remove those comments.

The principal noted an associated strategy, suggesting:

> For our first two reporting periods, a parent-teacher interview immediately follows the report card. So we try and emphasise the opportunity for parents to come in and talk to the teachers to get further information from them.

The principal indicated that this strategy had been effective for their school:

> Our numbers or our data around those parent teacher interviews are very good as well. Each year over the last four years the number of parents coming in and the number of interviews and face-to-face interactions we've had have increased. Whether they're solely related to removing the comments, I'm not sure but we're certainly increasing that face-to-face time.

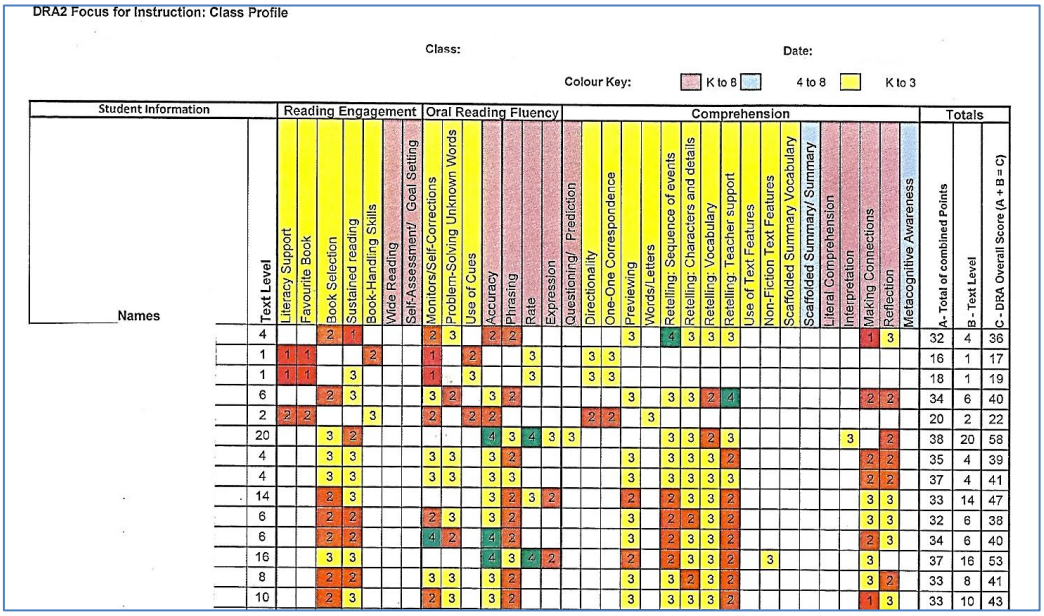
Collating, analysing and displaying data on student learning

Wayman (2005) suggests that while schools have been significantly "data-rich" environments, they have been "information poor" due to the ineffective, inflexible and often frustrating ways in which data is stored. Computer systems are often used to collate and display data in schools. In particular, stakeholders discussed the use of productivity software such as spreadsheets and warehousing tools available through online portals, specific to the different sectors, which collate, analyse and display classroom and systemic data.

SPREADSHEETS

This example given by one sector on the use of spreadsheets was linked to the *Developmental Reading Assessment (*DRA) discussed earlier in this section. Such spreadsheets provide "running totals" of students' progress. *Figure 11: Spreadsheet collating, analysing and displaying DRA classroom data*, is an example of one such spreadsheet.

FIGURE 11: SPREADSHEET COLLATING, ANALYSING AND DISPLAYING DRA CLASSROOM DATA



DRA2 Focus for Instruction: Class Profile

Class: Date:

Colour Key: K to 8 4 to 8 K to 3

Student Information		Reading Engagement							Oral Reading Fluency							Comprehension																				Totals		
Names	Text Level	Literacy Support	Favourite Book	Book Selection	Sustained reading	Book-Handling Skills	Wide Reading	Self-Assessment/ Goal Setting	Monitors/Self-Corrections	Problem-Solving Unknown Words	Use of Cues	Accuracy	Phrasing	Rate	Expression	Questioning/ Prediction	Directionality	One-One Correspondence	Previewing	Words/Letters	Retelling: Sequence of events	Retelling: Characters and details	Retelling: Vocabulary	Retelling: Teacher support	Use of Text Features	Non-Fiction Text Features	Scaffolded Summary/ Vocabulary	Scaffolded Summary/ Summary	Literal Comprehension	Interpretation	Making Connections	Reflection	Metacognitive Awareness	A- Total of combined Points	B - Text Level	C - DRA Overall Score (A + B = C)
	4			2	1				2	3		2	2						3		4	3	3	3							1	3		32	4	36
	1	1	1			2			1		2			3			3	3															16	1	17
	1	1	1		3				1		3			3			3	3															18	1	19
	6			2	3				3	2		3	2						3		3	3	2	4							2	2		34	6	40
	2	2	2			3			2		2	2					2	2		3														20	2	22
	20			3	2							4	3	4	3	3					3	3	2	3						3		2		38	20	58
	4			3	3				3	3		3	2						3		3	3	3	2							2	2		35	4	39
	4			3	3				3	3		3	3						3		3	3	3	3							2	2		37	4	41
	14			2	3							3	2	3	2				2		2	3	3	2							3	3		33	14	47
	6			2	2				2	3		3	2						3		2	2	3	2							3	3		32	6	38
	6			2	2				4	2		4	2						3		2	3	3	2							2	3		34	6	40
	16			3	3							4	3	2	2				2		2	3	3	2		3					3			37	16	53
	8			2	2				3	3		3	2						3		3	2	3	2							3	2		33	8	41
	10			2	3				2	3		3	2						3		3	3	3	2							1	3		33	10	43

SOURCE: Withheld for confidentiality

An education officer explained:

> This is one of the spreadsheets that they get from the class profile with the DRA … It's in an Excel document, and we then taught them [teachers] how to do conditional coding - conditional formatting … They colour code red for their "screaming needs", and 4s are greens obviously. This then becomes not just the target for their instruction. It also became the target for professional development.

To interpret this statement, it should be understood that, "Performance on each item is rated on a 4-point scale, corresponding to four categories or stages of reading performance: emerging/intervention, developing, independent, and advanced" (Rathvon, 2013). Therefore the readers' performance rated as 1, emerging/intervention are coded red on the spreadsheet to alert teachers of that child's reading instruction needs (see *Figure 11: Spreadsheet collating, analysing and displaying DRA classroom data*).

The education officer added:

> This starts to just show you trends. So what they can do is - they get to see graphs … about where they're sitting. Because it's just in Excel, they can apply filters and everything. They [the children] can do all kinds of analysis and tricks. We can look at doing pivot tables and what's this showing up for spelling? What are your patterns? But more at a school level than probably an individual class level.

Spreadsheets were identified as a productivity tool that enabled teachers to collate, analyse, and display classroom data in meaningful ways that visually identified trends within and across classes.

WAREHOUSING TOOLS

Wayman (2005) suggests, "Recent technological gains have resulted in tools and models that efficiently warehouse data for the examination of relationships commonly explored in the education arena"(p. 299). This warehousing of data within online portals was a practice identified by two sectors in this study. Often, the data were made available through "user-friendly data presentation interfaces" that "connect the user to the database and are the intermediaries through which users may examine relationships within the data" (Wayman, 2005, p. 299). Many of these warehouses contain "preformatted reports that are previously compiled summaries of data that are available for viewing or printing with one click and require no specifications, alterations, or input from the user" (Wayman, 2005, p. 299).

While there is significant publically available information about these warehousing systems that were identified by the two sectors in this study, these systems will not be named within this report and the data collected from the stakeholders will be presented as one so as not to affect confidentiality. Generally, these portals were identified as supporting teachers by collating and displaying analysed data on NAPLAN testing, academic reporting, student outcomes, student behaviour, career planning, student records, and details of any contact made with parents. A principal indicated the online portal "provided a wealth of information for classroom teachers and increasingly the broad strategic or central office data that's available to me as principal".

Access

An education officer identified the range of access associated with warehousing tools, explaining:

> Schools can access it [the tool] through our portal, but outside people can't access it. It is for people [within our organisation] and each school can only see their own set of data, they can't see other schools, whereas people working in the office, education officers and so forth, to help the schools that they work with, they can see a range of schools to see what the needs are. So the site is divided up into different areas, such as student profiles, NAPLAN, our SRS [School Reporting System] data, which is the report cards, and we've also got things that can come through from the QSA [Queensland Studies Authority].

Student history

The warehousing systems can also catalogue students' behaviour and academic histories at their schools, however, only within the single organisation. An education officer explained:

> Students who come into the system from other schools, their data doesn't come with them, we have to start with them from scratch. So if a student in Grade 8 happened to come into the organisation at Grade 8, we don't have access to any of their prior information. But if a student started in one of our schools in Prep, as long as they stayed within our system, as long as they were going from school to school, all of that information would travel with them, so we've got a picture for that.

Uses

While warehousing tools have been identified within the framework of accountability, one sector specifically indicated that their data tool was used to encourage conversations between teachers to improve student learning rather than "punish" perceived poor performance of either students or teachers. An education officer indicated:

> So, as a system, we're talking about how's it [warehousing tool] is being used in schools, what are the conversations we're having, what can we do to help teachers look at their NAPLAN results and ask questions of it. Not necessarily as a pointing fingers or anything like that, it's what does this data bring up for us, what are the questions that we're - what are the conversations we can have about what's going on and it's used for that business to start dialogues within schools and say what's going on … we've looked at some of the NAPLAN data for example, just recently, looking at our trends and looking at where we're seeing areas that obviously need some work, so that will have some influence on what we do.

Significantly, the tools were highlighted as being effective catalysts for reflecting on pedagogical practices. An education officer gave this hypothetical account:

> So they now have access to the data and it's just them, I suppose, trying to look at why things are the way they are. It's getting them thinking about pedagogical practices and as a result of that - that's probably where we as education officers that are often being called in now. I'm starting to get phone calls to say, "Hey, in the area of mathematics we've noticed that our students have been going backwards" - I'm making this up for the record – "Our students have been going backwards, significantly backwards for the last five years since I've been the principal. Come and help me because maybe it's something I'm doing wrong". Made up story. But they're the sorts of things that schools now have the ability to start questioning.

The warehousing tools are able to provide trending data for schools to interrogate their practices.

Additionally, the tools are able to display cross-referenced data that is able to provide preformatted displays on individuals, classes, and schools. An education officer indicated:

> So the tool can be used in lots of ways in terms of individual students, the whole school trends, class trends, so you can break it down into different areas … Seeing trends and also inconsistencies with some of their school-based assessment and national standardised assessments, so they're raising questions about that.

Scaffolded support

One of the sectors indicated their warehousing tool provided built-in support for teachers that scaffolded teachers' experiences in terms of understanding and interpreting the data. An education officer explained:

> I think one of the things we'd agree with is that teachers generally need a lot of assistance, how to interpret the data. It's not necessarily putting - well,

> even putting the data together - this tool puts the data graphically for them … Just in terms of how we use the data then, the info button on the right hand side is there to assist teachers. It actually gives descriptions of what the graphs are and what you might use. So one of the things probably we've recognised, that there are teachers in our schools who don't know how to interpret data. So as a way of addressing that need, as part of this package being put together, there's an info button about that, which we found was a valuable tool.

Aside from the technical assistance provided through the tool's built-in knowledge base regarding the simple statistical and graphical data visualisations, the education officer also indicated that teachers need support and assistance with interrogating the data and determining courses of action. The education officer stated:

> It's the questions around that, that teachers are going to need support and assistance with as well, about what it means, and what questions can be asked and all that.

Classroom dashboard

Another feature of the warehousing tools is their ability to provide dashboards within the portals (see *Text box 13: Dashboards*). A principal explained:

> [The warehousing tool] has released a functionality called the classroom dashboard. So teachers can go in and click on their particular class and it's got the dashboard set up for various information from students that they teach.

This dashboard would contain a single page of information about a teacher's class with visual representation of the data, displaying on a single computer screen. The dashboard would identify the most important aspects of the data in terms of identified goals, targets, and objectives (see *Figure 12: Mock dashboard display* for a hypothetical

Dashboards

Dashboards are simplified data with a particular focus, made available to the whole school.

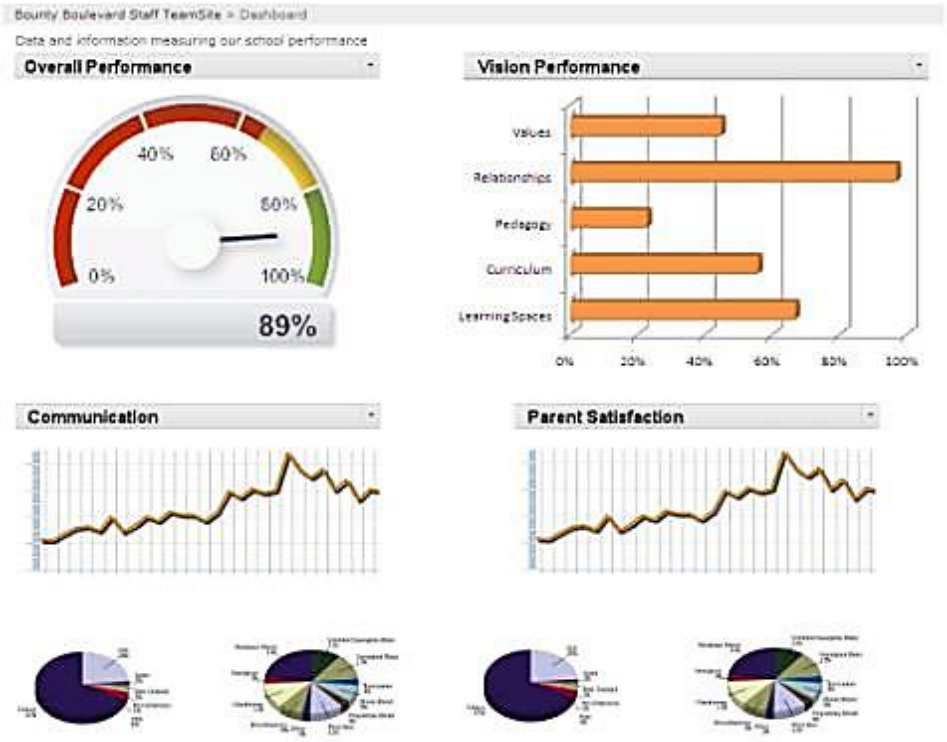
Dashboards are usually based on the school's goals in areas such as student learning, discipline, teacher growth, teacher recruiting, finance, etc. For example, the area of discipline may have 8 goals or targets for the year. These are listed on the dashboard as: "X% of students who, having been given a detention, are not given detention again." The percentages differ based on each grade level and the numbers from previous years (e.g., Year 12 may have improved from 70% to 75%).

SOURCE: Datnow et al. (2008, p. 39)

TEXT BOX 13: DASHBOARDS

example)

FIGURE 12: MOCK DASHBOARD DISPLAY



SOURCE: Pedagogical reflections (2013)

Section 2: Summary of key ideas

ONE: The **main focus** of the descriptive accounts from stakeholders focused on accountabilities and alignment. There were some accounts related to differentiation and differences within the P-12 structure, but no accounts addressed the notion of student self-assessment or challenging tasks. Additionally, there was a greater focus on the primary (P-7).

TWO: Descriptive accounts indicated that education systems and school are **inundated with measurement data**. Additionally, stakeholders suggested there is a greater focus on measurement data as a tool for improving vertical accountability, so much so that Lingard and Sellar (2013) suggest some of this measurement data, in particular the NAPLAN data, act as "catalyst data" and are pivotal to school and system accountability practices.

THREE: **Visual data displays** were used to collate and display many of these data via online portals that were accessible by computers. Access to data was related to the position of the individual within the education system. While this provides an ease of access, it is also a mechanism of control. Increasingly, within societies of control, schools rely more and more on numerical codes and data, and the utilisation of socio-technological mechanisms such as passwords that create gatekeepers and users (Deleuze, 1995). Consequently, institutions such as schools are becoming corporate systems that are increasingly required to maintain copious records of measurement and performance data in order to enable auditing (Power, 1999).

The incidence of online warehousing tools and the utilisation of dashboards was evident across two of the sectors. These data displays provided teachers, schools, and education systems with tools for comparison of individual students, classes, and schools across a state, nationally, and internationally, as well as comparisons of teachers based on extrapolated student data. These warehousing tools also scaffolded the data interpretation process for the teachers by providing pre-determined formats and visual displays. However, Australian and international studies (Hayes et al., 2006; Sahlberg, 2007) have indicated the limited usefulness of these data and cautioned against the use of simplistic analyses and international comparisons derived from these data as they fail to take into account the many underlying characteristics such as socio-economic status or family background, that may explain the comparative performance of schools.

FOUR: The stakeholders identified a tendency towards the use of other visual and **public displays of data within school communities**, such as the use of spreadsheets and data walls. Such displays become the sites of professional conversations between

teachers. Conversations surrounding these data walls were generally focused on data obtained from diagnostic assessments rather than high-stakes NAPLAN data, or conversations about assessment practices and pedagogy. The displays, while public, were generally reserved for the teacher cohort, rather than being made available to students and their parents. However, conversations between teachers that were based on data from the visual displays also led to conversations with students and their parents.

FIVE: The descriptive accounts focused on the multiple purposes of data. Effective use of data was dependent upon **alignment** between the purposes for which data were collected and the consequent purposes and uses of these data. Here, it was suggested, there needs to be a "fit" or an alignment of these purposes in order to ensure integrity of practice and an effective use of data.

SIX: Many of the descriptive accounts from the systemic and administrative levels focused on **literacy and numeracy**. Stakeholders linked the uses and purposes of data to improving the students' literacy and numeracy performances. Improvement was frequently gauged through NAPLAN testing, however, diagnostic literacy and numeracy assessments were also used. While focusing on literacies and numeracies, the stakeholders generally did not address notions of the actual curriculum, for example, the Australian curriculum or the key learning areas within the curriculum structure. This omission, while it may relate to the context of the data gathering process associated with this study, could relate to the understanding that such a focus on measurement and performance data from high-stakes testing narrows the curriculum (Darling-Hammond, 2010; Klenowski, 2011; Sahlberg, 2010; Stobart, 2008; Thompson, 2012). Additionally, this omission could also relate to the need for a greater focus on aligning curriculum with pedagogy and assessment (Hayes et al., 2006).

SEVEN: The notion of **differentiation** was not significantly addressed in the stakeholder accounts. As such, there is a danger that while there is an abundance of data, these data are not focused on providing differentiated learning opportunities for those most marginalised in our society. Consequently, if these students or groups of students are not identified as "under-performing" and do not get the opportunities to obtain instruction that is aligned with their educational needs, there is a risk that such students "fall through the cracks". Classroom data is able to help with aligning classroom instruction with learning goals and these data can therefore be used to refocus pedagogy on content and skills where performance is down (Moon, 2005). The danger associated with misalignment or a lack of differentiation is that students become disengaged with the learning process and risk displaying negative behavioural and attitudinal behaviours that propagate the achievement gap (Moon, 2005).

EIGTH: Many of the descriptive accounts provided a limited understanding of **what counts as data**. Data was almost exclusively limited to student performance data, often derived from tests, and as indicated earlier the data often focused only on literacy and numeracy.

With respect to the data described and exemplars offered there were none that recorded students' abilities to engage in analysis and evaluation, to apply knowledge and skills to real-life contexts and problem-solving, or to use critical thinking – the so-called 21st century skills. In addition there were few references to students' skills in communication or related to their affect and social-emotional well-being, although one school referred to tracking students with respect to their career aspirations and consequent achievements on their future career paths. Finally, in discussing data, there were few references of the need to take into account or to "read" and interpret data in the contexts of students' access and engagement with learning, their opportunities to learn, and the teaching practices employed. Thus it is suggested that developing a broader understanding of what counts as data and ensuring that attention is paid to the broader contexts of data gathering so that richer and more nuanced understandings and uses of data can be developed are essential.

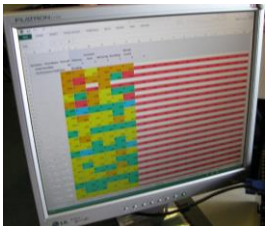
Section 3: Cases of strategies and practices for using classroom data

The cases are drawn from an analysis of interview data, classroom observations, and school artefacts. They identify useful strategies and practices for using classroom data to improve instruction and school programs. *Table 10: Summary of cases of strategies and practices for using classroom data* outlines the elements of the matrix relevant to each case and the alignment of each case with the Standards and the study's analytic framework.

The cases represent a consolidation of the data gathered from school visits, the previously analysed descriptive accounts from the stakeholders from each of the sectors, and the research literature. The case format[7] is divided into five main sections: context; focus areas; implementation and outcomes; evidence of success; and questions for discussion. The case is *contextualised* in terms of the area of the practice, the setting, and the goals and purposes of the strategy or practice or program that use classroom data. The section on *focus areas* outlines how the cases relate to the previous sections of the report, including the Standards, the themes of the research literature, and the descriptive accounts from the stakeholders. The third section outlines *implementation and outcomes* of the strategy or practice or program, focusing on teachers' impressions. The next section identifies anecdotal and empirical examples pertaining to the *success* of the program. The final section includes a series of questions that can be used to stimulate discussion related to the cases, but specifically to the Standard.

Appendix B provides an alphabetical list of practices outlined throughout the report, including the literature, the descriptive accounts and the cases, with hyperlinks to descriptions of each example.

Below is a summary of the five cases:

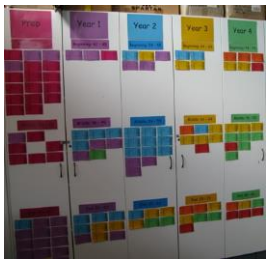


Case 1: Collecting and using diagnostic data focusing on reading

The staff at the primary school of this small metropolitan P-10 school implemented a whole-school program that focused on the *Developmental Reading Assessment* (DRA) which was collected and used to improve reading within the school. The examples of practices in this case are drawn from a Year 1 classroom.

[7] The general style of the case and some of the headings in some of the sections were drawn from a model provided by Timperley et al. (2007).

Professional Practice | Standard 5 | Focus areas 5.1, 5.4 |



Case 2: Using data in visual displays

Within a given school's professional learning community, data analysis encourages collaboration and conversation amongst teachers, and has the potential for making visual displays the tools for ongoing data analysis within collegial environments. These examples of practice are drawn from a variety of schools from the different sectors and show that rich and productive conversations can occur between teachers regarding students' progress when data is represented and display in a visual manner.

Professional Practice | Standard 5 | Focus areas 5.1, 5.3, 5.4 |

Case 3: Data-informed planning cycles

The staff at this medium to large metropolitan P-7 primary school used Learning Circles as a practice to plan their curriculum, to work through a problem and design intervention strategies for improved learning outcomes, and to support teachers. These circles formed part of the school's data-informed planning cycles to develop continuous cycles of improvement that was based on learning data.

Professional Practice | Standard 5 | Focus areas 5.3, 5.4 |

Case 4: Data for tracking progress and mentoring students

The staff at this medium-sized metropolitan secondary school undertook detailed tracking practices to monitor student progress in secondary school. They were able to provide their students with feedback regarding their progress towards identified career pathways. Additionally, teachers were able to support and advise their students based on their identified career pathways.

Professional Practice | Standard 5 | Focus areas 5.2, 5.4, 5.5 |

Case 5: Data and differentiated learning

The staff at this small metropolitan secondary school with a focus on inclusive education used classroom data to differentiate learning and assessment practices to better cater to students' specific learning needs and goals.

Professional Practice | Standard 5 | Focus areas 5.1, 5.2, 5.4 |

TABLE 10: SUMMARY OF CASES OF STRATEGIES AND PRACTICES FOR USING CLASSROOM DATA

Standards framework	Analytic framework				
	Accountabilities	**P-12 structure**	**Alignment & differentiation**	**Students' self-assessment**	**Challenging tasks**
Assessing student learning			Case 1 – using assessment to support students' individual learning needs Case 2 – using school-wide conversations to determine students' progress Case 5 – using differentiated assessment tasks	Case 1 – improving students' understanding of learning processes Case 2 – improving students' understanding of learning goals	
Providing feedback to students on their learning		Case 4 – using mentoring to provide feedback to students Case 5 – using various feedback strategies to ensure students understand their progress and how to improve their learning outcomes			
Making consistent &	Case 3 – supporting teachers through		Case 2 – collaborating and communicating to		

comparable judgments	collaborative professional learning situations		improve consistency of teacher judgments		
Interpreting student data	Case 4 – tracking and profiling student data to identify progress and aspirations		Case 1 – collating and displaying reading data for analysis Case 2 – interpreting student data using visual data displays Case 3 – collaborative interpreting student data within Learning Circles Case 5 – identifying and interpreting relevant assessment data for improved learning outcomes	Case 4 – using tracking data to make informed choices	
Reporting on student achievement			Case 4 – using tracking systems to monitor student progress and differentiate learning		

Case 1: Collecting and using diagnostic data focusing on reading

About this practice:

The staff at this small metropolitan P-10 school has implemented a whole-school program that focused on the *Developmental Reading Assessment* (DRA) which was collected and used to improve reading in the primary school. The examples of practices in this case are drawn from a Year 1 classroom. The sector will not be identified for purposes of confidentiality. The case study is divided into five sections:

1. Context
2. Focus areas
3. Implementation and outcomes – A list of practices include:
    - Supporting teachers
    - Facilitating learning
    - Classroom organisation
    - Reflection to refocus classroom practices
    - Differentiation of activities and assessments
    - Improving collaboration
    - Effective professional learning
    - Improved feedback systems
4. Evidence of success
    - Increased peer and student self-assessment
    - Self-paced learning
    - Using NAPLAN data
5. Questions for discussion

Collecting and using diagnostic data from the Developmental Reading Assessment

1. CONTEXT

Area of practice	**Reading**: The staff at this school implemented a whole-school program that focused on the *Developmental Reading Assessment* (DRA) to improve reading within the school.
Setting	Observations by the school principal focused on preparing primary school children for high school and beyond. **Principal:** *"So we looked at everything we did, and said, 'What's the core? What's the most important to us?' And literacy and numeracy were the things that came out as the things we've really got to do well. That's when we went on our journey and started looking at what's out there."*
Goals and	• Improve students' literacy and numeracy competencies and

purposes	performances using formative and diagnostic tools such as the DRA. • The practice is linked to the notion of early intervention where teachers use ongoing assessment data to determine intervention strategies such as reteaching, varying instructional approaches, using different materials, or providing students with more time (Sharratt & Fullan, 2012, p. 124). • The practice is a strategy that identifies the low-achieving Year 1 and prep students and thereby can potentially narrow the achievement gap in later years (Sharratt & Fullan, 2012, p. 124).

2. FOCUS AREAS

Related sections of Standard 5	• 5.1: Assessing student learning • 5.4: Interpreting student data
Related themes from the literature	• *Data and accountability:* In this example, teachers collected, analysed, and interpreted classroom data drawn from individual reading tests. While the data was used to support and improve student learning, this practice was also likely to improve the school's NAPLAN results, thereby indicating an accountability component in the practice. • *Data and assessment literacy:* The teachers at this school used formative assessment tools, such as the DRA, to provide assessment feedback to their students about their progress in reading. Consequently, many of the practices in this case use the principles of assessment *for* learning. • *Data and numerate teachers:* At this school, data-informed decision making was used to improve students' reading outcomes. The school's management team provided project leadership, support, and guidance. Many of the teachers, in particular the male Year 1 teacher, acted as an internal coach; mentoring, providing professional learning opportunities for other staff, and supporting the other teachers, as well as developing or modifying the spreadsheets that were used to record student reading data. • *Using data:* The teachers in this case used specific data sources related to literacy data to monitor student learning and develop meaningful learning experiences to improve students' learning outcomes in this area.
Related descriptive accounts from stakeholders	For additional anecdotal examples of associated practices by principals and education officers, see the following sections of the report: • Mentoring teachers – Coaching Academies - The Coaching Academy, identified by one sector, was developed as a sector-

wide approach to mentor teachers in relation to improving literacy and numeracy practices. The Year 1 teacher in this case study is an example of an internal Learning Coach.

- Diagnostic tools – The sector actively promotes the use of the DRA as a diagnostic tool to monitor and improve school reading outcomes.
- Conversations - The DRA tool gave the staff at this school the opportunity and the impetus to undertake significant conversations regarding teaching and learning practices related to reading and consequently improving their pedagogy. Conversations are strongly encouraged within this sector.
- Spreadsheet – The sector provides the schools with sample spreadsheets and professional learning activities to enable teachers to collate and analyse the reading data, as well as displaying it in a useful manner that visually flags students' progress.

3. IMPLEMENTATION AND OUTCOMES

Teachers' impressions

SUPPPORTING TEACHERS: While the principal was aware of the anxiety associated with the implementation of this program, the teachers at this school generally felt supported and comfortable with the implementation process without a sense that this new reading strategy was professionally threatening or intimidating to them.

Teacher: *"I personally don't feel pressure on where my kids are going to be because I know that it's not - I'm not trying to obtain a mark from that, and it's not a direct reflection of me as a teacher but rather as informing what I can do as a teacher. I look at it as we're all on the journey together. I teach Year 1s so there's five years of primary school from my year where we can all work together to do that."*

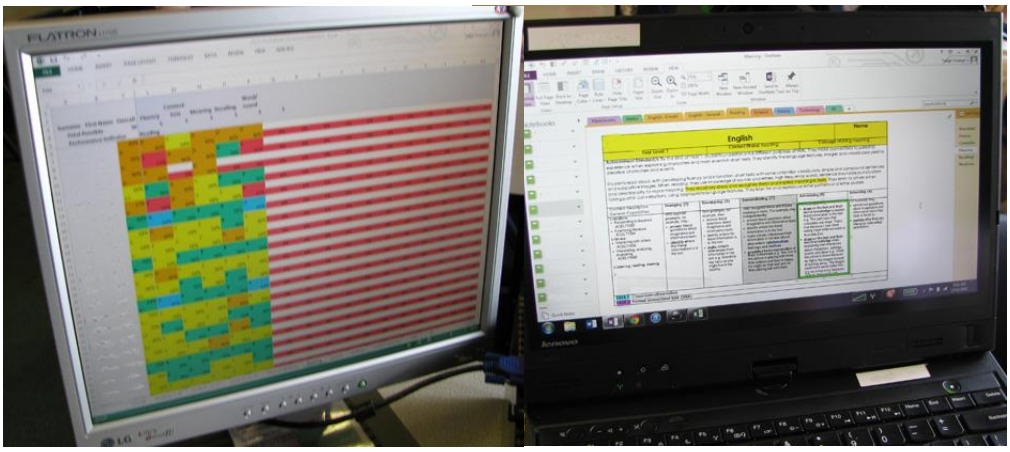
However, the principal at this school did indicate that there was a level of anxiety associated with implementing new practices.

Principal: "*When we first took it on, there was quite a bit of anxiety in the staffroom and it was significantly challenging initially because to collect the data initially when they hadn't done it before takes a lot of time."*

FACILITATING LEARNING: One teacher highlighted the perceived benefits, suggesting diagnostic and formative assessment tools enabled teachers' own conceptualising of the knowledge, processes, and skills associated with reading.

Teacher: *"The benefit that I see it is it's helping me become a better*

	teacher, to facilitate the focus learning that each child needs. Going through school myself I didn't do very well. We all learnt together regardless of where we were on our journey. That didn't work for me and subsequently I failed everything. Coming into a school as a teacher, this process has now allowed me to focus in on a concept, understand that concept well and then be able to facilitate it in several different ways to a focus student. So for me it's great for the kids but personally it's helping my journey in leaps and bounds. So the data is a two-way thing … It's a great system … it does help the teacher focus and understand why and what they're teaching and who they're teaching it to."
Practical examples - Implementation	**CLASSROOM ORGANISATION**: The principal indicated that there was initially an extensive financial commitment to the program. This was in the form of professional learning and time-release support for teachers for the planning and implementation of the program. **Principal:** *"It takes a lot of time. So in that first 12-month period we got in quite a few relief teachers to actually relieve staff while they were doing the one-on-one testing with their children because each child initially is tested for around about 20 to 30 minutes now. Now we know how to do it. Back then it was more like 40 to 45 minutes per child. So we probably put about 40 days of relief into our budget that year to get us through that first 12 months. We found that the next six months, it dropped down to about 20 days and now we get very few. When new staff come on board in the school we obviously try and support the growth in this area but the seasoned staff have done it for a while now and know how to fit it into their class schedule."* From a practical perspective, the teacher in the Year 1 classroom conducted the reading assessments during class time then recorded the results of the individual assessments on a computer spreadsheet. This spreadsheet (see Picture 1 – left hand side screen) aligns students' progress with proformas linked to the Australian Curriculum (see Picture 1 – right hand side screen).



PICTURE 1: SPREADSHEET DISPLAY ON THE LEFT AND AUSTRALIAN CURRICULUM ON THE RIGHT

Another teacher indicated that while an individual student was undertaking the reading assessments, the class worked independently and quietly on activities set by the teacher.

Teacher: *"We have now got to a point where we can organise our schedule now based around how long it's going to take and they do it in the back of the classroom while students are still working on other things and so we've got it to that point. But it needed a lot of support initially to get teachers in the head space of … this is the way we collect the data here."*

Practical examples - Outcomes

REFLECTION TO REFOCUS CLASSROOM PRACTICES: The teachers at this school suggested that they needed to use their classroom data to reflect and refocus their classroom practices. Their regional educational authority was able to provide them with support and guidance.

Teacher: *"We used to do a lot of testing … [of] spelling and all those things but we just did them and they just got put away. They didn't drive what we did in the classroom. Yeah. Whereas this sort of data [the DRA] is actually driving what we actually do in the classroom day to day, so that was the big change for us."*

Another teacher added how they are vigilant and have a greater awareness of the students' progress.

Teacher: *"But now the focus is like - its alarm bells - Who needs help? What do we need to do? It's not about … What are the effects on you as a teacher? But it's whether the kid's moving [forward] … We need to make sure we're moving everyone."*

DIFFERENTIATION OF ACITIVITIES AND ASSESSMENTS:

Additionally, the data collected from the diagnostic tools enabled teachers to provide differentiated activities for small groups. Sharratt and Fullan (2012) identify such approaches as differentiated instruction or intentional teaching. They suggest there are five questions that teachers should ask:

- What am I teaching?
- Why am I teaching it?
- How will I teach it?
- How will I know when all students have learned it?
- What then?

Flexible groupings are often associated with this practice as they are able to meet individual students' needs. "Teachers scaffold learning for each student through modelling, questioning, clarifying, chunking, sharing, rehearsing, guiding, and making their thinking visible through words, pictures, and symbols" (Sharratt & Fullan, 2012, p. 114).

A teacher gave an example related to spelling.

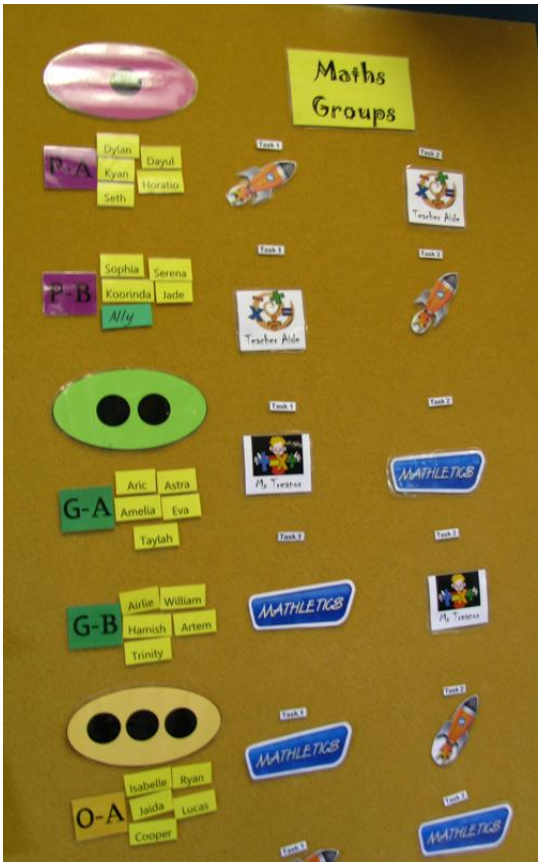
Teacher: *"So sometimes, for spelling say, we do group them into different groups and it gives them different spelling words or different things they're trying to learn at the time. But then, say for writing or reading, the kids are all working on the same thing but then I will pull a group aside which is not the same group every time - a different group pulled aside to work on something. So it can be broken-up groups or just random groups as well."*

Another teacher elaborated on these practices (also see Picture 2).

Teacher: *"Three seems to be the optimum group and they're grouped as in the most, more able or less able. Through the structure of the question - and I have an example here of the data that we've done - **red** indicating "not understanding or grasping the question"; **green's** indicating that that student "has an idea of that concept"; and **white** is "I didn't answer". So what we're able to do then is to then classify the three groups of needs, identify specifically where their lack of understanding is and then they move to that group. So kids might find themselves weekly in different groups."*

IMPROVING COLLABORATION: The teachers suggested one of the outcomes of the reading program was improved teacher collaboration and the development of a common language. Sharratt and Fullan (2012) suggest that co-teaching, co-planning, co-debriefing, and co-reflecting are effective strategies for building effective data use for improved teaching and learning (p. 117). Comments from teachers include.

Teacher: *"[What this program] did was bring a common language to the staff and made us – before, we were single streams so we're little islands in our own classroom. Now, much more collaborative."*



PICTURE 2: GROUP COMPOSITION FOR THE WEEK BASED ON CHILDREN'S UNDERSTANDINGS (RED, GREEN, WHITE)

Teacher: *"Now, people plan together because - even though yes, you've got Year 1 and Year 2, we're still using the same language, we've got the same focus and all that. So it's certainly - now the professional conversations in the staffroom have certainly changed".*

Teacher: *"It's made a big difference."*

EFFECTIVE PROFESSIONAL LEARNING: The teachers suggested that their collaborative processes also included improved and more effective professional learning activities during staff meetings.

Teacher: *"... we now have a lot more professional development focus in our staff meetings because we might be working on writing so because we're all doing the same thing - because we've all got kids at - some here will have kids at Year 1 level and Year 4 level. We do a lot more PD [professional development] and collaboration planning and all that sort of thing."*

Sharratt and Fullan (2012) suggest that instructional coaches are an effective way of organising teacher professionals. Within this approach,

professional learning is delivered by credible colleagues who understand the school context (Sharratt & Fullan, 2012, p. 117). In-house instructional coaches such as the Year 1 teacher were an effective practice used at this school.

Teacher: "The PD is *in-house. It is me as a coach*[8] *doing stuff … Tomorrow we were going do a walk-through [a teacher's] classroom. So I'll take teachers in there for five minutes just to see some things he's doing in his reading and that."*

IMPROVED FEEDBACK SYSTEMS: The teachers indicated they were acutely aware of the students' progress in their class. However, this was rarely derived from summative testing, rather, through forging a relationship with the students that was based on interaction and observation, and the use of diagnostic tools to gather classroom data. A number of teachers provided examples.

Teacher: *"When I test kids now, the stress level is way down [for the children] because the language I use to them, I always say to them this is not about you, this is so I know what I need to do as a teacher, where I need to teach you better. So it's taken a whole lot of stress and anxiety off them. Whereas before they were like, 'Oh I'm doing a test and it's for my report'."*

Teacher: *"They [the students] understand why they're doing it [the assessment]. It's for them, that's why they're doing it. Then throughout that process we're also, as teachers, trying to bring that professionalism back into it and not say this is why they got this mark because they got a 'D' for this test. It's like we're watching our kids constantly and as professionals, this is our judgement of where they're at, and we have the evidence and the data … But as professionals, we're actually constantly monitoring where they're at and we can tell you where each and every one of our students are at for each and every subject off-hand because we're constantly following it through and doing it and monitoring them."*

Teacher: *"For part of our report-writing, we're trying to move away from tests to give us data. It's more about the teacher looking at what the child is capable of, which is a far better way to report on a child, than, 'Okay, Johnny, here's your test, go and do it. Oh you got a 'D', that's your mark'. Whereas this way the teacher can walk around the classroom and go, 'I didn't realise Johnny could do that, he's quite capable, he may have some weaknesses we need to work on but he's showing he's capable in that area'."*

[8] See Section 2: Making consistent and comparable judgements – section on Mentoring teachers – Coaching Academy.

4. EVIDENCE OF SUCCESS

Anecdotal

INCREASED PEER AND SELF-ASSESSMENTS: The teachers indicated the children in their classes became more aware of the learning process. They developed a deeper understanding of the assessment tasks and were more reflexive of their own performances. Students were also given increased responsibility and autonomy and the opportunity to develop their skills in making judgements. Additionally, students developed skill in delivering more relevant feedback to their peers. Peer and self-assessments also develop independent learners who can apply what is being learned to new situations (Sharratt & Fullan, 2012, p. 73). Additionally, peers can influence learning by helping, tutoring, developing friendships and giving feedback (Sharratt & Fullan, 2012, p. 73). One teacher gave an example.

Teacher: *"It's a lot more open learning and student-directed sort of thing, and peer assessments, self-assessment. They might have a deadline of something finishing in a few weeks but the teacher is facilitating going around the class but the kids - it's not that direct teaching of you have to do this and that sort of thing."*

SELF-PACED LEARNING: Additionally, there were times during the week when year levels and curriculum areas were combined. For example, there may be a Year 3, 4, and 5 grouping focusing on science, history, and technology. This presents a thematic teaching approach rather than a class or subject-based approach. Sharratt and Fullan (2012) identify such approaches as developing cross-curricular literacy connections where students are able to make sense of their world through various literacy-based tasks, for example, modelling reading in history, writing different genres in science, and making thinking visible in mathematical problem-solving (p. 112). One teacher gave an example of practice.

Teacher: *"The learning is all supplied on our website so the kids are able to access all the rubrics, all the information, all the links, everything that they need it's all there. It's a self-pace thing and what it's doing is it's focusing on the kids' learning to their multiple intelligences. They're able to present in different mobile forms according to their strengths. It's quite exciting, we've only been doing it for six months. There's been a lot of hiccups but I see a great advantage and it's teaching thematically and you've got three different year levels working together to coach and work with each other as well. For me, a child working with a child is one of the most powerful forms of teaching if they're on the right track. I find a great benefit and it's quite a buzz to sit in there and watch these little pockets of kids busy working away. There's no front of the classroom, there's no teacher walking around asking, What are you doing?"*

Empirical

USING NAPLAN DATA: NAPLAN data were identified as a means of verifying school improvement. Improvements were attributed to the programs and pedagogy at the school. An explanation was provided by the principal (also see data table: Reading).

Reading	
467	
434-500	
Above	Substantially above
SIMILAR	ALL
439	420
430-448	

Principal: *"The first cohort that went through, where we started to collect data - which is now a cohort that's just finishing Year 5, what we actually have seen this year with our NAPLAN data is that the state and the national average are quite close on the graphs but our school is between 40 and 60 points beyond in every area."*

The example of empirical evidence from the NAPLAN data has been generated using hypothetical data representing one year of testing, for example 2012, and one year level, for example, Year 3.

Principal: *"So it's showing to us that that data collection and using the data to drive the learning is actually making a significant difference in the way children learn. And hence our journey down this path. It wasn't driven by NAPLAN data from our perspective. It was driven by a need to prepare children for high school in a better way."*

5. Questions for discussion:

1. Discuss the usefulness of the implementation practices and outcomes (Section 3: Implementation and outcomes) in relation to your own school environment. Which data practices identified in this case have applications in your own school context?
2. What do you consider to be the most important considerations when implementing a whole-school diagnostic tool for improved reading outcomes?
3. How can teachers' professional conversations about students' reading progress improve (a) individual student outcomes, (2) classroom outcomes, and (3) school outcomes?
4. While not explicitly stated in this case study, how do you anticipate students would be given feedback regarding their progress?

Case 2: Using data in visual displays

About this practice:
Within a given school's professional learning community, data analysis encourages collaboration and conversation amongst teachers. Visual displays of data have the potential to encourage and promote ongoing data analysis within collegial environments. These examples of practice are drawn from a variety of schools from the different sectors and show that rich and productive conversations can occur between teachers regarding students' progress when data is represented and display in a visual manner. The case study is divided into five sections:

1. Context
2. Focus areas
3. Implementation and outcomes – A list of practices include:
    - Using data walls
    - Ensuring confidentiality
    - Using shared data
4. Variations
    - Learning charts
    - Anchor charts
    - Data charts
    - Check-in cards
5. Questions for discussion

Data walls

1. CONTEXT

Area of practice	**Visual displays**: Students' progress is represented and displayed through student' assessment data in a visual manner. **Conversations**: Visual displays enable teachers to participate in rich conversations about students' progress asking – "How can we move all our students forward?" (Sharratt & Fullan, 2012, pp. 78-79).
Setting	• Within a school's professional learning community, data analysis encourages collaboration and conversation, making visual displays the tools for ongoing data analysis within collegial environments. • Privacy is essential for certain visual displays such as data walls. • Other data (see section below on variations) is displayed in the classroom as part of an instructional strategy.

Goals and purposes	• Encourage ownership of data analysis, problem-solving, and decision-making. • Identify the students who require additional assistance (or intervention). • Promote choices through discussions regarding instructional strategies. • Allow for whole-school and classroom goal setting, based on visual data displays and analysis. • Develop productive communication tools

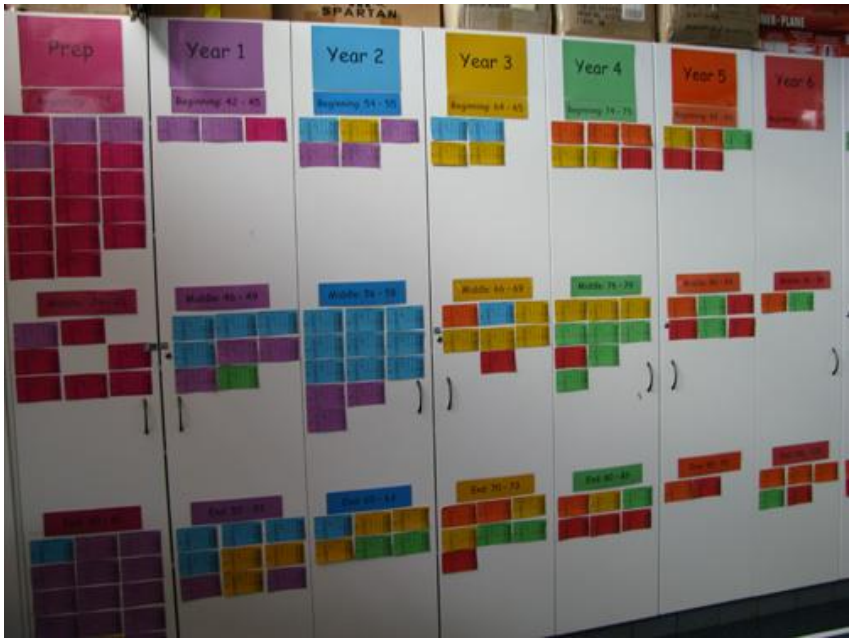
2. FOCUS AREAS

Related sections of Standard 5	• 5.1 Assessing student learning • 5.3: Making consistent and comparable judgements • 5.4: Interpreting student data
Related themes from the literature	• *Data and accountability:* Teachers at these schools used visual displays of data to analyse and interpret classroom data. While the data was used to support and improve student learning, this practice was also likely to improve the school's NAPLAN results, thereby indicating an accountability component in the practice. • *Data and numerate teachers*: These schools engaged in data-informed decision making to improve students' learning outcomes. • *Using data*: Teachers at these schools used visual displays that incorporated the use of colour and space to map students' progress and flag individual students whose performance was above or below the year level performance.
Related descriptive accounts from stakeholders	For additional anecdotal examples of associated practices by principals and education officers, see the following sections of the report: • Conversations: Visual displays of data promote whole-school conversations regarding school approaches and strategies for improving pedagogy and student learning. • Tracking progress: Visual displays of data such as data walls encourage schools to track individual students' progress within a class, across year levels and through P-12. • Collaborative professional judgements: Visual displays of data enable collective and collaborative conversations to occur about students' work and progress.

3. IMPLEMENTATION AND OUTCOMES

Data walls

VISUAL DISPLAYS OF DATA: The data on data walls is displayed visually, in this example, using colour-coded cards to denote year levels and progress (see *Picture 3: Colour-coded data wall*).



PICTURE 3: COLOUR-CODED DATA WALL

Education officer: *"All these little cards are colour coded for the year levels. So it's an at a glance opportunity to see where each and every student is in the school. They're the individual student cards. There's other stuff that sits there on that card. Like even some of their [students'] previous scores. So they move these along according to how their kids are progressing."*

This data walls enabled teachers to have conversations about students' progress. Each year level was allocated a colour, for example, Year 1 was purple and Year 6 was red. Any red cards that appeared in year levels below Year 6 indicated those students' progress needed monitoring and intervention.

Education officer: *"But you can see Year 6, the colour is red. So you see very quickly we've got a few kids in Year 6 still reading at Year 4 level. So they become, what are we all doing to help these kids move along?"*

ENSURING CONFIDENTIALITY: These data walls were displayed in a teacher-only area to maintain student privacy and confidentiality.

Education officer: *"This is just always displayed in a private area, where no students are coming in. One school, they didn't have a place - a permanent*

place. So they used a blue, vinyl sheet, and put all of the cards there. Then they can just roll it up and bring it out when they need to. So then they have conversations as a whole staff around this data."

USING SHARED DATA: The data moved from being classroom data that was accessed and analysed by the classroom teacher to whole-school data where the responsibility for students' progress was shared between teachers.

Education officer: *"So it's not just then the classroom teacher having that data in their book. But it actually becomes a conversation across the school as well, where they talk about areas of need."*

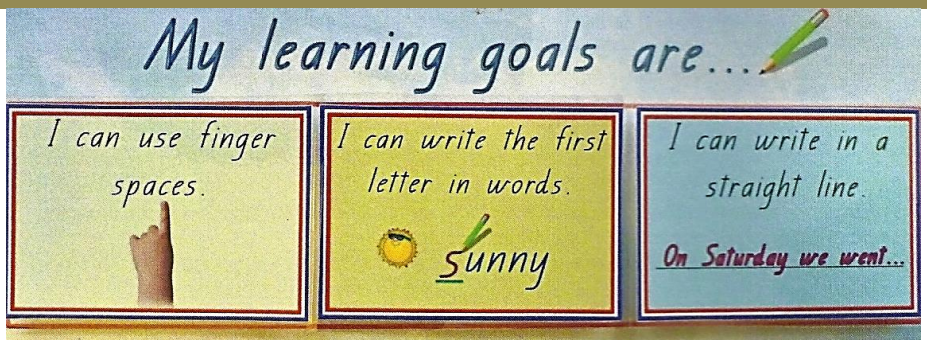
Outcomes

Data walls constantly focus attention on students' progress.

Education officer: *"One of the principals described this as their conscience. Because it was up there and in full - so easily interpreted - interpretable."*

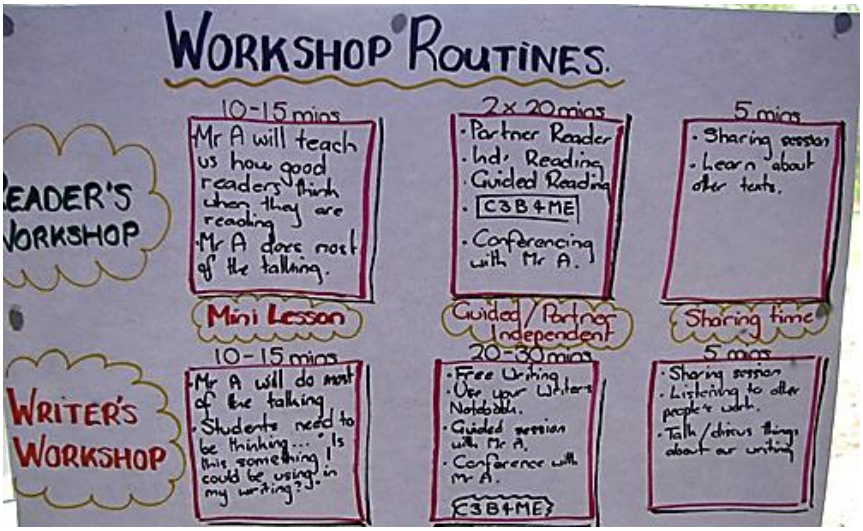
4. VARIATIONS

Learning charts



Other visual displays such as learning charts (see above picture) become part of classroom instruction. These charts are clearly display in the classroom and list learning goals as well as teacher and student co-constructed success criteria (Sharratt & Fullan, 2012, p. 67).

Anchor charts



The above diagram is an example of an anchor chart. These are "classroom charts that prompt students to remember their learning, their work, and the process they've explored. Most useful are those that are visible in the classroom and that are co-constructed by teachers and students to provide clarity" (Sharratt & Fullan, 2012, p. 202).

Data charts

Student attendance rate for each year level (shown as a percentage)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
2010	86%	87%	84%	87%	87%	87%	86%	
2011	84%	87%	85%	85%	86%	84%	88%	
2012	81%	84%	83%	84%	84%	87%	81%	

Data charts tell stories, usually stories of classroom improvement (Sharratt & Fullan, 2012, p. 114). The above data table is an example showing student attendance rates (also see *Table 9: Attendance outcomes - All Indigenous students*).

Check-in cards

This strategy uses post-it notes in the colours of the traffic light for students to self-assess their progress within a particular lesson. Students would write on coloured notes indicating the progress (see picture). Also see *Picture 2: Group composition for the week based on children's understandings (Red, green, white)* as another example of the traffic light.

5. Questions for discussion:

1. What are (a) the benefits and drawbacks of visual display of data, and (b) the usefulness of such practices in your own school context?
2. Identify additional variations to those listed in Section 4 (Variations), and explain how you have used these strategies and practices in your own school.
3. Conversations amongst staff are useful and effective planning tools. How would you anticipate students be given feedback regarding their progress if they were performing (a) below benchmark standards, (b) above benchmark standards, or (c) at benchmark standards? Would the approaches vary in each situation? Why or why not?
4. What types of feedback strategies could be used to ensure students understand what is required to make effective improvements in their progress?

Case 3: Data-informed planning cycles

About this practice:

The staff at this medium to large metropolitan P-7 primary school used Learning Circles as a practice to plan their curriculum, work through a problem, and design intervention strategies for improved learning outcomes, and support teachers. These circles formed part of the school's data-informed planning cycles to develop continuous cycles of improvement that was based on learning data. The case study is divided into four sections:

1. Context
2. Focus areas
3. Implementation and outcomes – A list of practices include:
    - Reviewing classroom data
    - Scaffolding interpretation of data
    - Implementing tiered support
    - Developing learning programs
    - Developing learning maps
4. Evidence of success
    - Using cycles of improvement
5. Questions for discussion

Learning circles and learning groups

1. CONTEXT

Area of practice	• **Supporting teachers**: Learning Circles were identified as fortnightly meeting for teachers to focus on collaborative planning for the improvement of student outcomes. • **Data-informed planning cycles**: Developing continuous cycles of improvement based on learning data.
Setting	• The Learning Circles were identified as a "structured process" where teachers worked in teams to plan the curriculum or work through a problem and design intervention strategies for improved learning outcomes. Each Learning Circle was associated with a member of the leadership team within the school. **Principal**: *"A Learning Circle is where a teacher presents a problem. If they've got a particular student that they're struggling to understand and struggling to deal with or that kid's struggling to make progress."* ***Principal**: "[It is about] using the data to drive their [teachers'] judgements. Knowing their students. Getting to know the students really,*

	really well, so that judgement process is there. But not just making judgements around where students are at, but using those judgements to plan the intervention process for students."
Goals and purposes	• To provide supportive and collaborative environments for teachers to develop strategies that utilises classroom data to improve student learning outcomes. • Within Learning Circles, small groups of teachers with a shared purpose undertake collaborative work with shared decision-making and collective responsibilities (Collay, 1998).

2. FOCUS AREAS

Related sections of Standard 5	• 5.3: Making consistent and comparable judgements • 5.4: Interpreting student data
Related themes from the literature	• *Data and numerate teachers:* Teachers use data to inform decision making related to practice, pedagogy, and assessment to improve student learning outcomes. The practice of utilising Learning Circles continuously informs this cycle of improvement and professional learning. • *Using data:* Data can be drawn from a variety of sources, including demographic data, achievement data, and data related to the instructional process. This example uses a range of data sources to obtain an overall picture of the students and their progress.
Related descriptive accounts from stakeholders	• Using frameworks - Such frameworks are able to provide a structure for school reform, outline and clarify the multiple purposes and audiences of assessment information, and identify the importance of feedback. • Professional learning - Teacher professional learning is considered to be an important aspect of data-informed decision making and supporting the development of numerate teachers. This example uses Learning Circles as a practice that develops teachers' professional capacities. • Data inquiry models and cycles – Various frameworks and models of inquiry are often used to incorporate the use of data within the inquiry and improvement cycle. • Warehousing tools – Online warehousing portals are often used in schools to support teachers by collating and displaying analysed data on NAPLAN testing, academic reporting, student outcomes, student behaviour, career planning, student records, and details of any contact made with parents. These data are

able to inform decision making processes.

3. IMPLEMENTATION AND OUTCOMES

Practical examples - Implementation

REVIEWING CLASSROOM DATA: The teachers and the school's leadership team reviewed the school's learning data, for example the NAPLAN data, at various staff meetings. Strong links were made to the warehousing tools available to that sector.

Principal: *"We then linked that back into … the class dashboard in [the warehousing tool], so we linked that back to teachers accessing the class dashboard."*

SCAFFOLDING INTERPRETATION OF DATA: The teachers were asked to undertake data-related tasks that scaffolded the interpretation and use of the learning data.

Principal: *"Teachers have homework around that and actually that's what I've just been doing this morning. I've been meeting - I have a group of teachers that I particularly supervised around that data. So they had to take something from their classroom data. They had to build a learning group into the class dashboard around their students and set goals. They had to teach. Have a teaching program with those students over a five week period. Then they had to report back to whoever their supervisor was. All of our leadership team have a number of teachers that report back to them around the progress the students made."*

IMPLEMENTING TIER 1 SUPPORT: Teachers presented a "case" to the Learning Circle. This process utilised teachers reporting students' progress to other teachers within the same school.

	Principal: *"So that's the first step a teacher needs to do, bring that back into a Learning Circle. Then they need to go away and work on a five week program around that."* **IMPLEMENTING TIER 2 SUPPORT**: If limited progress was made by the teacher with the "case", it was referred to the Student Support Committee. **Principal**: *"Then if they come back and say this kid hasn't made any progress, then that's a Tier - what we call a Tier 2 structure … So it's a Tier 2, and that would then come to the Student Support Committee. Then we'd look at what intervention we would go to, and it could be go to the guidance officer. It could be that we go we need more data, so we're actually going to do a range of tests, and - yeah."*
Practical examples - Outcomes	**DEVELOPING LEARNING PROGRAMS**: Teachers were able to develop learning programs for the students that were informed by the data. **Principal**: *"One of my Year 3 teachers that I'm supervising went back to the NAPLAN questions and identified the NAPLAN questions that their students missed within the NAPLAN test. Then she built her learning group and the dashboard around those students getting a particular question right. It was around reading comprehension, because we have a real focus on improving reading. So she taught reading comprehension around those particular questions for five weeks. Then she did a retest on that particular concept, and identified those students that have made progress. Which questions they now knew how to answer, but also identified questions that they didn't know how to answer.* Additionally, the teachers had access to Instructional Coaches, such as a Literacy Coach, at the school. Sharratt and Fullan (2012) identify such individuals as "knowledgeable others" who are teaching experts embedded in the school (p. 117). **Principal**: *"She actually used a similar sort of question that - because if you know NAPLAN questions, there's a whole lot of things that are thrown up around that. So she used a similar sort of question from that. She actually went back to our Literacy Coach to get her the information about how to find extra questions. Then she retested - again, using a similar sort of question on that."* **DEVELOPING LEARNING MAPS**: Within the framework of Learning Circles, the planning included the development of learning maps that identified the learning and assessment goals for particular units of work.

Learning maps are associated with the notion of visible learning (Hattie, 2012). Here, the learning and assessment intentions were made explicit, along with the success criteria.

Principal: *"Well, our goal is to make sure that … every English unit has a learning map, before teachers start that [assessment] process. So every child sees a learning map so they know what the assessment piece is beforehand. So you're not teaching a five week unit and then, here's your piece of assessment."*

4. EVIDENCE OF SUCCESS

Anecdotal

USING CYCLES OF IMPROVEMENT: The Learning Circles are a continual and cyclical process that promotes improvement. Learning Circles use classroom data to inform their decision making.

Principal: *"Engaging teachers in the use of data, how to set up a learning group around the data and set specific goals for children using that particular data … Certainly in terms of using the data to drive their judgements. Knowing their students. Getting to know the students really, really well, so that judgement process is there. But not just making judgements around where students are at, but using those judgements to plan the intervention process for students."*

Once one cycle is completed, there is usually a review and then planning commences for the next cycle of improvement.

Principal: *"[When I talk to the teachers] my discussions were, "Okay, you worked with 10 children. Most of them made progress. Some got all of - those 10 [questions]. But you've now got five children, who didn't know question 17, which said blah, blah, blah". So now you've got another learning group that you can work on with that particular concept."*

5. Questions for discussion:

1. What kinds of student data might the Learning Circles use to identify modified planning, learning or intervention plans, as part of a data-informed planning cycle?
2. In your opinion, are Learning Circles effective strategies for developing (a) teachers' professional learning, (b) modified or differentiated pedagogy, (c) improving teachers' practices around using classroom data? Can you identify additional strategies or practices, other than Learning Circles, that would encourage the above practices?
3. Reflect and discuss how the experiences within Learning Circles may be different for teachers at various stages of their careers, that is, graduate, proficient, highly accomplished, and lead.
4. What are the benefits of being involved with Learning Circles or other similar networks of educators for (a) the individual teacher, (b) other colleagues, and (c) the school?

Case 4: Data for tracking progress and mentoring students

About this practice:

The staff at this medium-sized metropolitan secondary school undertook detailed tracking practices to monitor student progress in secondary school. They were able to provide their students with feedback regarding their progress towards identified career pathways. Additionally, teachers were able to support and advise their students based on their identified career pathways. The sector will not be identified for purposes of confidentiality. The case study is divided into six sections:

Tracking progress and mentoring students

1. CONTEXT

Area of practice	• **Providing feedback to students**: This collection of strategies focus on tracking students' progress in secondary school and providing them with feedback regarding their progress towards identified career pathways. • **Mentoring students**: Support is provided for students in the form of mentors, that is, personnel in schools other than their classroom teachers who are able to advise students on the basis of their identified career pathways.
Setting	• By maintaining thorough details of students' academic data in a single spreadsheet, the school leadership team was able to support and advise students in their identified learning goals. • At this school, these records were maintained by the Head of Senior Schooling Head of Department (HoD) who had an extensive background in mathematics and was consequently able to develop a purpose-build spreadsheet to record and analyse student data.

	HoD: *"It's a complex business. To all of life's complex problems there are a number of simple answers and unfortunately they're all wrong … The take home message is know your stuff. If you are going to be a player in the system and you are responsible for the outcomes of students in schools, then I think it is incumbent on you to know the system, to know your students, to understand your subject very well, and to understand what you're assessing and why you're assessing it and how you can help students to get there."*
Goals and purposes	• Academic tracking is identified as a useful way of monitoring and advising students. It is a strategy for profiling students based on longitudinal data, often derived from warehousing tools (Wayman & Stringfield, 2006), related to their academic progress and projections regarding secondary school exit scores.

2. FOCUS AREAS

Related sections of Standard 5	• 5.2: Providing feedback to students on their learning • 5.4: Interpreting student data • 5.5: Reporting on student achievement
Related themes from the literature	• *Data and accountability:* Demographic and classroom data is used to track a student's progress at school. While the data was used to support and improve student learning and attendance, this practice was also likely to improve the school's annual performance data, thereby indicating an accountability component in the practice.
Related descriptive accounts from stakeholders	• Tracking progress - Tracking student progress can be a strategy that operates in terms of vertical accountability, but also as a means of differentiating teaching instruction. • Tracking academic results – As well as providing individual academic reports, secondary schools often maintained a system that tracked students' academic progress across the five years of schooling. This practice provided a mechanism for additional feedback to students and parents regarding an individual's progress. • Tracking attendance, suspensions and exclusions – While maintaining daily attendance records is a form of vertical accountability, the tracking of an individual's attendance at school provides a profile of student behaviour that can lead to meaningful conversations with students.

3. IMPLEMENTATION AND OUTCOMES

Teachers' impressions	**ROLE OF SENIOR SCHOOLING HEAD OF DEPARTMENT**: At this school, the Senior Schooling Head of Department (HoD) was responsible for collecting the learning and career data and maintaining the records

pertaining to students' academic progress.

HoD: *"Well, I look after all the VET[9] and all that side of it, all that management; I look after all the tracking; I manage all the QCE[10] ; all of the traineeships and apprenticeships; plus I teach senior classes. Oh, and the SDCS[11], I also manage all that; and I look after the OP Analyser database."*

TIME-COMSUMING ROLE: Wayman and Stringfield (2006) acknowledge that maintaining databases such as the one developed by the Senior Schooling HoD are time-consuming tasks that require significant computer and technical knowledge.

HoD: *"So for example I started at work, 3:00 am Monday morning, I started work at 4:30 [am] on Tuesday morning. So there'll just be times during the year when instead of working 50-hour weeks I'll be working 75, 80 hour weeks."*

Practical examples - Implementation

UTILISING VARIOUS TYPES OF DATA: A wide range of both internal and external data was collated on the single spreadsheet and updated quarterly by the Senior Schooling HoD.

HoD: *"I look after the OP analyser database and SDCS and from there I then set up the tracking document and on that tracking document I show the current results of the students, any OP indicator, the QCE tracking, any outside VET, any internal VET, any apprenticeships, anything like that at all plus anything else like change of subjects, whether they've got any special conditions, whatever. Anything to do with their progress and that's updated every term."*

HoD: *"So at the end of their first term in Year 11 we then have reporting data. So our tech man who looks after [the warehousing tool], he creates spreadsheets for me … and I will get from him, that, which you can see is extremely useless. It's got all the information on it but it's extremely useless. So what I then do, my first task is to organise that into something useable."*

HoD: *"So I then take that rough spreadsheet or that raw data, and from that data I then organise it with the main information of their names, their gender, whether they're Aboriginal and Torres Strait Islander, the class code, the staff code, the subject, their effort, and their achievement."*

[9] VET refers to Vocational Education and Training.
[10] QCE refers to the Queensland Certificate of Education, Queensland's senior school qualification.
[11] SDCS refers to Student Data Capture System, the data collection system for schools to report student details to the Queensland Studies Authority.

HoD: *"So, yellow means that's an outside cert [certificate] that that student's doing. When we find out that student has completed the cert it becomes green and the number of QCE credits will go in there … Purple means they've left a subject … Everywhere you see a red under the QCE, the student is not on track to get the credits for that. Over here in the last column you see their OP and the OP of course, I generate from OP Analyser, so I also have to get all of the class lists and the levels and rungs for each student."*

DEVELOPING INTERNAL SCHOOL DATA: Unlike warehousing data, the spreadsheet is customisable and the Senior Schooling HoD was able to input school-specific data.

HoD: *"Then from there I can then use this database to get an OP indicator using our previous data because I'm also look after the Core Skills test and all that sort of stuff as well and run the Core Skills test practice and take that program with the seniors and the 11s as well, along with the Head of English. So from all that information, that gets me that one bit of information there."*

Practical examples - Outcomes

INFORMING CHOICE AND CAREER OPTIONS: The practice at this school was to ensure ethical and equitable processes were maintained in relation to the school's student population with regard to Queensland Core Skills (QCS) testing.

HoD: *"As well as that we don't do what some schools do to get their OP data looking good, which is give the flick to the slower ones, because with a pass in English and even an OP of 20 there are many university courses you can get into. For many of these students they'll be the first one in their family. So we don't discourage them even if they're struggling."*

However, in the interest of informed choice and differentiation, students were given information regarding other career choices.

HoD: *"What we do is try and inform them, 'Okay, you're struggling, you might get a 20, however get this pass in English, get this pass, you can still take these courses and go these ways'. We're always looking for scholarships for them, we're always looking for ways into the TAFE and Cert III course for them, however, with the money that's been cut out of TAFE … that will impact on students in places like this. Last year I think we had eight students took up a scholarship for Cert IIIs at TAFE for this year but I don't think there's any scholarships for next year. So sure, we differentiate and that butts in with the mentoring system."*

MENTORING AS FEEDBACK: Mentoring was provided through individual meetings between students and a member of the leadership/management team. The first stage involved a management team meeting. This is a type of case management that focuses on learning performances and career pathways rather than student behaviour (Sharratt & Fullan, 2012). Additionally, this is a type of descriptive feedback that provides students with "practical, direct, and useful insights" that outline how they can use the information in order to successfully attain their learning and career goals (Sharratt & Fullan, 2012, p. 71).

HoD: *"The students will be divvied out by the management team … We talk about every kid, any situations we might not know about. So we all get to know oh, that kid, I know that mum's just left or whatever it might be, so that we can intervene appropriately. If it's a guidance officer issue or a cancellation issue, whatever it might be."*

The next stage involved the mentors meeting their allocated students.

HoD: *"We then have to interview those students and talk about how they're going and how they can get back on the pathway or whether they should change the subject or whatever … So I would … print off the OP Analyser indicators … it also gives me an opportunity to explain to the students how the system works and what it means to be taking the subjects they're taking and where they have to be if that's going … I also have the QTAC[12] book beside me so the student may well say, 'Oh, I want to be an accountant'. I'd say, 'Where do you want to go? Does it need to be at Brisbane University? Yes, let's have a look at the OP cut offs and the pre requisites. How are you going?' That sort of thing. So we can also then advise them if they need a 13 and they're tracking at a 16, make sure you put in for one of your preferences, something that you're going to get in with a 16 and then et cetera, et cetera. So basically just give them the information as it were, on their pathway, their most appropriate pathway and how they're going to go."*

PICTURE 4: QTAC GUIDE (HTTP://WWW.QTAC.EDU.AU/OTHERSERVICES/PUBLICATIONS.HTML)

[12] QTAC refers to the Queensland Tertiary Admissions Centre, the organisation that processes applications for the majority of undergraduate courses at Queensland universities.

DEVELOPING RESPONSIBILITY AND OWNERSHIP: The students were given some ownership over the process. They were asked to take responsibility for checking the displayed data about their progress; ensuring they understood the process and took ownership for understanding the key aspects of the learning and career data.

HoD: *"I've put them on a display board, the rank orders, they're updated all the time … right outside my office. Kids are there all the time. Absolutely there all the time. I tell the kids … you must check and if you think it's wrong, you chase it up and if you don't get an answer you like, come and see me and I'll chase it up because the whole process has got to be totally accountable. Students should know exactly how it works, why it works and where they are and why they're there. Teachers should be able to tell them, 'Well, you're a SA5[13] and you're not a SA10 because…' and that's something that I have pushed and pushed and pushed. Well, wherever I've worked, with varying degrees of success, sometimes no success at all but here, finally, great success."*

4. EVIDENCE OF SUCCESS

Empirical

There was empirical evidence to suggest that the strategies that were implemented as part of tracking students' academic progress and career pathways through a system of data tracking and mentoring was effective.

IMPROVED CLASS SIZES AND STUDENTS' RESULTS:

AREA	YEAR	
	2006	2013
QCE	30%	90%
VET (completed)	30%	90%
VET (no qualification)	35%	3%

HoD: *"When I got here in 2006 there were four students in 12 Maths B and 11 in 11 Maths B and that was it. We've now got two classes of Maths B in 11 and we've got standalone Maths Cs in both 12 and 11 and this year I had a VHA10 in B and C and two other VHAs in C and four other VHs in B. so, same kids, for same area."*

The data table demonstrates this improvement.

[13] SA5 and SA10 refer to the rank order, that is, Sound Achievement 5 is a lower grade than a Sound Achievement 10 on the 5-point scale (Very High Achievement (VHA); High Achievement (HA); Sound Achievement (SA); Low Achievement (LA); and Very Low Achievement (VLA)). Each of the five levels has 10 rungs.

IMPROVED QCE AND VET RESULTS:

HoD: *"Our QCE data, the first year I think we were under 30 per cent. This year it'll be 90. So you can see there, that's just the last two years. VET completion rates were under 20 per cent or not much. We get them up to 64 this year. The number of students who got no qualifications whatsoever I think was 35 per cent in the first year. We're now down to three students or just under 3 per cent."*

5. VARIATIONS

Variation: Tracking behaviours

A variation to this practice of tracking students' academic data and career pathways involves tracking students' attendance and behaviour. This was managed by the Data Coordinator at the school.

Teacher: *"The data coordinator … report[s] to our deputies, mainly referring to behaviour. So it's all about students - we have a time out and buddy system where they need to be timed out in class or they've been buddied to another room. So I report on that and who's been buddied and what faculties and all that sort of stuff. I also report on uniform; who's wearing the uniform, who's not. Who's not wearing the uniform but producing notes as well. Also around mobile phone usage; who's using it too much; who needs to hand it in. All those types of things. [Based on this data] the deputies can therefore make decisions around supporting that teacher or maybe putting some different consequences in for students that aren't working that pops up in a lot of the data that I do."*

6. Questions for discussion:

1. Are there benefits to profiling and tracking students' progress and career aspirations using compilations of data identified in this case? Are there alternative ways of tracking students' progress?
2. How can a school facilitate a school-wide approach to providing effective and meaningful feedback to students regarding their progress?
3. How are teachers able to use such tracking data to better (a) modify their teaching practice in relation to the analysis of assessment data, and (b) for supporting colleagues in this process?
4. How effective is the practice of mentoring in providing feedback to students?
5. How useful is the practice of encouraging students to take ownership and responsibility for their own progress and career choices?

Case 5: Data and differentiated learning

About this practice:

The staff at this small metropolitan secondary school with a focus on inclusive education used classroom data to differentiate learning and assessment practices to better cater to students' specific learning needs and goals. The sector will not be identified for purposes of confidentiality. The case study is divided into four sections:

1. Context
2. Focus areas
3. Implementation and outcomes – A list of practices include:
   - Using collaborative planning
   - Differentiating the curriculum and pedagogy
   - Differentiating assessment
   - Developing educational support plans and individual education plans
   - Using graphic organisers
   - Providing verbal feedback
   - Incorporating scaffolding
   - Using one-on-one explanations
   - Maintaining regular contact with parents
4. Questions for discussion

Differentiated learning and assessment

1. CONTEXT

Area of practice	• **Catering to students' specific needs**: Differentiated learning and assessment was a way teachers at this school were able to cater to students' specific learning needs and goals.
Setting	• The school self-identified as one that had a specific focus on inclusive education. **Teacher**: "*Well, we've got approximately about 250 students, of which 25 per cent of those students would be ascertained as special needs of some sort. Of course, we've got another percentage of students who have difficulties in accessing the curriculum, who've got literacy and numeracy problems which … I suppose they haven't been flagged or we can't get funding for, basically, to assist them. So we cater for a broad range of students.*"

Goals and purposes	• **Students' success**: Teachers were focused on enabling all students to attain successful and equitable educational outcomes.

2. FOCUS AREAS

Related sections of Standard 5	• 5.1: Assessing student learning • 5.2: Providing feedback to students on their learning • 5.4: Interpreting student data
Related themes from the literature	• *Data and assessment:* This example utilises the notions of assessment for learning where students exercise autonomy and have the freedom to choose elements of their assessment. Additionally, this assessment is part of the learning and teaching process.

3. IMPLEMENTATION AND OUTCOMES

Practical examples - implementation

USING COLLABORATIVE PLANNING: Groups of teachers within each department at this secondary school worked collaboratively to plan curriculum and assessment.

Teacher: *"Each respective department would sit down and have a look at what they're doing and then have a discussion about possible assessment tasks for these students to show their achievement, within their respective areas. So there are always department meetings and things like that, that the teachers attend and all those sorts of things. We work collaboratively, basically, to cater for the needs of all our students the best we can."*

DIFFERENTIATING THE CURRICULUM AND PEDAGOGY: The school was focused on an inclusive curriculum and this required a commitment to planning for students' differing needs (Moon, 2005).

Teacher: *"I think we have to differentiate the curriculum. While we do focus on accessing the Australian Curriculum for each student, we also have to make sure that we cater for those students who do have special needs … Making adjustments. Making a lot of adjustments in our teaching practice, to meet the needs of each of those particular students within our group. So there's a lot of scaffolding expected by teachers to do, to put in place for our special needs students, to ensure that they are still accessing their curriculum at appropriate age level."*

DIFFERENTIATING ASSESSMENT: The teachers structured assessment based on data about the students' learning goals. There was a range of ability groups present within the school and teachers aimed to ensure students were not unfairly penalised nor advantaged on the basis of the assigned assessment tasks (Moon, 2005).

Teacher: *"We have ascertained students and all those sorts of things, so that they are accessing the same sort of curriculum as our high flying students. So they are sort of introduced into looking at what an essay would be, even though we wouldn't expect them to go off and write an individual - you know, you wouldn't expect them to able to write an essay on their own. With a lot of guidance and a lot of structure put in place, then they can achieve certain things in that area. So there is also a process of deconstruction and reconstruction, and an individual rewrites and things like that, to teach the genres that the students need to know and all those sorts of things."*

The following is an example of an assessment task that had differentiated components. All students complete the unit of work and then all students produce a sequence of events and a PowerPoint presentation based on the movie, *Hercules*. Additionally, those students who were identified by the school's data as being able to master the higher order and more challenging tasks were also expected to write a comparative essay.

***Teacher**: "We did a unit on myths and legends, which we focused on Hercules, in particular. We actually got - the actual high end [students] would be writing an essay about a comparison between the myth and the movie, or something like that. Whereas, our other students would be looking at a sequence of events. Looking at the movie and being able to get a sequence of events that happened, or something like that, and then they would be encouraged to put a PowerPoint presentation, or a multi-modal presentation together, based on that sequence of events that they've extracted from that."*

DEVELOPING EDUCATIONAL SUPPORT PLANS AND INDIVIDUAL EDUCATION PLANS (IEPs): The teachers were asked about each of these plans. This is an example of the Education Support Plan for a student verified as two.

Teacher: *"That begins basically when they arrive if they are a student with disabilities and it's reviewed every year. The curriculum is modified to actually cater for all their needs and basically what the goals are, what the targets are and in each area, what is going to happen and who is going to be responsible."*

The teacher then explained about the IEP for this student:

Teacher: *"His IEP is more specific and more curriculum orientated. Some personal and social capabilities and everything else so here we set some goals to focus on expected learnings, to strengthen the partnership between home, school and personal and just to support the verification process. That's what the IEP is for."*

Practical examples - Outcomes

USING GRAPHIC ORGANISERS: These are thinking tools that enable concepts to be broken down in to simpler ideas. These often involve visual or diagrammatic representations of the concepts and use key words rather than detailed paragraphs. The teachers at this school indicated they used graphic organisers in their teaching.

Teacher: *"We use a lot of … graphic organisers. We do a lot of visual things with them and all those sorts of things, and we break things right down to the smallest components for them. So there's a lot of deconstruction that would go on within the classroom, just for those students to be able to understand the processes that are put in place for them to actually achieve their task and achieve some success."*

PROVIDING VERBAL FEEDBACK: The teachers frequently used verbal feedback with their students. The feedback was also descriptive feedback (Sharratt & Fullan, 2012) that enabled learners to move forward in their learning goals and promoted improved understandings of key concepts (Wiliam, 2011). Hattie (2009) suggests, "If feedback is directed at the right level, it can assist students to comprehend, engage, or develop effective strategies to process the information intended to be learnt. To be effective, feedback needs to be clear, purposeful, meaningful and compatible with students' prior knowledge, and to provide logical connections" (pp. 177-178).

Teacher: *"When they've handed their work in, they generally get feedback from how they've gone in that – on their task sheets and things like that … A lot of verbal feedback too, on their progress as well. Because they're always keen to sort of see how they're going and ask you how they're going. Being a small school, you tend to know the students."*

Teacher: *"As far as I know, most of the teachers will give feedback to their students verbally, initially, and then when they've submitted their task, then they'll give them the written feedback as well, on their progress."*

Teacher: *"I give verbal feedback. Then we would write a little note on their charts and put them in their folders so that they were able to take them*

home to their parents as well."

Additionally, this feedback was generally positive and encouraging.

***Teacher**: "I'm never negative. All the feedback is continually positive. If I go back to the Year 10s with this assignment writing, there was almost fear in their eyes when they weren't sure about things. I always said to them, 'If you make a mistake, it doesn't matter. That's why you're in the classroom today, to learn. That's why I'm being paid to teach you. You don't understand, it's my fault. I need to find another way to explain'. I probably say that nearly every lesson to keep them pushing, because they are - they're just mm - with the - it's just positive reinforcement all the time, 10, 11 and 12. You can do it. I give personal examples as well."*

INCORPORATING SCAFFOLDING: Data was used to determine the type of scaffolding that was required. Teachers were then able to collect different resources or structure instruction within units differently, as well as scaffolding instructional when students did not understand specific instructions or explanations (Moon, 2005, p. 228).

Teacher: *"I would reconstruct the whole thing and write out steps for them. Step one, what is conflict? You may find your answers in the handout that I gave you or you may like to use your laptop. So it's all self-explanatory right from the word go all the way through. So scaffolding, yeah, which I do all the time with these kids. They need the scaffolding. It's really important."*

The following example involved students with *Autistic Spectrum Disorder* (ASD) who found certain assessment activities difficult. Teachers were able to identify aspects of the problem and then change their planning and assessment to suit these students' "readiness levels" and "learning preferences" (Moon, 2005, p. 229).

Teacher: *"So they had to perform a play. They were able to come up with a conflict all right. Some of them had battles on the floor and stuff, but the empathy and then resolving it was not possible. But the penny didn't drop. Then we realised after a while that it wasn't working, because these kids [ASD] have no empathy, they don't have emotion. They don't know how to do it, they didn't understand the resolution. So we're actually changing this."*

In this example, the teachers were able to address their own misconceptions and insights regarding the students' potential to master specific assessment formats (Moon, 2005).

USING ONE-ON-ONE EXPLANATIONS: As part of the scaffolding strategy, teachers used individualised explanations to differentiate learning processes for the students.

Teacher: *"So I'll have the child in and I'll say, 'What's the problem? You've got maths, English and science. It was due last week. What's the problem?' Half the time they'll burst into tears, so okay, 'When was it due?' Whatever. 'What is the task?' [and they say] 'I don't know'. I would say, 'But your teacher just told me that they explained it to you.' 'I still didn't understand.' I ask, 'So did you go back to the teacher and say you still didn't understand?' 'No.' 'Okay, if I got the task out for you and I ask the teacher what it is, will you do with me?' They usually say, 'Yes'. They're in the classroom and they're embarrassed to say, 'I don't understand'. This is a big problem every term, a huge problem."*

MAINTAINING REGULAR CONTACT WITH PARENTS: The teachers at this school also indicated that they used the daily classroom interactions with their students as forms of data that they were able to build understandings of their students, and consequently routinely inform parents of their child's progress, rather than quarterly at reporting periods.

Teacher: *"Because the school is so small, we're in contact with the parents on a regular basis. So we try and encourage staff as well that if a kid is struggling or something's - don't leave it till the last minute, until the reports go home. Just keep informing the parents along the way. So we're in constant contact with parents."*

4. Questions for discussion:

1. Is moderation a useful or necessary strategy to ensure consistency of teacher judgements when schools use differentiated assessment? What are the features or processes that should be used for an effective assessment moderation process with differentiated assessment?
2. What types of leadership and support structures would be needed to encourage and stimulate professional dialogue in (a) this school context and, (b) your school context?
3. Apart for the feedback strategies identified in this case study, what other strategies or practices could be used for providing feedback to students? Would approaches to feedback be different for students undertaking the differentiated assessment tasks?
4. Which data sources could be used to support the delivery of feedback to students? How could the teacher ensure the student understands the feedback and what is required to improve their learning outcomes?

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Appendix A: Annotated bibliography

ACARA. (2011). Australian Curriculum, Assessment and Reporting Authority. Retrieved 12 August, 2013, from http://www.acara.edu.au/assessment/assessment.html

ACARA is the independent authority responsible for the development of a national curriculum, a national assessment program, and a national data collection and reporting program that supports 21st century learning for Australian students.

Allal, L. (2013). Teachers' professional judgement in assessment: A cognitive act and a socially situated practice. *Assessment in Education: Principles, Policy & Practice, 20*(1), 20-34.

This paper presents a study of teachers' professional judgement in the area of summative assessment. It adopts a situated perspective on assessment practices in classroom and school settings. The study is based on interviews with 10 sixth-grade teachers and on the assessment documents they used when determining end-of-term grades in students' report cards. The main findings from qualitative data analysis highlight both the individual cognitive and the socially situated aspects of teachers' judgements. The findings are discussed with respect to three levels of teacher judgement and the implications for activities of social moderation.

Allen, R. (2005). *Using the evidence of student achievement for improvements at individual, class and school level*. Paper presented at the Using data to support learning, Melbourne. Retrieved September, 2013 from http://www.acer.edu.au/documents/RC2005_RegAllen.pdf

Techniques using student work as direct and visible evidence of achievement, of the repertoires of practice of students and teachers, provide a powerful opportunity for teachers and schools seeking to improve the learning of the students they have. This is a purpose different from that of the analyst modelling patterns in large data sets of test scores or the concerns with complex causality found in small-n studies and the methods consequently differ. Critical elements of techniques for using student work include the value of seeking a student, rather than subject or teacher, perspective, open to both the official – what is recognised as part of school – and the unofficial – unrecognised factors that underpin students' practices. This paper describes the nature, use and importance of some powerful techniques through which teachers can use data to improve student learning.

American Association of School Administrators. (2002). *Using data to improve schools: What's working*. Retrieved 7 August, 2013, from http://www.aasa.org/uploadedFiles/Policy_and_Advocacy/files/UsingDataToImproveSchools.pdf

School system leaders are discovering the power of data for promoting school improvement. With recent advances in technology and the increased demand for assessing

student learning, an unprecedented amount of data are available to educators. School districts across America are beginning to use the tools necessary to make effective use of the data. In addition to test scores, many educators are collecting data about citizenship, character, healthy lifestyles, school climate and parental and community involvement. Using Data to Improve Schools: What's Working is an easy-to-read guide to using data to drive school improvement. School system leaders and their staffs can learn from this book how to build a district-wide culture of inquiry that values the use of data for sound decision-making. School board members, parents and community members interested in helping improve schools will find tools for their work as well in this guide. It describes the challenges and the successes of educators from districts both large and small committed to using data.

Armstrong, J., & Anthes, K. (2001). How data can help: Putting information to work to raise student achievement. *American School Board Journal, 188*(11), 38-41.

What do you do with the reams of information your state sends every year, showing how your students performed on the state's student assessment program? Some school districts take this information—and add more of their own—to improve their curriculum, their teaching strategies, and their overall student achievement. As researchers at the Education Commission of the States (ECS), we wanted to understand how districts can use data most effectively. So this past spring we set out to conduct interviews in six school districts in five different states (California, Colorado, Iowa, Maryland, and Texas) that had reputations as exemplary data users.

Axworthy, D. (2005). *Turning data into information that improves learning: The WA experience*. Paper presented at the Using data to support learning, Melbourne. Retrieved September 2013, from www.acer.edu.au/documents/RC2005_DavidAxworthy.pdf

This paper will look at some examples of the way in which the Western Australian Department of Education and Training is presenting student performance data and transforming it into information to assist teachers to modify their teaching practices and improve the learning of their students.

Barnes, F. D. (2004). *Inquiry and action: Making school improvement part of daily practice*. Providence, RI: Annenberg Institute for School Reform, Brown University.

The School-Improvement Guide describes a school self-study cycle of inquiry and action, designed to help a school community develop the habits of collaboration, discussion, inquiry, and data-informed decision making that fuel ongoing improvement.

Bedwell, L. E. (2004). Data-driven instruction. *Phi Delta Kappa, 516*, 3, 7-33.

Bedwell comments that teachers are in the midst of an assessment revolution. Educators are coerced into becoming instruments of the statewide testing program in order to

convince the public that all is well in the schools. It can be argued that schools do not actually need drastic reform but merely steady improvement at the instructional level.

Bernhardt, V. L. (2009). *Data, data everywhere: Bringing all the data together for continuous school improvement*. Larchmont, NY: Eye on Education.

This book describes what it takes to increase student achievement at every grade level, subject area, and student group. Readers will learn how to use data to drive their continuous improvement process as they develop an appreciation of the various types of data, uses for data, and how data are involved with the school improvement process.

Bernhardt, V. L. (2009). *From questions to actions: Using questionnaire data for continuous school improvement*. Larchmont, NY: Eye On Education.

Victoria L. Bernhardt and Bradley J. Geise explain how to collect and analyse data with an eye toward positive change. In addition to gaining an overview of the questionnaire process, you'll learn to start with your survey's purpose, create questionnaires that get valuable answers, analyse data, share results in a dynamic way, use meaningful data to understand the needs of teachers and students, and then implement targeted improvement plans.

Bernhardt, V. L. (2013). *Translating data into information to improve teaching and learning*. Moorabbin, Vic: Hawker Brownlow.

This book helps educators think through the selection of the data elements and data tools needed to support quality decisions for improving teaching and learning. It shows you how to use data to help make decisions about strategies to improve student achievement.

Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2003). *Assessment for learning: Putting it into practice*. Maidenhead: Open University Press.

This book gives teachers, school heads, and other leaders and trainers ideas and advice about improving formative assessment in the classroom, based on two years of work in a project that involved the team of authors at King's College working with 36 teachers in schools.

Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2004). Working inside the black box: Assessment for learning in the classroom. *Phi Delta Kappan, 86*(1), 18-21.

In their widely read article “Inside the Black Box,” Mr. Black and Mr. Wiliam demonstrated that improving formative assessment raises student achievement. Now they and their colleagues report on a follow-up project that has helped teachers change their practice and students change their behavior so that everyone shares responsibility for the students’ learning.

Black, P., & Wiliam, D. (1998). Inside the Black Box: Raising Standards through Classroom Assessment. *Phi Delta Kappan, 80*(2), 139-144, 146-148.

Firm evidence shows that formative assessment is an essential component of classroom work and that its development can raise standards of achievement, Mr. Black and Mr. Wiliam point out. Indeed, they know of no other way of raising standards for which such a strong prima facie case can be made.

Black, P., & Wiliam, D. (2005). Lessons from around the world: How policies, politics and cultures constrain and afford assessment practices. *Curriculum Journal, 16*(2), 249-261.

This article outlines the main assessment traditions in four countries – England, France, Germany and the United States – in order to explore the prospects for the integration of summative and formative functions of assessment during compulsory schooling. In England, teachers' judgments do feed into national assessments, at 7, 11, 14 and 16, but concerns for reliability and accountability mean that such judgments are made in a way that has little impact on learning. In France, teachers have no involvement in the formal assessment of students, and, possibly as a result, have been free to concentrate on the use of assessment to serve learning. In Germany, faith in the education system has been considerably undermined by recent unfavourable international comparisons, although faith in the ability of tests both to measure learning accurately and to allocate students to different educational pathways appears to be unshaken. In the United States, multiple demands for accountability at different levels of the system have resulted in multiple assessment systems, but these tend to be focused on measuring the amount of learning that has taken place, providing little insight into how it might be improved. It is concluded that the effective integration of formative and summative functions of assessment will need to take different forms in different countries, and is likely to be extremely difficult.

Bobis, J. (2009). *Count me in too: The learning framework in number and its impact on teacher knowledge and pedagogy*. Sydney: NSW Department of Education & Training.

This study is concerned with teacher professional learning and the impact of this learning on teaching practices. Its focus is on teacher knowledge of the Learning Framework In Number [LFIN] from the Count Me In Too [CMIT] numeracy project operating in Department of Education & Training (DET) schools across New South Wales (NSWDET, 2007). In particular, the study addresses the following research questions: 1. What are teachers' perceptions about the degree to which CMIT is being implemented at the school and classroom levels? 2. What are teachers' perceptions about the extent of their knowledge of the Learning Framework In Number? 3. Do teachers perceive that the Learning Framework In Number has impacted on teaching practices at the school, classroom and student levels? If so, how? If not, why? 4. How confident do teachers feel about identifying children's levels of mathematical development on the LFIN? 5. To what extent is the CMIT planning matrix a useful tool for identifying the level of reported implementation of the program at the school and classroom levels?

Bobis, J., Clarke, B., Clarke, D., Gould, P., Thomas, G., Wright, B., & Young-Leveridge, J. (2005). Supporting teachers in the development of young children's mathematical thinking: Three large scale cases. *Mathematics Education Research Journal, 16*(3), 27–57.

Recognition of the importance of the early childhood years in the development of numeracy is a significant characteristic of the New Zealand Numeracy Development Project, the Victorian Early Numeracy Research Project and the Count Me In Too program in New South Wales, Australia. This article outlines the background, key components and major impacts of these three innovative and successful professional development and research initiatives. Juxtaposing the three projects highlights important commonalities—research-based frameworks, diagnostic interviews, and whole-school approaches to professional development. Each program has been significant in rethinking what mathematics and how mathematics is taught to young children.

Boomer, G., Lester, N., Onore, C., & Cook, J. (Eds.). (1992). *Negotiating the curriculum: Educating for the 21st century*. London: Falmer.

This work presents an ongoing international dialogue about the theory and practice of curriculum negotiating in the classroom at elementary, primary, secondary and university levels.

Boudett, K. P., City, E. A., & Murnane, R. J. (Eds.). (2005). *Data Wise: A step-by-step guide to using assessment results to improve teaching and learning*. Cambridge, MA: Harvard Education Press.

In the wake of the accountability movement, school administrators are inundated with data about their students. How can they use this information to support student achievement? This book presents a clear and carefully tested blueprint for school leaders. It shows how examining test scores and other classroom data can become a catalyst for important schoolwide conversations that will enhance schools' ability to capture teachers' knowledge, foster collaboration, identify obstacles to change, and enhance school culture and climate.

Boudett, K. P., City, E. A., & Murnane, R. J. (2006). The "Data Wise" Improvement Process. *Principal Leadership, 7*(2), 53-56.

The barriers to constructive, regular use of student assessment data to improve instruction can seem insurmountable. There is just so much data. Where do you start? How do you make time for the work? How do you build your faculty's a culture that focuses on improvement, not blame? How do you maintain momentum in the face of all the other demands at your school?

Boudett, K. P., & Steele, J. L. (Eds.). (2007). *Data Wise in action: Stories of schools using data to improve teaching and learning*. Cambridge, MA: Harvard Education Press.

What does it look like when a school uses data wisely? "Data Wise in Action", a new companion and sequel to the bestselling "Data Wise", tells the stories of eight very different schools following the Data Wise process of using assessment results to improve teaching and learning. "Data Wise in Action" highlights the leadership challenges schools face in each phase of the eight-step Data Wise cycle and illustrates how staff members use creativity and collaboration to overcome those challenges. "Data Wise in Action" builds on the work of leading faculty and graduate students at the Harvard Graduate School of Education, who joined with exemplary practitioners in 2005 to produce "Data Wise: A Step-by-Step Guide to Using Assessment Results to Improve Teaching and Learning". Since its publication, "Data Wise" has been read by thousands of school leaders, many of whom have shared the book with colleagues and staff. The success of the original book has generated a new demand among school leaders: to hear real stories from schools that are implementing the Data Wise process. "Data Wise in Action" answers that need. It offers both inspiration and practical guidance for school leaders.

Brunner, C., Fasca, C., Heinze, J., Honey, M., Light, D., & Mardinach, E. W., Dara. (2005). Linking data and learning: The Grow Network Study. *Journal of Education for Students Placed at Risk (JESPAR), 10*(3), 241-267.

During the last decade, standards, assessments, and accountability have emerged as three prongs of a national education reform movement that has asked district and school administrators to think very differently about educational decision making and the use of data. However, research about data-driven decision making is limited, especially concerning teachers. This article describes findings from a 2-year exploratory study that examined how educators within the New York City public school system are using data—made available to teachers through the print- and Web-based reporting systems of the Grow Network—to inform decisions about teaching and learning. In this article, we summarize what we learned about the specific ways in which teachers and administrators make use of the Grow Reports® to inform educational practices.

Coburn, C. E., & Talbert, J. E. (2006). Conceptions of Evidence Use in School Districts: Mapping the Terrain. *American Journal of Education, 112*(4), 469-495.

Current policies place unprecedented demands on districts to use evidence to guide their educational improvement efforts. How districts respond is likely to be influenced by how individuals in the district conceptualize what it means to use evidence in their ongoing work. This study draws on sense-making and institutional theory to investigate how individuals in one urban school district conceive of evidence-based practice. The study develops grounded typologies that describe the ways that individuals conceptualize high-quality evidence, appropriate evidence use, and high-quality research. It then explains variation in conceptions, pointing to the ways organizational responsibilities and reform

history shape how individuals come to understand evidence-based practice. The article closes by suggesting implications for district response to federal policy demands for evidence-based practice.

Darling-Hammond, L., Ancess, J., & Falk, B. (1995). *Authentic assessment in action: Studies of schools and students at work*. New York: Teachers College Press.

This book examines, through case studies of elementary and secondary school classrooms, how five schools have developed "authentic," performance-based assessments of students' learning, and how this work has influenced the teaching and learning experiences students encounter in school. This important and timely book reveals the changing dynamics of classroom life as it moves from more traditional pedagogy to one which asks students to master intellectual and practical skills that are eminently "transferable" to "real-life" social settings and workplaces.

Datnow, A., Park, V., & Kennedy, B. L. (2008). *Acting on data: How urban high schools use data to improve instruction*. Los Angeles: Center on Educational Governance, University of Southern California.

The above statement is from a principal in a high-performing, urban charter high school where educators are committed to using data to inform their instruction. As she suggests, a "data-driven" teacher uses formative assessment data on a regular basis to make adjustments to his or her instructional plan. Moreover, a teacher truly committed to improving student achievement is not willing to settle, but expects all of his or her students to reach high standards. In recent years, an increasingly clear and persuasive body of research is demonstrating what common sense tells us: that high-performing schools and school systems use student data in all facets of their work to continuously inform and improve their instruction. Successful practices that involve the instructional uses of data have been demonstrated and documented in elementary schools. At the high school level, these practices appear to be more difficult to design and to take longer to implement in replicable, consistent, and successful ways. Despite this, several pioneering secondary schools—and the school systems of which they are part—are making significant inroads in using data to improve instruction and hence to improve student outcomes. While still imperfect and occasionally idiosyncratic, these exemplars offer valuable lessons for all secondary schools relentlessly focused on improving their students' achievement. This study of data-driven instructional decision making at the secondary level examined four urban high schools and districts across the U.S. where instructional data practices are taking hold; each was identified as a leader in this area. Our study included two high schools belonging to traditional school districts and two that were part of nonprofit charter school management organizations (CMOs). All of these schools have records of improving student achievement over time.

Datnow, A., Park, V., & Wohlstetter, P. (2007). *Achieving with Data: How high-performing school systems use data to improve instruction for elementary students.* California: Center on Educational Governance, University of Southern California.

Using data to improve decision making is a promising systemic reform strategy. However, there is a dearth of rigorous research conducted thus far on this practice. Recently, New Schools Venture Fund in San Francisco set an agenda to help fill this research gap. As part of a study of data-driven decision making, we were fortunate to visit schools and districts where practices, such as the one depicted in the above quote, are indeed becoming commonplace. In this report, we capture the work of four school systems that were identified as leaders in data-driven decision making. Our study included two mid-size urban school districts and two non-profit charter management organizations (CMOs). All of these school systems have records of improving student achievement over time.

Dixon, H. R., Hawe, E., & Parr, J. (2011). Enacting assessment for learning: The beliefs practice nexus. *Assessment in Education: Principles, Policy & Practice, 18*(4), 365-379.

Engagement in self and peer assessment are authentic ways in which students can develop evaluative and productive knowledge and expertise, necessary prerequisites if they are to become autonomous learners. Teachers in the current study who had articulated similar beliefs in regard to the importance of developing student autonomy and who had described similar practices to develop self-monitoring behaviour were observed teaching a written language unit. However, the ways these practices 'played out' in the classroom was a matter of considerable variation in regard to the nature of the judgements made, the degree of student involvement in evaluative and productive activities, and the amount of control maintained by the teacher. Two particular cases are used to draw attention to teachers' espoused beliefs and their congruence with practice. Given the powerful role that beliefs play in the enactment of specific assessment for learning practices, recommendations for teacher professional development are made.

Earl, L. (2005). *From accounting to accountability: Harnessing data for school improvement*. Paper presented at the Using data to support learning, Melbourne. Retrieved September 2013, from http://www.acer.edu.au/documents/RC2005_Earl.pdf

There was a time in education when decisions were based on the best judgements of the people in authority. It was assumed that school leaders, as professionals in the field, had both the responsibility and the right to make decisions about students, schools and even about education more broadly. They did so using a combination of intimate and privileged knowledge of the context, political savvy, professional training and logical analysis. Data played almost no part in decisions. In fact, there was not much data available about schools. Instead, leaders relied on their tacit knowledge to formulate and execute plans.

Earl, L., & Fullan, M. (2003). Using data in leadership for learning. *Cambridge Journal of Education, 33*(3), 383-394. doi: 10.1080/0305764032000122023

School leaders are faced with the daunting task of anticipating the future and making conscious adaptations to their practices, in order to keep up and to be responsive to the environment. To succeed in a rapidly changing and increasingly complex world, it is vital that schools grow, develop, adapt and take charge of change so that they can control their own futures. This paper will examine the tension that exists for school leaders in relation to data about their schools and their students, arguing that the explicit connections between data and large-scale reforms make it impossible to avoid a critical approach to data, drawing on research in Ontario and Manitoba in Canada, and examining parallels with evidence from research in England, to highlight the challenges involved in using data effectively in different political contexts and mandated policies on the uses of data.

Earl, L., & Katz, S. (2002). Leading schools in a data-rich world. In K. Leithwood & P. Hallinger (Eds.), *Second international handbook of educational leadership and administration* (pp. 1003-1024). Dordrecht, Netherlands: Kluwer.

Each week we receive the Times Educational Supplement from England and Education Week from the US. Between us, we also subscribe to several Canadian newspapers and a number of educational journals and popular magazines from different countries. A quick glance at any of these publications makes it very clear that there is no escaping the presence of data in education. As researchers whose stock in trade is "data", we have become increasingly interested in the role that data have to play in educational change, particularly in how school and district leaders feel about, understand, and use the mountains of data that are being generated about schools.

Earl, L., & Torrance, N. (2000). Embedding accountability and improvement into large-scale assessment: What difference does it make? *Peabody Journal of Education, 75*(4), 114-141.

Assessment-led reform has become one of the most widely favored strategies to promote more credible forms of public accountability (Black, 1998). Unlike the assessment agenda of the 1960s and 1970s, assessment programs in the 1990s and beyond are part of a broader scheme for changing education. Large-scale assessment has become the vehicle of choice for accountability purposes around the world, and testing has become the lever for holding schools accountable for results (Firestone, Mayrowetz, & Fairman, 1998). Assessment reform, like other educational initiatives, is not singular, nor is it static. Like other reform efforts, it is caught in a maelstrom of rapid change and uncertainty. The knowledge base on assessment is being developed as the assessment procedures are being implemented, and many states, provinces, and countries are on a quest for the "best" approach.

Education Commission of the States. (n.d.). *No Child Left Behind issue brief: Data-driven decision-making*, Retrieved September 2013, from http://www.ecs.org/clearinghouse/35/52/3552.pdf

Nearly every state reports annually to districts on how well their schools and students are meeting state standards. With schools being held accountable for helping all children achieve state standards, and assessment data measuring how well schools and students are meeting those standards, the question is: How can districts support schools' use of data, and what types of data can be used to make decisions that improve student and school performance?

Education Services Australia. (n.d.*). Assessment for learning*. Retrieved 1 August, 2013, from http://www.assessmentforlearning.edu.au/default.asp

The Assessment for Learning website has been developed by Curriculum Corporation on behalf of the education departments of the States, Territories and Commonwealth of Australia.

Eltis, K. J. (2003). *Time to teach, time to learn: Report on the evaluation of outcomes assessment and reporting in NSW government schools.* State of NSW: Department of Education and Training.

The Evaluation being reported on had its origins late in 2002 when the NSW Teachers Federation approached the then Minister for Education and Training, the Hon John Watkins MP, with the request that a study be undertaken of demands created for teachers as a result of the introduction of outcomes assessment and reporting. The Minister agreed that an Evaluation should take place and asked if I would conduct the study, having completed a similar exercise in 1995. Agreement was reached on Terms of Reference and Associate Professor Stephen Crump from the Faculty of Education and Social Work at the University of Sydney agreed to work with me. We began our work in February 2003.

Even, R. (2005). Using assessment to inform instructional decisions: How hard can it be? *Mathematics Education Research Journal, 17*(3), 45-61.

In this article, two problems associated with the expectation that teachers use contemporary assessment techniques are examined. The first problem relates to teachers' sense-making of assessment data. Illustrative cases revealed that teachers' processes of interpretation of students' understanding, knowledge and learning of mathematics draws on a rich knowledge base of understandings, beliefs, and attitudes. Consequently, the process of sense-making of students' mathematical understandings involves ambiguity and difficulty. The second problem relates to ways of helping teachers adopt contemporary assessment approaches. A professional development activity served as the example examined. Three aspects of what the course instructor promoted with respect to contemporary assessment were analysed: (1) the assessment methods and tools advocated in the course, (2) the degree to which the integration of assessment with instruction was

promoted, and (3) the purposes for assessment highlighted in the course. It appeared that attention was paid to the use of contemporary assessment tools, but this was associated with traditional assessment purposes. Learning to use the new assessment tool did, however, influence instruction and fostered greater integration of assessment and instruction than before--a characteristic of contemporary assessment. The article concludes with a discussion of the current expectation that teachers use assessment data to improve instruction.

Feldman, J., & Tung, R. (2001). *Whole school reform: How schools use the data-based inquiry and decision making process*. Paper presented at the American Educational Research Association, Seattle. Retrieved September 2013, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.78.1885&rep=rep1&type=pdf

In the current culture of high-stakes tests, school accountability, and standards, schools are under increasing external pressure. Schools are inundated with a wide variety of data and are looking for ways to understand how to interpret the data that is provided to them, as well as how to use the process of inquiry to improve the quality of instruction offered by their school. Many schools are currently working with data in limited ways, often as a reactionary response to external pressure, with little thought given to what the process can do for the school. Few schools use a process of data-based inquiry and decision making (DBDM) which includes the whole faculty in looking at and thinking about data, with a goal of creating an inquiry-minded school. “Inquiry-minded schools recognize that improving teaching and learning is an intentional and ongoing process” (Rallis & MacMullen, 2000).

Frederiksen, J. R., & White, B. Y. (2004). Designing assessments for instruction and accountability: An application of validity theory to assessing scientific inquiry. *Yearbook of the National Society for the Study of Education, 103*(2), 74-104.

This chapter is concerned with how assessments of students’ work in classrooms, although primarily intended to promote learning, can also become an important source of information for evaluating a school’s effectiveness within an accountability system (Shepard, 2000). On the face of it, formative assessment practices used in the classroom to support learning and summative assessments used for accountability purposes seem to be incompatible. In their classroom activities, students know ahead of time the tasks on which they will be assessed, and they can prepare for them and get help in doing them. In addition, teachers’ judgments of their students’ work could be influenced if their classroom assessments were to be used for accountability purposes. For reasons such as these, assessments used for accountability typically are external assessments based on tasks that are not known to the students or the teacher; they often use items that are objectively scored; and they are scored externally (Baker, Linn, Herman, & Koretz, 2002; Linn, 2000).

Fullan, M., Hill, P., & Crevola, C. (2006). *Breakthrough*. Thousand Oaks, CA: Corwin.

Breakthrough presents a revolutionary new approach to educational reform, breaking away from the conventional paradigm to help educators create focused instruction, transform the classroom experience, and dramatically raise, and sustain, performance levels for students and teachers alike. This book provides the breakthrough concepts needed for developing precise, validated, data-driven instruction personalised to each and every student.

Gallagher, L., Means, B., & Padilla, C. (2008). *Teachers' use of student data systems to improve instruction: 2005 to 2007*. Washington, D.C.: US Department of Education, Office of Planning, Evaluation and Policy Development.

The following findings are based on analyses of national survey data from district technology coordinators and teachers from 2005 and 2007:

- There was a significant increase in teacher-reported access to electronic student data systems between 2005 and 2007—from 48 percent to 74 percent.
- Even so, teachers are more likely to report having electronic access to students' grades and attendance than to achievement data: Only 37 percent of all teachers reported having electronic access to achievement data for the students in their classrooms in 2007.
- Teachers express a desire for more professional development around the use of data, and those teachers who do feel better-than-average support from their colleagues and schools for working with data are more likely to use student data for instructional purposes.

Gardner, J. (Ed.). (2013). *Assessment and learning* (2 ed.). Los Angeles: SAGE.

Key areas of assessment for learning covered in this volume include the practice of assessment for learning in the classroom, developing motivation for learning, professional learning and assessment for learning, and assessment and theories of learning.

Gipps, C. V. (1994). *Beyond testing: Towards a theory of educational assessment*. London: FalmerPress.

Assessment has been developing at a rapid rate during the 1990s, and issues surrounding this development have been examined and re-thought by various key researchers. Examination of the technical issues of the effect of assessment on curriculum and teaching, and the relationship with learning criterion-referenced, teacher and performance assessment is provided in this book. Drawing together analyses, it offers a framework for educational assessment.

Gorard, S. (2001). The role of secondary data in combining methodological approaches. *Educational Review, 54*(3), 231-237.

This paper contains a plea for the greater use of numeric secondary data as a routine part of all studies, whatever their primary method. It starts with a rehearsal of the current poor public image of UK educational research, and some of the possible reasons for that. This rehearsal includes consideration of the limitations in some examples of influential work by established researchers. The paper continues with a summary of the reasons for using secondary data, and one example of a project based solely on secondary data. It concludes that the purportedly poor quality of some UK educational research, allied to the potential of secondary data, might actually empower novice researchers, enabling them to critique established work and to conduct powerful and informative analyses of their own.

Hall, K., Conway, P. F., Rath, A., Murphy, R., & McKeon, J. (2008). *Reporting to parents in primary school: Communication, meaning and learning*. Dublin, Ireland: National Council for Curriculum and Assessment (NCCA).

How schools report to parents about the learning of their children is becoming increasingly important and challenging in the light of a) new developments and understanding about learning and assessment, b) Ireland's relatively recent cultural diversity, and c) recent legislation and official policy highlighting how schools are accountable to students, parents and the State. The NCCA's Reporting Children's Progress in Primary Schools endorses the role of parents, as partners with schools, in extending children's learning. School reporting practices are central to this role. The nature of these practices is the theme of this NCCA-commissioned study. In terms of assessment policy and practice, we note that reporting is more closely linked with summative than formative assessment (as indicated in the shaded column in Table 1). As such, in terms of formal reporting at both parent-teacher meetings and in relation to written report cards the emphasis is on 'what has been learned by students to date', that is, 'assessment of learning' (AoL).

Halverson, R. (2010). School formative feedback systems. *Peabody Journal of Education, 85*(2), 130-146.

Data-driven instructional improvement relies on developing coherent systems that allow school staff to generate, interpret, and act upon quality formative information on students and school programs. This article offers a formative feedback system model that captures how school leaders and teachers structure artefacts and practices to create formative information flows across interventions, assessments, and actuation spaces. A formative feedback system model describes the organizational capacity upon which innovations such as comprehensive school reforms, benchmark assessment systems, and student behavior management systems draw to improve teaching and learning in schools.

Hamilton, L., Halverson, R., Jackson, S., Mandinach, E., Supovitz, J., & Wayman, J. (2009). *Using student achievement data to support instructional decision making* (NCEE 2009-4067). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

As educators face increasing pressure from federal, state, and local accountability policies to improve student achievement, the use of data has become more central to how many educators evaluate their practices and monitor students' academic progress. Despite this trend, questions about how educators should use data to make instructional decisions remain mostly unanswered. In response, this guide provides a framework for using student achievement data to support instructional decision making. These decisions include, but are not limited to, how to adapt lessons or assignments in response to students' needs, alter classroom goals or objectives, or modify student-grouping arrangements. The guide also provides recommendations for creating the organizational and technological conditions that foster effective data use. Each recommendation describes action steps for implementation, as well as suggestions for addressing obstacles that may impede progress. In adopting this framework, educators will be best served by implementing the recommendations in this guide together rather than individually.

Hargreaves, A., Earl, L., & Schmidt, M. (2002). Perspectives on alternative assessment reform. *American Educational Research Journal, 39*(1), 69-95.

This article examines classroom assessment reform from four perspectives: technological, cultural, political, and postmodern. Each perspective highlights different issues and problems in the phenomenon of classroom assessment. The technological perspective focuses on issues of organization, structure, strategy, and skill in developing new assessment techniques. The cultural perspective examines how alternative assessments are interpreted and integrated into the social and cultural context of schools. The political perspective views assessment issues as being embedded in and resulting from the dynamics of power and control in human interaction. Here assessment problems are caused by inappropriate use, political and bureaucratic interference, or institutional priorities and requirements. Last, the postmodern perspective is based on the view that in today's complex and uncertain world, human beings are not completely knowable and that "authentic" experiences and assessments are fundamentally questionable. Using a semi-structured interview protocol, teachers were asked about their personal understanding of alternative forms of assessment; about how they had acquired this understanding; how they integrated changes into their practices; what these practices looked like; what successes and obstacles they encountered during implementation; and what support systems had been provided for them.

Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. London: Routledge.

In November 2008, John Hattie's ground-breaking book Visible Learning synthesised the results of more than fifteen years research involving millions of students and represented the biggest ever collection of evidence-based research into what actually works in schools to improve learning. Visible Learning for Teachers takes the next step and brings those ground breaking concepts to a completely new audience. Written for students, pre-service and in-service teachers, it explains how to apply the principles of Visible Learning to any classroom anywhere in the world. The author offers concise and user-friendly summaries of the most successful interventions and offers practical step-by-step guidance to the successful implementation of visible learning and visible teaching in the classroom.

Hattie, J., & Anderman, E. M. (Eds.). (2013). *International guide to student achievement*. New York: Routledge.

The International Guide to Student Achievement brings together and critically examines the major influences shaping student achievement today. There are many, often competing, claims about how to enhance student achievement, raising the questions of "What works?" and "What works best?" World-renowned bestselling authors, John Hattie and Eric M. Anderman have invited an international group of scholars to write brief, empirically-supported articles that examine predictors of academic achievement across a variety of topics and domains.

Rather than telling people what to do in their schools and classrooms, this guide simply provides the first-ever compendium of research that summarizes what is known about the major influences shaping students' academic achievement around the world. Readers can apply this knowledge base to their own school and classroom settings. The 150+ entries serve as intellectual building blocks to creatively mix into new or existing educational arrangements and aim for quick, easy reference. Chapter authors follow a common format that allows readers to more seamlessly compare and contrast information across entries, guiding readers to apply this knowledge to their own classrooms, their curriculums and teaching strategies, and their teacher training programs.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81-112.

Feedback is one of the most powerful influences on learning and achievement, but this impact can be either positive or negative. Its power is frequently mentioned in articles about learning and teaching, but surprisingly few recent studies have systematically investigated its meaning. This article provides a conceptual analysis of feedback and reviews the evidence related to its impact on learning and achievement. This evidence shows that although feedback is among the major influences, the type of feedback and the way it is given can be differentially effective. A model of feedback is then proposed that

identifies the particular properties and circumstances that make it effective, and some typically thorny issues are discussed, including the timing of feedback and the effects of positive and negative feedback. Finally, this analysis is used to suggest ways in which feedback can be used to enhance its effectiveness in classrooms.

Hill, M. F. (2009). Ways of seeing: using ethnography and Foucault's `toolkit' to view assessment practices differently. *Qualitative Research, 9*(3), 309-330.

Tamboukou and Ball ask, what value can genealogy and/or ethnography add to the other? This article illustrates, through an educational exemplar study, how being genealogically driven can produce new ways of seeing and thinking about practices, within the field of educational assessment. To date, neither the qualitative nor the quantitative methods customarily applied to the assessment field have been able to illuminate why, since the late 1980s, accountability demands have caused New Zealand primary school teachers to prioritize the use of summative classroom assessment practices when research indicates that formative practices are clearly more productive of learning. Using ethnographic data gathering techniques and grounded theory in combination with Foucauldian tools and notions of genealogy, discourses, surveillance, and 'the history of the present', it is argued, enabled new ways to think about why teachers have normalized particular assessment practices in New Zealand's self-managing schools. In short, this article argues that it is extremely helpful to mix modernist ethnographic methods that focus on the micro-practices of teaching with post-modernist theoretical tools in order to provide different ways of seeing.

Hill, M. F. (2011). 'Getting traction': Enablers and barriers to implementing Assessment for Learning in secondary schools. *Assessment in Education: Principles, Policy & Practice, 18*(4), 347-364.

While there is clear evidence that using classroom assessment for learning can improve learning significantly, research has demonstrated that it is particularly challenging for secondary teachers to change their practices in an assessment for learning direction. Many factors have been suggested as inhibiting change in these schools. Some studies do link improved student outcomes to changes in teaching brought about through professional development. They suggest that the same factors enhance professional learning in primary and secondary schools. However, the way large secondary schools are organised by subject departments exerts enormous influence on how professional learning in the sector can and should be structured. The results of three success case studies demonstrated the critical impact of school-level factors on changing assessment for learning practices in secondary schools. These factors enabled these three schools to address the departmental constraints and supported cross-curricular professional learning in assessment for learning.

Huffman, D., & Kalnin, J. (2003). Collaborative inquiry to make data-based decisions in schools. *Teaching and Teacher Education, 19*, 569-580.

The purpose of this study was to investigate the impact of a long-term collaborative inquiry project for diverse teams of teachers, administrators, school board members, and parents. The teams engaged in collaborative inquiry to collect and analyse local data to make data based decisions about how to improve teaching and learning. The results suggest the collaborative inquiry not only positively influenced the teachers, but also helped them engage in a continuous improvement process that allowed them to take more ownership over local data and expand their role in their schools' decision-making processes.

Ingram, D., Seashore Louis, K., & Schroeder, R. G. (2004). Accountability policies and teacher decision making: Barriers to the use of data to improve practice. *Teachers College Record, 106*(6), 1258–1287.

One assumption underlying accountability policies is that results from standardized tests and other sources will be used to make decisions about school and classroom practice. We explore this assumption using data from a longitudinal study of nine high schools nominated as leading practitioners of Continuous Improvement (CI) practices. We use the key beliefs underlying continuous improvement derived from educational applications of Deming's TQM models and organizational learning to analyse teachers' responses to district expectations that they would use data to assess their own, their colleagues', and their schools' effectiveness and to make improvements. The findings suggest that most teachers are willing, but they have significant concerns about the kind of information that is available and how it is used to judge their own and colleagues' performance. Our analysis reveals some cultural assumptions that are inconsistent with accountability policies and with theories of continuous improvement and organizational learning. We also identify barriers to use of testing and other data that help to account for the limited impacts.

Kelly, A., & Downey, C. (2010). *Using effectiveness data for school improvement: Developing and utilising metrics* (eBook ed.). London: Taylor and Francis.

Data metrics in schools are becoming increasingly complex, but despite their best efforts, teachers and academics generally find them something of a 'black-box'. This book lifts the lid on that box, exploring the provenance and problematization of existing techniques and developing new algorithms for measuring the more oblique aspects of in-school performance. Using contextual value-added measures in England as a foundation - they have become the template of choice for policy-makers around the world and a basis for some excellent school effectiveness research - the book explores the potential of performance and progress data to guide student and teacher self-evaluation, to set targets and allocate resources, to evaluate initiatives and identify good practice, to assess and reward staff responsibility, and to inform policy in relation to emerging issues like school choice, equality of opportunity and post-compulsory progression. Using Effectiveness Data

for School Improvement brings together for the first time in one place the various metrics and models, and their basis in research. A full technical specification is included so that both 'data experts' and 'data novices', academics and practitioners, can use the book to understand and maximize what is potentially a hugely transforming, but under-utilized, resource and an increasingly important aspect to school and curriculum management.

Kennedy, B. L., & Datnow, A. (2011). Student involvement and data-driven decision making: Developing a new typology. *Youth Society, 43*(4), 1246-1271.

Existing literature supports the inclusion of students in education reform, documenting benefits for both students and educators. When student voice is not included in reform efforts, these efforts are more likely to flounder. The emerging educational reform of data-driven decision making (DDDM) offers promise for increasing student achievement. However, scant research documents the involvement of students in DDDM reforms. Using a theoretical framework that advocates for democratically involving students in education reform, this cross-case analysis examines the role of students in DDDM reforms in elementary and high schools known to be exemplars of data-driven decision making. Based on findings of efforts made by exemplar districts as well as actions they did not take to involve students, the authors conclude that a new typology is necessary for assessing student involvement in DDDM. Consequently, the authors propose a new three-tiered typology for conceptualizing this phenomenon.

Kerr, K. A., Marsh, J. A., Schuyler Ikemoto, G., Darilek, H., & Barney, H. (2006). Strategies to promote data use for instructional improvement: Actions, outcomes, and lessons from three urban districts. *American Journal of Education, 112*(4), 496-520.

The current high-stakes accountability environment has created strong incentives for educators to systematically collect and use data to inform instructional decisions. This article examines the strategies employed by three urban school districts to promote data use for instructional improvement and their effect on administrator, principal, and teacher practice. Several factors are found to affect data use, including accessibility and timeliness of data, perceptions of data validity, training, and support for teachers with regard to data analysis and interpretation, and the alignment of data strategies with other instructional initiatives.

Kirkup, C. (2006). Using assessment information to inform teaching and learning. *Education 3-13: International Journal of Primary, Elementary and Early Years Education, 34*(2), 153-162.

The ways in which teachers and head teachers integrate external summative testing and formative assessment practices were explored by means of a questionnaire survey and a small number of case studies. A clear distinction was found between end of key stage tests and optional tests in the extent to which they could be used directly to support teaching and learning. Within the current context of high-stakes external testing, it was found that,

although qualitative information from formal tests was proving useful at school and class level, potential benefits for individual pupils were not being fully realised.

Kirkup, C., Sizmur, J., Sturman, L., & Lewis, K. (2005). *Schools' use of data in teaching and learning*. England: National Foundation for Educational Research.

The National Foundation for Educational Research (NFER) was commissioned by the Department for Education and Skills (DfES) to conduct a study of primary, secondary and special maintained schools in England to assess the use of data in teaching and learning.

Klenowski, V. (2011). Assessment for learning in the accountability era: Queensland, Australia. *Studies in Educational Evaluation, 37*, 78-83.

Developments in school education in Australia over the past decade have witnessed the rise of national efforts to reform curriculum, assessment and reporting. Constitutionally the power to decide on curriculum matters still resides with the States. Higher stakes in assessment, brought about by national testing and international comparative analyses of student achievement data, have challenged State efforts to maintain the emphasis on assessment to promote learning while fulfilling accountability demands. In this article lessons from the Queensland experience indicate that it is important to build teachers' assessment capacity and their assessment literacy for the promotion of student learning. It is argued that teacher assessment can be a source of dependable results through moderation practice. The Queensland Studies Authority has recognised and supported the development of teacher assessment and moderation practice in the context of standards-driven, national reform. Recent research findings explain how the focus on learning can be maintained by avoiding an over-interpretation of test results in terms of innate ability and limitations and by encouraging teachers to adopt more tailored diagnosis of assessment data to address equity through a focus on achievement for all. Such efforts are challenged as political pressures related to the Australian government's implementation of national testing and national partnership funding arrangements tied to the performance of students at or below minimum standards become increasingly apparent.

Klenowski, V., & Funnell, B. (2013). Exploring the conditions to support assessment for more equitable learning outcomes. *Curriculum Perspectives, 33*(3), 33-45.

NAPLAN results have gained socio-political prominence and have been used as indicators of educational outcomes for all students, including Indigenous students. Despite the promise of open and in-depth access to NAPLAN data as a vehicle for intervention, we argue that the use of NAPLAN data as a basis for teachers and schools to reduce variance in learning outcomes is insufficient. NAPLAN tests are designed to show statistical variance at the level of the school and the individual, yet do not factor in the sociocultural and cognitive conditions Indigenous students' experience when taking the tests. We contend that further understanding of these influences may help teachers understand how to develop their classroom practices to secure better numeracy and literacy outcomes for all students.

Empirical research findings demonstrate how teachers can develop their classroom practices from an understanding of the extraneous cognitive load imposed by test taking. We have analysed Indigenous students' experience of solving mathematical test problems to discover evidence of extraneous cognitive load. We have also explored conditions that are more supportive of learning derived from a classroom intervention which provides an alternative way to both assess and build learning for Indigenous students. We conclude that conditions to support assessment for more equitable learning outcomes require a reduction in cognitive load for Indigenous students while maintaining a high level of expectation and participation in problem solving.

Lachat, M. A., & Smith, S. (2005). Practices that support data use in urban high schools. *Journal of Education for Students Placed at Risk, 10*(3), 333-349.

This article presents initial findings of a case study focusing on data use in five low-performing urban high schools undergoing comprehensive school-wide reform. The case study investigates: (a) the ways in which disaggregated data can be used to examine progress and guide improvement in the process of restructuring urban, low-performing high schools; (b) factors and conditions that either promote or act as barriers to data use; and (c) the policy and practice implications of achieving effective data use in a high school reform process. Study findings point to several key factors that have an impact on data use in the study sites: the quality and accuracy of available data, staff access to timely data, the capacity for data disaggregation, and the collaborative use of data organized around a clear set of questions, and leadership structures that support school-wide use of data. The findings build on current literature and also contribute new knowledge of the key roles played by a data team and a data coach in fostering effective data use in high school reform.

Lesaux, N. K., & Marietta, S. H. (2012). *Making assessment matter: using test results to differentiate reading instruction*. New York: Guilford Publications, Inc.

All too often, literacy assessments are given only for accountability purposes and fail to be seen as valuable resources for planning and differentiating instruction. This clear, concise book shows K-5 educators how to implement a comprehensive, balanced assessment battery that integrates accountability concerns with data-driven instruction. Teachers learn to use different types of test scores to understand and address students' specific learning needs. The book features an in-depth case example of a diverse elementary school that serves many struggling readers and English language learners.

Linn, R. L. (2000). Assessments and accountability. *Educational Researcher, 29*(2), 4-16.

Use of tests and assessments as key elements in five waves of educational reform during the past 50 years are reviewed. These waves include the role of tests in tracking and selection emphasized in the 1950s, the use of tests for program accountability in the 1960s, minimum competency testing programs of the 1970s, school and district accountability of

the 1980s, and the standards-based accountability systems of the 1990s. Questions regarding the impact, validity, and generalizability of reported gains, and the credibility of results in high-stakes accountability uses are discussed. Emphasis is given to three issues regarding currently popular accountability systems. These are (a) the role of content standards, (b) the dual goals of high performance standards and common standards for all students, and (c) the validity of accountability models. Some suggestions for dealing with the most severe limitations of accountability are provided

Little, J. W., Gearhart, M., Curry, M., & Kafka, J. (2003). Looking at student work for teacher learning, teacher community, and school reform. *Phi Delta Kappan, 85*(3), 184-192.

Teachers are usually alone when they examine student work and think about student performance. The authors describe several projects that have enabled teachers to leave the isolation of their own classrooms and think together about student work in the broader contexts of school improvement and professional development

Love, N. (2004). Taking data to new depths. *Journal of Staff Development, 25*(4), 22-26.

There's a ton of data being collected. The trick is to know how to use it effectively.

Luke, A., Freebody, P., Shun, L., & Gopinathan, S. (2005). Towards research-based innovation and reform: Singapore schooling in transition. *Asia Pacific Journal of Education, 25*(1), 5-28.

The challenges facing the Singapore education system in the new millennium are unique and unprecedented in Asia. Demands for new skills, knowledges, and flexible competencies for globalised economies and cosmopolitan cultures will require system-wide innovation and reform. But there is a dearth of international benchmarks and prototypes for such reforms. This paper describes the current Core Research Program underway at the National Institute of Education in Singapore, a multilevel analysis of Singaporean schooling, pedagogy, youth and educational outcomes. It describes student background, performance, classroom practices, student artefacts and outcomes, and student longitudinal life pathways. The case is made that a systematic focus on teachers' and students' work in everyday classroom contexts is the necessary starting point for pedagogical innovation and change. This, it is argued, can constitute a rich multidisciplinary evidence base for educational policy.

Mansell, W., James, M., & Assessment Reform Group. (2009). *Assessment in schools Fit for purpose? A commentary by the Teaching and Learning Research Programme*. London: Economic and Social Research Council, Teaching and Learning Research Programme.

Perhaps no area of education policy is as contentious – or as consistently newsworthy – as assessment. Recent headlines show how emotive and controversial it can be: “Tests blamed for blighting children’s lives”; “New fears over dumbing down of key exams”; “Science exam standards ‘eroded’”1. The public, formal, face of assessment – typically “high-stakes” examinations such as GCSEs, A-levels, Scottish Highers, the Welsh

Baccalaureate or national curriculum tests in England – often dominates debate. But all good teachers also use assessment informally in the classroom to judge what progress pupils have made with their understanding, and to provide information on how they can be helped to move forward.

Marsh, J. A. (2012). Interventions promoting educators' use of data: Research insights and gaps. *Teachers College Record, 114*(11), 1-48.

Background/Context: In recent years, states, districts, schools, and external partners have recognized the need to proactively foster the use of data to guide educational decision-making and practice. Understanding that data alone will not guarantee use, individuals at all levels have invested in interventions to support better access to, interpretation of, and responses to data of all kinds. Despite the emergence of these efforts, there has been little systematic examination of research on such efforts.

Purpose/Objective/Research Question/Focus of Study: This article synthesizes what we currently know about interventions to support educators' use of data—ranging from comprehensive, system-level initiatives, such as reforms sponsored by districts or intermediary organizations, to more narrowly focused interventions, such as a workshop. The article summarizes what is what is known across studies about the design and implementation of these interventions, their effects at the individual and organizational levels, and the conditions shown to affect implementation and outcomes.

Findings/Results: The review uncovers a host of common themes regarding implementation, including promising practices (e.g., making data "usable" and "safe," targeting multiple leverage points) and persistent challenges (e.g., developing support that is generic but also customized, sustaining sufficient support). The review also finds mixed findings and levels of research evidence on effects of interventions, with relatively more evidence on effects on educators' knowledge, skills, and practice than on effects on organizations and student achievement. The article also identifies a set of common conditions found to influence intervention implementation and effects, including intervention characteristics (capacity, data properties), broader context (leadership, organizational structure), and individual relationships and characteristics (trust, beliefs and knowledge).

Conclusions/Recommendations: The review finds that the current research base is limited in quantity and quality. It suggests the need for more methodologically rigorous research and greater attention to the organizational and student-level outcomes of interventions, comparative analyses, interventions that help educators move from knowledge to action, and specific ways in which the quality of data and leadership practices shape the effectiveness of interventions.

Marsh, J. A., Pane, J. F., & Hamilton, L. S. (2006). *Making sense of data-driven decision making in education*. Santa Monica, CA: RAND Corporation.

Data-driven decision making (DDDM), applied to student achievement testing data, is a central focus of many school and district reform efforts, in part because of federal and state test-based accountability policies. This paper uses RAND research to show how schools and districts are analyzing achievement test results and other types of data to make decisions to improve student success. It examines DDDM policies and suggests future research in the field. A conceptual framework, adapted from the literature and used to organize the discussion, recognizes that multiple data types (input, outcome, process, and satisfaction data) can inform decisions, and that the presence of raw data does not ensure its effective use. Research questions addressed are: what types of data are administrators and teachers using, and how are they using them; what support is available to help with the use of the data; and what factors influence the use of data for decision making? RAND research suggests that most educators find data useful for informing aspects of their work and that they use data to improve teaching and learning. The first implication of this work is that DDDM does not guarantee effective decision making: having data does not mean that it will be used appropriately or lead to improvements. Second, practitioners and policymakers should promote the use of various data types collected at multiple points in time. Third, equal attention needs to be paid to analysing data and taking action based on data. Capacity-building efforts may be needed to achieve this goal. Fourth, RAND research raises concerns about the consequences of high-stakes testing and excessive reliance on test data. Fifth, attaching stakes to data such as local progress tests can lead to the same negative practices that appear in high-stakes testing systems. Finally, policymakers seeking to promote educators' data use should consider giving teachers flexibility to alter instruction based on data analyses. More research is needed on the effects of DDDM on instruction, student achievement, and other outcomes; how the focus on state test results affects the validity of those tests; and the quality of data being examined, the analyses educators are undertaking, and the decisions they are making.

Masters, G. N. (2013*). Reforming educational assessment: Imperatives, principles and challenges.* Camberwell, Vic: Australian Council for Educational Research.

This review addresses the role of assessment in education. It observes that the field of educational assessment is currently divided and in disarray. Fault lines fragment the field into differing, and often competing philosophies, methods and approaches. At the same time, there are unprecedented external pressures for assessment reform. These pressures include the following: the need for better information to guide and evaluate educational decision-making; advances being made in understandings of human learning; calls for greater emphasis on the development of a broader range of life skills and attributes; and changes in where and how learning takes place, particularly resulting from advances in technology.

Matters, G. (2006). *Using data to support learning in schools: Students, teachers, systems*. Camberwell, Vic: Australian Council for Educational Research.

In 'Using data to support learning', Gabrielle Matters envisions an educational system built around 'evidenced-based practice', the idea that decisions at all levels should be grounded in data. From this perspective, we are not only concerned with giving teachers the data they need to make more informed decisions about their students, but with all of the decision makers that constitute the educational system and all of the decisions they need to make to facilitate achievement.

Matthews, J., Trimble, S., & Gay, A. (2007). But what do you do with the data? *Education Digest: Essential Readings Condensed for Quick Review, 73*(3), 53-56.

Using data to redesign instruction is a means of increasing student achievement. Educators in Camden County (Georgia) Schools have used data from benchmark testing since 1999. They hired a commercial vendor to design a benchmark test that is administered four times a year and use the data to generate subject-area reports that can be further disaggregated by grade, team, teacher, and student. To use data, teachers must accept the data, know what the numbers indicate, and be ready to change their instruction. Therefore, teacher leaders in each of the 12 schools organize the test data and help teachers through the stages of growth that are inherent with data usage (Trimble, Gay, & Matthews, 2005). This article discusses three steps that Camden uses to get the most out of its test data: (1) Schedule intensive data sessions; (2) Prepare data for teachers to examine; and (3) Lead teachers in data analysis. Data from benchmark tests are only useful if teachers and principals know how to use them to modify instruction. These steps can help school leaders make the most of benchmark data.

Means, B., Padilla, C., DeBarger, A., & Bakia, M. (2009). *Implementing data-informed decision making in schools—Teacher access, supports and use.* California: U.S. Department of Education Office of Planning, Evaluation and Policy Development.

The collection, analysis and use of educational data are central to the improvement of student outcomes envisioned by No Child Left Behind (NCLB). The use of data in educational decision making is expected to span all layers of the education system—from the federal to the state, district, school and classroom levels. The implementation of the NCLB legislation has been accompanied by a demand for data systems capable of providing a longitudinal record of each student's educational experiences and performance over time. The conceptual framework developed for the study identifies six prerequisites and supports for data-informed decision making: (a) state, district and school data systems; (b) leadership for educational improvement and the use of data; (c) tools for generating actionable data; (d) social structures and time set aside for analysing and interpreting data; (e) professional development and technical support for data interpretation; and (f) tools for acting on data.

Meiers, M. (2008). Using data to improve student learning. *The Digest.* Retrieved 1 August, 2013, from http://www.nswteachers.nsw.edu.au

This Digest is focused on studies that have investigated how data can be used in schools to examine teaching practices in order to improve student learning. A selection of relevant websites is listed, and a full reference list is provided. Links to those references for which full-text online access is freely available are also included. Topics include Data in schools, Understanding and interpreting data, Purposes for using data, Does performance feedback lead to improvement?, On a large scale, Comment: Using data in classrooms. Produced by ACER for the NSW Institute of Teachers

Mokhtari, K., Thoma, J., & Edwards, P. (2009). How one elementary school uses data to help raise students' reading achievement. *The Reading Teacher, 63*(4), 334-337.

In this column, we share the collective reflections of a group of teachers and a school administrator in one Midwestern elementary school, which highlight the value of using data collaboratively to bring about instructional change and to improve student reading achievement. If you are a classroom teacher or a school administrator, chances are you are inundated with all sorts of data, including student demographic information, reading and writing test scores, and an array of formative assessment data used for documenting and promoting student reading and learning. The key question here is, What are the factors that contribute to effective uses of data to help raise students' reading achievement? In this column, we share collective reflections from two literacy specialists and one school administrator in one Midwestern U.S. elementary school, which highlight the value of using data collaboratively to bring about instructional change and to improve student reading achievement.

Moon, T. R. (2005). The role of assessment in differentiation. *Theory into Practice*, *44*(3), 226-233.

With the increasing diversity in classrooms, teachers are faced with a broad range of students representing a wide variety of educational needs. To effectively address students' diverse education needs, teachers must engage in good decision making. This article explores the bidirectional relationship between differentiation and assessment through the lens of decision-making. Particularly, the article investigates the 3 phases of assessment - planning instruction, guiding instruction, and evaluating instruction. It also asks 4 questions: Why does assessment matter? What happens if it is misaligned with learning goals? How does the teacher use the assessment data? What does it look like? The article concludes with a summary of the 3 principle building blocks of differentiation-active learning, high expectations for students, social context of learning-and their implications for assessment.

New Zealand Ministry of Education. (2013). *Assessment online*. Retrieved 12 August, 2013, from http://assessment.tki.org.nz/

Information and ideas relating to this process and the principles expressed in the Ministry of Education Position Paper: Assessment (2011) are presented on this site.

Newmann, F. M., King, M. B., & Rigdon, M. (1997). Accountability and school performance: Implications from restructuring schools. *Harvard Educational Review, 67*(1), 41-74.

Many politicians and policymakers today link school accountability and school performance. Drawing on evidence from the corporate world, they assume that strong external accountability will impel schools to improve student achievement. In this article, however, Fred Neumann, M. Bruce King; and Mark Rigdon argue that three issues keep this popular theory from working in practice. 1) implementation controversies around standards, incentives, and constituencies; b) insufficient efforts to organize the human, technical, and social resources of a school into an effective collective enterprise - what the authors term ''organizational capacity'' - and c) failure to recognize the importance of internal school accountability. In a study of twenty-four restructuring schools, the authors found that strong accountability was rare; that organizational capacity was not related to accountability; that schools with strong external accountability tended to have low organizational capacity; and that strong internal accountability tended to reinforce a school's organizational capacity. Although the implications' of this study for both accountability policy and, more broadly, school restructuring efforts may appear disconcerting, the authors conclude with several practical guidelines to stimulate the Kind of internal accountability that they found to be related to enhanced school performance.

Northern Territory Government. (2012). *2012 NAPLAN: Data analysis guide*. Retrieved 12 August, 2013, from www.det.nt.gov.au/teachers-educators/assessment-reporting

A shift is occurring in the way educators view data and it’s potential to inform professional learning needs, intervention requirements and resource allocation. Data can be used to focus discussion on teaching, learning, assessment, teacher pedagogy, and monitoring of progress. School improvement requires more than just presenting the data and assuming it will automatically transform teachers’ thinking. Rather, teachers need sensitive coaching and facilitation to study the data and make connections between data and instructional decision making. School leaders, as data coaches, need to ask purposeful questions to promote thoughtful discussion which should be followed by targeted action. Effective data use has to become part of a schools’ culture. A culture where:

- there is a shared belief in the value of data
- data literacy capacity and skills are proactively developed
- there are planned times to collaboratively interrogate the data
- effective change in classroom practice is achieved in a supportive environment.

OECD. (2005). *Formative assessment: Improving learning in secondary classrooms*. Paris: OECD.

This study features a collection of eight case studies of exemplary cases from secondary schools as well as international literature reviews and policy analysis related to formative assessment – the frequent assessments of student progress to identify learning needs and shape teaching. It examines such issues as benefits and barriers for using formative assessment, policy frameworks and implications, and formative assessment in practice. Achievement gains attributed to formative assessment are reported as being quite high, but it is not yet practiced systematically. This book makes the case for use of formative assessment and shows how it can be put into practice.

OECD/CERI. (n.d.). Assessment for learning: Formative assessment. Retrieved 12 August, 2013, from www.oecd.org/site/educeri21st/40600533.pdf

This paper provides findings on assessment for learning, drawn from recent analyses undertaken by CERI. It begins with analysis of the formative approach in exemplary practice carried out in secondary schools in eight education systems. The second half of the paper comprises key analyses on formative assessment in adult language, literacy, and numeracy provision, and a framework for strengthening policy and practice across the sector as well as for building the evidence base.

Pettit, P. (2010). From Data-informed to Data-led?: School Leadership within the Context of External Testing. *Leading and Managing, 16*(2), 90-107.

There is an expectation at system and national policy levels that data on student achievement are collected for the purposes of improving student learning, program accountability and public reporting. This article reports on a recent study that explored how the experience of external literacy and numeracy testing and data utilisation affects attitudes to the tests, teaching practice and school leadership. The research employed a 'mixed methods' approach to obtain both qualitative and quantitative data from participants in 55 systemic Catholic primary, central and secondary schools in one Australian diocese. The study found differences in the way that leadership in using data from external testing of literacy and numeracy is perceived within the school. This was particularly in relation to how data is analysed and used, the degree of staff involvement in the process, and associated issues surrounding whole-school planning using the testing results. There was evidence that schools were not effectively using such data and that accountability for testing results was viewed according to their perceived purpose. The findings from the study demonstrate the importance of the perceived value of such data in informing decisions about student outcomes, and the central role of evidence-based leadership at the school level in utilising such evidence of learning.

Phelps, R. P. (Ed.). (2005). *Defending standardized testing*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

The education reform movement of the past two decades has focused on raising academic standards. Some standards advocates attach a testing mechanism to gauge the extent to which high standards are actually accomplished, whereas some critics accuse the push for standards and testing of impeding reform and perpetuating inequality. At the same time, the testing profession has produced advances in the format, accuracy, dependability, and utility of tests. Never before has obtaining such an abundance of accurate and useful information about student learning been possible. Meanwhile, the American public remains steadfast in support of testing to measure student performance and monitor the performance of educational systems.

Many educational testing experts who acknowledge the benefits of testing also believe that those benefits have been insufficiently articulated. Although much has been written on standardized testing policy, most of the material has been written by opponents. The contributing authors of this volume are both accomplished researchers and practitioners who are respected and admired worldwide. They bring to the project an abundance of experience working with standardized tests.

Pierce, R., & Chick, H. (2011). Teachers' intentions to use national literacy and numeracy assessment data: a pilot study. *Australian Educational Researcher, 38*(4), 433-447.

In recent years the educational policy environment has emphasised data-driven change. This has increased the expectation for school personnel to use statistical information to inform their programs and to improve teaching practices. Such data include system reports of student achievement tests and socio-economic profiles provided to schools by various state education departments' data services. This paper reports on a pilot study that explored factors affecting Mathematics and English teachers' intentions to engage with the statistical data their schools receive and to consider these data when making decisions about their teaching practices. It was found that most teachers perceived that such data identify weak students and some teachers (mostly mathematics teachers) thought that they can help to identify curriculum topics that need attention. Most teachers felt that the reports were not easy to understand. Confidence in dealing with statistical data was a problem for many teachers, but especially for English teachers.

Pierce, R., Chick, H., & Gordon, I. (2013). Teachers' perceptions of the factors influencing their engagement with statistical reports on student achievement data. *Australian Journal of Education*, *57*(3), 237-255.

In Australia, as in other countries, school students participate in national literacy and numeracy testing with the resulting reports being sent to teachers and school administrators. In this study, the Theory of Planned Behaviour provides a framework for examining teachers' perceptions of factors influencing their intention to engage with these

data. Most teachers perceived the data to be useful, but there were some negatively held views. For both primary and secondary teachers, males were more positive and had weaker perceptions of barriers to their use of data from system reports compared to females. Teachers who had studied statistics at the post-secondary level and/or attended relevant professional learning generally felt more capable of using the data, and senior teachers and principals were more favourably disposed to using these kinds of statistical reports. Many teachers had concerns about the timeliness of the data's release and the effort required to interpret them.

Queensland Studies Authority. (2012). *2012 NAPLAN: Test reporting handbook*. Brisbane: Queensland Studies Authority.

The NAPLAN tests were developed using the nationally agreed Statements of Learning for English and Statements of Learning for Mathematics, referred to as the Statements of Learning (SoLs). These statements describe essential skills, knowledge, understandings and capabilities that all young Australians should have the opportunity to learn by the end of Years 3, 5, 7 and 9. In SunLANDA we have provided the links between the questions and the SoLs. It is important that principals and teachers note the scope of the tests and how they were scored. Students were assessed in four areas: Language conventions, Writing, Reading and Numeracy.

Quint, J. C., Sepanik, S., & Smith, J. K. (2008). *Using student data to improve teaching and learning: Findings from an evaluation of the Formative Assessments of Students. Thinking in Reading (FAST-R) Program in Boston elementary schools*, Retrieved September 2013, from www.mdrc.org

Formative assessments - assessments that measure what students do and do not know, so that teachers can modify their instruction accordingly--have been widely hailed as a potential vehicle for improving student achievement. Yet little solid research evidence exists about their effectiveness, especially in reform-rich school districts. This study examines the effects of the Formative Assessments of Student Thinking in Reading (FAST-R) initiative in the Boston Public Schools system (BPS), where the use of data to improve instruction is a general priority of the school district. The study looks at changes in reading scores over time at 21 BPS schools that operated FAST-R during the 2005-2006 and 2006-2007 school years and changes at a group of comparison schools serving demographically similar students during the same period. The MDRC evaluation includes process and impact analyses. The process analysis found that teachers at the FAST-R schools who took a survey administered as part of the study reported that the professional development they received from the BPE FAST-R coaches was helpful and contributed to their understanding of data and their ability to work with students. At the same time, while the intervention was implemented as intended (it was meant to be flexible and to provide as much or as little coaching to individual schools as administrators and teachers sought), it was not very intensive; the majority of survey respondents spent only one to five hours with the FAST-R

data coach during the 2006-2007 school year. Moreover, comparison school teachers who took the survey reported receiving at least as much professional development as their FAST-R counterparts, were as likely to find it useful, and spent as much or more time analysing data, including data from other (non-FAST-R) formative assessments. The impact analysis examines the effects of FAST-R on the reading test scores of third- and fourth-graders. FAST-R's impacts on student achievement--that is, the difference that FAST-R made over and above what was going on in the comparison schools--are generally positive but not statistically significant, as measured by MCAS reading scores. In other words, these differences could have arisen by chance. Effects on another measure of student reading, the Stanford Achievement Test, are more mixed but are also not statistically significant. While FAST-R schools put in place a particular model of data utilization, other BPS schools were pursuing similar goals, and this fact, along with the intervention's lack of intensity, may have undercut the likelihood that it would generate substantial and statistically significant impacts in this evaluation. Thus, this single study in a single district is not the last word on the potential of FAST-R. Much remains to be discovered about how teachers can best learn to use data to improve their instruction and boost the achievement of their students. Following an Overview, Preface, and an Executive Summary, this report is organized into four chapters. Chapter 3 discusses the professional development activities in FAST-R and non-FAST-R schools highlighted by the findings of the principal and teacher surveys. The chapter also considers how teachers perceived the utility of the FAST-R intervention for their instructional practices. Chapter 4 describes the findings from the impact analysis of FAST-R with regard to student achievement, exploring the range of student outcomes on the MCAS and the SAT-9 reading assessments. In addition, the chapter reports on an analysis to measure the impact of FAST-R on students' ability to make inferences and find evidence while reading. Lastly, subgroup analyses to compare the effect of FAST-R on various groups of students (by, for example, gender and socioeconomic status) are discussed. Chapter 5 presents the overall conclusions that may be drawn from the study's analyses and their implications for the use of formative assessments and data-driven instruction to improve reading skills. Appended are: (1) The Analytic Model Used in the FAST-R Impact Analysis; (2) List of FAST-R and Non-FAST-R Schools; (3) Subgroup Analyses of the Effects of the FAST-R Program; and (4) Sample of FAST-R Assessment Student and Teacher Materials. (Contains 28 tables, 5 figures, and 3 boxes.)

Rowley, G., & Congdon, P. (2005). *Data-driven school improvement through the VCE Data Service*. Paper presented at the Using data to support learning, Melbourne. http://www.acer.edu.au/documents/RC2005_GRowleyandPCongdon.pdf

As the holder of student achievement data spanning three sectors and four levels, the Victorian Curriculum and Assessment Authority (VCAA) has a responsibility to provide these data to schools in ways that enable school staff to use them effectively and easily. With the discontinuation of the publication of school achievement indices, the VCAA was forced to confront a range of issues surrounding the question of which data belonged to the student,

which was the property of the school, and which belonged to the general public. In 2002, a new balance was struck. A key component in this balance was the introduction of the VCE Data Service. The VCE Data Service is an online service that connects schools to the entire VCE data set going back to 1998, and provides them with the capacity to generate a range of analyses related to their own school, and how its results compare to those of other schools in the State, schools in the same sector (government, Catholic and Independent), and to schools in its Like School Group.

Sadler, D. R. (2013). Assuring academic achievement standards: From moderation to calibration. *Assessment in Education: Principles, Policy & Practice, 20*(1), 5-19.

The course (module) grades entered on higher education academic records (transcripts) purportedly represent substantive levels of student achievement. They are often taken at face value and accepted as comparable across courses. Research undertaken over several decades has shown that the underlying standards against which student works are appraised are poorly understood and can vary widely from assessor to assessor. At the same time, it is commonly held that academic judgements should be respected and form the basis of any quality assurance scheme. This article is about some of the conceptual foundations relevant to a particular approach to assuring academic achievement standards. The final concept discussed is that of 'calibrated' academics who are able to make grading judgements consistent with those which similarly calibrated colleagues would make, but without constant engagement in moderation. The overall aims are to achieve comparability of standards across institutions and stability of standards over time.

Salpeter, J. (2004). Data: Mining with a mission. *Technology and Learning, 24*(8), 30-37.

Data-driven decision making is the buzz phrase of choice for the new decade, but once we've got the information, how do we use it to yield results? Here 20 school administrators share the expertise.

Schildkamp, K., Lai, M. K., & Earl, L. (Eds.). (2013). *Data-based decision making in education: Challenges and opportunities*. London: Springer.

This resource provides an overview of data-based decision making, how classroom achievement data can be used to raise student achievement, and some case studies.

Schwartz, W. (2002). Data-driven equity in urban schools. *ERIC Digest.* Retrieved 7 August, 2013, from http://files.eric.ed.gov/fulltext/ED467688.pdf

The 2002 reauthorization of the Elementary and Secondary Education Act mandates that schools receiving federal funding must desegregate their student performance data by race, gender, and socioeconomic status in order to provide progress information to the community and state. Data-driven decision making is particularly important in urban schools whose populations are disproportionately poor, minority, and in need of special services. This digest discusses the types of data that schools should collect and the ways to

use the information effectively in decision making to enhance equity. It begins by explaining how to use data to enhance quality, then it describes data types (student learning data, student demographics, perceptions data, and school process data). It goes on to explain the disaggregation of data, which allows schools to determine more accurately the effects of programs and strategies on segments of its student body. Finally, this digest explains data-driven decision making and describes how to choose a technology tool to support data-driven decision making (functionality, data storage capacity, training, and format). A sidebar presents data disaggregation tools. Data support resources are listed.

Sharratt, L., & Fullan, M. (2012). *Putting faces on the data*. Thousand Oaks, CA: Corwin.

Students are people – not data. Assessment data can bury you or give you focused information on how to reach every student. Putting faces on the data shows how to develop a common language for sharing all students' progress with all teachers and leaders and how to use ongoing assessment to inform instruction.

Shepard, L. A. (1995). Using assessment to improve learning. *Educational Leadership, 52*(5), 38.

One study focusing on a classroom-based assessment project yielded insights about the potential of performance assessment to redirect instruction. Teachers need sustained support to try out new practices, learn the new theory and make it their own.

Shepard, L. A. (2000). The role of assessment in a learning culture. *Educational Researcher, 29*(7), 4-14.

This article is about classroom assessment - not the kind of assessments used to give grades or to satisfy the accountability demands of an external authority, but rather the kind of assessment that can be used as a part of instruction to support and enhance learning. On this topic, I am especially interested in engaging the very large number of educational researchers who participate, in one way or another, in teacher education. The transformation of assessment practices cannot be accomplished in separate tests and measurement courses, but rather should be a central concern in teaching methods courses.

Slavin, R. E., Cheung, A., Holmes, G., Madden, N. A., & Chamberlain, A. (2013). Effects of a data-driven district reform model on state assessment outcomes. *American Educational Research Journal, 50*(2), 371-396.

A district-level reform model created by the Center for Data-Driven Reform in Education (CDDRE) provided consultation with district leaders on strategic use of data and selection of proven programs. Fifty-nine districts in seven states were randomly assigned to CDDRE or control conditions. A total of 397 elementary and 225 middle schools were followed over a period of up to 4 years. In a district-level hierarchical linear modeling (HLM) analysis controlling for pretests, few important differences on state tests were found 1 and 2 years

after CDDRE services began. Positive effects were found on reading outcomes in elementary schools by Year 4. An exploratory analysis found that reading effects were larger for schools that selected reading programs with good evidence of effectiveness than for those that did not.

Smith, M. (2005). *Data for schools in NSW: What is provided and can it help?* Paper presented at the Using data to support learning, Melbourne. Retrieved September 2013, from http://research.acer.edu.au/research_conference_2005/11

Lifting the performance of New South Wales (NSW) students in literacy, numeracy and other key outcome areas to world-class standards is a central priority of this Government. The crucial responsibilities, shared between schools and the system, for effective educational provision are articulated in the most recent Framework for School Development and Accountability for NSW government schools. The role of 108 very senior officers, School Education Directors, recently appointed to regions across the state, is to ensure the effective implementation of this framework. The aim is to consolidate and focus existing accountability, improvement and reporting policies to improve and enrich student outcomes.

Stiggins, R. (2005). From formative assessment to assessment for learning: A path to success in standards-based schools. *Phi Delta Kappan, 87*(4), 324-328.

As the mission of schools changes from ranking students to ensuring that all learn to specified standards, Mr. Stiggins argues that the purpose and form of assessments must change as well. Society has seen fit to redefine the role of its schools. No longer are they to be places that merely sort and rank students according to their achievement. Now, they are to be places where all students become competent, where all students meet pre-specified standards and so aren't left behind. With increasing intensity, policy makers are turning to assessment as the power tool that will compel schools to fulfil this new role. If we look closely at the union of this redefined mission and the growing reliance on assessment, we can find a surprising and immensely powerful way to use assessment in the development of effective schools.

Stiggins, R., & Duke, D. (2008). Effective instructional leadership requires assessment leadership. *Phi Delta Kappan, 90*(4), 285-291.

Principals can play a pivotal role in the improvement of student learning by helping teachers develop and use sound classroom assessments that will strengthen instruction and student learning. The typical teacher will spend a quarter to a third of her or his available professional time involved in assessment-related activities. If they do it well, both teachers and students gain access to evidence that can be used in making sound instructional decisions; if they do it poorly, learning will suffer. In spite of this, little of principals' preparation time is spent learning about assessments.

Stiggins, R. J. (1995). Assessment literacy for the 21st century. *Phi Delta Kappan, 77*(3), 238-245.

Without a clear vision of the meaning of academic success and without the ability to effectively assess student attainment of those achievement targets at the classroom, building, and district levels, we will remain unable to help students attain higher levels of academic achievement, regardless of the instructional methods we use or how we organize our schools Mr Stiggins warns.

Stiggins, R. J. (2002). Assessment crisis: The absence of Assessment FOR Learning. *Phi Delta Kappan, 83*(10), 758-765.

If we wish to maximize student achievement in the U.S., we must pay far greater attention to the improvement of classroom assessment, Mr. Stiggins warns. Both assessment of learning and assessment for learning are essential. But one is currently in place, and the other is not.

Supovitz, J. A., & Klein, V. (2003). *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*. Pennsylvania: Consortium for Policy Research in Education.

To be useful to teachers and school leaders, test data must provide more than just a destination. Student performance results must also provide guidance that informs educators that they are moving in the right direction, while providing interactive and recursive feedback for mid-course adjustments. In order for student performance data to be useful to teachers and school leaders, and to make it worthwhile for them to make the extensive efforts necessary to learn to interpret and act upon what they learn, data feedback systems must rely on multiple sources of data collected and analysed at regular intervals.

This report is about building better roadmaps for teachers and school leaders in order to guide their instructional decision-making. The data required for more precise decision-making come from systematically exploiting a variety of student performance data at both the individual classroom and school levels. Rather than just relying on one individual test to provide guidance, innovative school leaders are building more comprehensive systems of assessments that provide better interim information from multiple perspectives. Through more sophisticated data systems, teachers and school leaders can foster a more inquiry oriented approach that involves ongoing and sustained investigations into the kinds of teaching that produce more powerful student learning. In this report, we show how innovative teachers and school leaders are creatively using their data to help guide their strategic decisions. Through their examples, we develop and describe a theory of what a system of school data use might look like.

Sutherland, S. (2004). Creating a culture of data use for continuous improvement: A case study of an Edison Project school. *American Journal of Evaluation, 25*(3), 277-293.

In this article, I outline how, with the appropriate mix of external requirements and internal motivation, structure and capacity, a school can promote and maintain a culture of evaluative practices, specifically data use, for continuous improvement. I draw upon qualitative data conducted in a study of an Edison Project school. The findings from this paper are the result of a larger 4-year study examining Comprehensive School Reform in 12 Title 1 schools in three states. Interviews were conducted with principals, teachers, other staff, parents and students, as well as with state officials, the superintendent, assistant superintendent and other high level administrators in the district. Observations were undertaken at the classroom level. Key findings include the importance of obtaining a multidimensional view of educational change. That is, we need to obtain a picture of the school reform environment (i.e., interconnections between the state, district, and school levels), and simultaneously investigate the interplay among critical school levers that are required to promote and maintain a culture of data use for school improvement. From this multidimensional view, we are better positioned to investigate and evaluate school change efforts.

Swaffield, S. (2011). Getting to the heart of authentic Assessment for Learning. *Assessment in Education: Principles, Policy & Practice, 18*(4), 433-449.

Assessment for Learning (AfL) has gained increasing international prominence in both policy and practice but some of its proliferation, notably the national strategy in England, has been accompanied by distortion of essential features. This paper presents an understanding of authentic (in the sense of genuine) AfL informed by literature and particularly by two major research projects. Assessment for learning is characterised by information being used to inform learning and teaching, its focus on learning conceived broadly, and actively engage progressively more autonomous students. It is distinctive in its timescale, protagonists, beneficiaries, the role of students, the relationship between student and teacher, and the centrality of learning to the process – all of which can but may not necessarily be features of formative assessment. An examination of the document setting out the National Assessment for Learning Strategy in England reveals the ways that it is at odds with authentic assessment for learning.

Symonds, K. W. (2003). *After the test: How schools are using data to close the achievement gap*. San Francisco, CA: Bay Area School Reform Collaborative.

In recent years, closing the achievement gaps between higher-and lower-achieving groups of students has become the focus of state and federal policy. Yet, while there are decades of research about classroom-level practices associated with increased student performance, few studies have examined the school-level policies and strategies that help close the achievement gaps. In order to identify effective school-level policies and strategies, the Bay Area School Reform Collaborative (BASRC) surveyed 32 K–8 schools in

the San Francisco Bay Area and compared responses from schools narrowing the gaps with schools maintaining or widening the gaps. Schools' gaps were measured using California's Academic Performance Index (API) ranking system over the four-year time period between 1998–99 and 2001–02. We defined gap-closing schools as those schools in which all students made improvement but low-performing students made more rapid progress. Conversely, we defined non-gap-closing schools as those schools in which high-performing students made more improvement than low-performing students. We also conducted case studies of three schools making outstanding progress in narrowing the achievement gaps.

Thomas, G., & Tagg, A. (2005). Numeracy Development Project Longitudinal Study: Patterns of achievement. Retrieved 6 August, 2013, from http://www2.nzmaths.co.nz/numeracy/references/comp05/comp05_thomas_tagg.pdf

The central aim of the Numeracy Development Projects (NDP) is to improve student performance in mathematics through improving the professional capability of teachers. The aim of the NDP Longitudinal Study is to investigate the longer term impact of the NDP on student achievement in number and in mathematics more generally. This paper reports on the mathematics achievement of students in 26 schools that participated in the NDP prior to 2004. Not surprisingly, the findings suggest that the project has had the strongest impact on the students' performance on number items that are directly related to the NDP. The achievement of students as measured against the Number Framework indicates that, at most year levels, strategy level attainment has increased over time.

Thomas, G., Tagg, A., & Ward, J. (2003). *An evaluation of the Early Numeracy Project, 2002: Exploring issues in mathematics education*. Retrieved 6 August, 2013, from http://www2.nzmaths.co.nz/numeracy/References/eval_enp2002.pdf

The Numeracy Development Project sits within the context of the Ministry of Education's Literacy and Numeracy strategy. Three themes underpin that strategy: clarifying expectations, improving professional capability and involving the community.

Thorn, C. A. (2002). *Data use in the classroom: The challenges of implementing data-based decision-making at the school level*. Madison: Wisconsin Center for Education Research, University of Wisconsin.

This paper examines problems school-level staff encounter when attempting to implement data-based decision-making reform efforts, specifically those focused on teaching and learning in the classroom. The paper also offers recommendations for professional development that address gaps in traditional principal and teacher training. Many schools and districts are exploring data-driven decision making as a solution for improving resource allocation and instructional program decisions. One of the most challenging problems policy makers and educators face in attempting to implement curriculum reforms is that intervention decisions are made at least one organizational level above that of the teachers—the persons actually engaged in instruction. Any systemic effort to implement a

focus on data-based decision making at the school and classroom levels faces several challenges. First, most data available within district information systems are limited to what has been deemed important for the operational needs of schools and the district and are only available on systems supported by centralized computing services. These data include attendance, discipline, and basic demographic data. District systems also contain detailed information about human resources, budgets, and other business processes. Typically, the only available outcome data are grades and the results from centrally (and often annually) administered tests. These data, although useful to help frame annual analysis of school-, classroom-, or student-level outcomes, are inadequate for making midcourse or interim instructional decisions within a single grade or marking period.

Tierney, R. D. (2006). Changing practices: influences on classroom assessment. *Assessment in Education: Principles, Policy & Practice, 13*(3), 239-264.

The pedagogical potential of classroom assessment to support student learning has increasingly been evidenced in research over the past decade. Constructive classroom assessment has been championed by assessment specialists, and endorsed by professional organizations. In practice, however, the process of changing classroom assessment from its traditionally summative orientation is not straightforward. This methodical review looks at how six sources, which are educational research, evaluative inquiry, large-scale assessment, educational policy, professional development, and teachers' beliefs, influence and mediate assessment practices. A group of purposively selected research articles are analysed as evidence of the dynamics in this complex process. Cross-currents relating to research perspective, collaboration, and time are discussed. For the movement seen in this study to continue, the tension between teacher autonomy and school community, and the relationship between collective commitment and assessment literacy should be considered.

Timperley, H. (2005). Instructional leadership challenges: The case of using student achievement information for instructional improvement. *Leadership and Policy in Schools, 4*(1), 3-22.

Increasingly school leaders are being challenged to take a more instructionally focused role in their schools. This paper tracks the leadership challenges through a change process involving an assistant principal and a group of teachers, supported by a consultant, through four phases of an action research project. During the project the participants learned how to use achievement data to improve instruction for their low-achieving students. Initially, the teachers did not believe that they could influence the low literacy achievement of their students and so analysing achievement data was irrelevant to their practice. Eighteen months later they were using the data to target their instruction more precisely and to test the effectiveness of their teaching practice and make refinements to their programs. The multifaceted challenges involved in leading such an initiative are discussed for each phase,

together with conclusions about the realities of instructional leadership and the support that might be needed to undertake it effectively.

Timperley, H., & Parr, J. (2004). *Using evidence in teaching practice: Implications for professional learning*. Auckland, NZ: Hodder Moa Beckett.

For teachers to use evidence to improve teaching and learning in their classrooms they need information about what their students know and can do, evidence about their own practice and its impact on students, and knowledge of the research evidence and that from other established sources to give direction for improvements to practice. Teachers, however, cannot be expected to know and do all this on their own, but need the support of well-informed leaders who have sufficient knowledge both to lead teachers' evidence-informed inquiry and to engage in their own inquiry into the effectiveness of their leadership practice in promoting teacher and student learning.

Timperley, H., Wilson, A., Barrar, H., Fung, I., & University of Auckland. (2007). *Teacher professional learning and development: Best Evidence Synthesis [BES]iteration.* Auckland: New Zealand Ministry of Education.

Over the past several decades the focus on educational change has been pervasive and unrelenting as education systems everywhere have struggled to meet the needs of the times. For those of us who have a long history of involvement in education, it is sometimes hard to imagine that there could be anything new under the educational reform sun, as old ideas are recycled and the pace of change often seems painfully slow. But periodically, something surfaces that has the power to fundamentally reshape how we work. The Iterative Best Evidence Synthesis Programme, of which this BES is part, has this potential.

Tovani, C. (2011). *So what do they really know?: Assessment that informs teaching and learning* (eBook ed.). Portland, Maine: Stenhouse Publishers.

In So What Do They Really Know? Cris Tovani explores the complex issue of monitoring, assessing, and grading students' thinking and performance with fairness and fidelity. Like all teachers, Cris struggles to balance her student-centred instruction with school system mandates. Her recommendations are realistic and practical; she understands that what isn't manageable isn't sustainable. Cris describes the systems and structure she uses in her own classroom and shows teachers how to use assessments to monitor student growth and provide targeted feedback that enables students to master content goals. She also shares ways to bring students into the assessment cycle so they can monitor their own learning, maximizing motivation and engagement.

Tozer, L., & Holmes, M. (2005). *Moving on from Count Me In Too: Evidence-based teaching and learning in numeracy in the early and middle years of schooling*. Paper presented at the Using data to support learning, Melbourne. Retrieved September 2013, from http://www.acer.edu.au/documents/RC2005_LTozerandMHolmes.pdf

New Zealand developed the Early Numeracy Project for Years 1–3 in 2000–2001, based on the New South Wales' Count Me In Too, and much has happened in mathematics education since. Change is inevitable and numeracy has moved on. Today the New Zealand Number Framework, the Diagnostic Interview and Teaching Model now underpin numeracy teaching practice in over 14,000 classrooms from Year 1–9. Important developments to date have included a flexible national database and web site, well-developed supporting materials and data-rich annual evaluation reports which inform future direction and expectation of achievement. Because the Numeracy Project is evolving, further development and consolidation will continue. This paper gives a brief background to the Numeracy Project and outlines, through a story, how evidence-based teaching is an integral part of classroom practice.

van Barneveld, C. (2008). *Using data to improve student achiev*ement. Retrieved 7 August, 2013, from http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/using_data.pdf

In the context of education, data is a synonym for information. Data can be words, numbers, or observations that are collected systematically, usually for a specific purpose. Educational data include (but are not limited to):

- student achievement data such as teacher observational notes of students' performance in class, samples of students' class work, student portfolios, results of formal and informal classroom assessment, report cards or large-scale assessment results
- other student data relevant to the students such as student mobility, attendance data, behavioural incident data and homework completion
- contextual data that are not under the direct control of the teacher (such as students' linguistic background, gender or community socio-economic factors) but are important to consider when planning for improved student achievement

Waddell, G., & Lee, G. (2008). Crunching numbers, changing practices: A close look at student data turns the tide in efforts to close the achievement gap. *JSD: The Journal of the National Staff Development Council, 29*(3), 18-21.

A close look at student data turns the tide in efforts to close the achievement gap.

Wayman, J. C. (2005). Involving teachers in data-driven decision making: Using computer data systems to support teacher inquiry and reflection. *Journal of Education for Students Placed at Risk (JESPAR), 10*(3), 295-308.

Accountability mandates such as No Child Left Behind (NCLB) have drawn attention to the practical use of student data for school improvement. Nevertheless, schools may struggle with these mandates because student data are often stored in forms that are difficult to access, manipulate, and interpret. Such access barriers additionally preclude the use of data at the classroom level to inform and impact instruction. Fortunately, there are newly available computer technologies that allow efficient organization and access to student data. In addition to allowing easier accountability reporting, these tools allow user-friendly data access at all educational levels, meaning that teachers can use these tools to engage in the informed reflection necessary to improve classroom practice. In this article, I discuss teacher use of these systems, providing insight into the function of these tools and discussing conditions that make these tools of the most service to teachers.

Wayman, J. C., Cho, V., & Johnston, M. T. (2007). *The data-informed district: A district-wide evaluation of data use in the Natrona County School District*. Austin, TX: The University of Texas.

For years, educational entities have collected data on school process and student learning. Recent accountability policies have brought public attention to these data, increased the amount of data collected, and tied funding to certain characteristics of these data. Consequently, educators respond to reporting requirements while simultaneously struggling with better ways to understand these data internally to improve practice. To understand and improve district data use, individuals from the Natrona County School District (NCSD) commissioned a district-wide evaluation of data uses and procedures for data-based decision-making. In this report, we present findings from this evaluation. Results provided an in-depth description of data use at every level, showing the hardships of using data but also highlighting many positive structures upon which to build an effective initiative. As a result of this evaluation, the authors recommended the following: (a) a framework to guide NCSD in establishing itself as a data-informed district where data and practice are integrated throughout; (b) a plan for acquiring an efficient data system that can integrate data district-wide; (c) a blueprint for NCSD to use in establishing a healthy, district-wide data initiative; and (d) specific issues for NCSD to address in getting up to speed on data use, such as school dropouts, school differences, public perception, and areas for further study.

Wildy, H. (2004). Designing assessments for instruction and accountability: An application of validity theory to assessing scientific inquiry. *Yearbook of the National Society for the Study of Education, 103*(2), 155–168.

This chapter gives an account of a project known in Western Australia as the Data Club. The origins of the Data Club can be traced to the national assessment project conducted by

the Australian Council for Educational Research (ACER) reported by Forster and Masters. In their chapter they argue for a conceptual bridge between a program for system-wide monitoring of student achievement (NSELS) and a classroom assessment resource (DART). The Data Club provides a practical bridge between statewide, system-level data used for national accountability purposes and school-level use of the same data.

Wiliam, D. (2011). *Embedded formative assessment*. Bloomington, US: Solution Tree.

In this book Dylan Wiliam argues that quality of teachers is the single most important factor in the education system. He outlines the many possible ways in which we could seek to develop the practice of serving teachers and concludes that of these, formative assessment has the biggest impact on student outcomes.

Williams, J., & Ryan, J. (2000). National testing and the improvement of classroom teaching: Can they coexist? *British Educational Research Journal, 26*(1), 49-73.

Can children's responses to tests be used to provide useful diagnostic information for classroom teachers? This article describes an analysis of children's performance in the 1997 UK mathematics tests by 7 and 14 year-olds. The children's responses and errors were scaled against their ability using Rasch methodology. These were then interpreted in terms of the literature on the psychology of mathematics education, especially that related to misconceptions, and an attempt was made to describe children's progression in thinking as it relates to their test performance. This work has been reported to all primary and secondary schools in England and Wales, and is intended to provide a description of what the children believe and know. As such it provides a resource to help raise teachers' awareness of their children's thinking and present openings for diagnostic assessment and teaching. Opportunities for and obstacles to developing this approach in future are discussed.

Woods, A., & Amorsen, A. (2011). *Evaluation of the Year 1 literacy and numeracy checkpoints assessments trial – 2010*. Brisbane: School of Early Childhood, Faculty of Education, Queensland University of Technology.

The draft Year 1 Literacy and Numeracy Checkpoints Assessments were in open and supported trial during Semester 2, 2010. The purpose of these trials was to evaluate the Year 1 Literacy and Numeracy Checkpoints Assessments (hereafter the Year 1 Checkpoints) that were designed in 2009 as a way to incorporate the use of the Year 1 Literacy and Numeracy Indicators as formative assessment in Year 1 in Queensland Schools. In these trials there were no mandated reporting requirements. The processes of assessment were related to future teaching decisions. As such the trials were trials of materials and the processes of using those materials to assess students, plan and teach in year 1 classrooms.

Woods, K., & Griffin, P. (2013). Judgement-based performance measures of literacy for students with additional needs: Seeing students through the eyes of experienced special education teachers. *Assessment in Education: Principles, Policy & Practice, 20*(3), 325-348.

This article describes the development of judgement-based performance measures to support the instruction of students with additional learning needs. The focus of the research was the design of assessment materials and protocols to help teachers recognise and respond to students' proficiency in foundational literacy skills. It drew on the expertise of special education teachers to provide all teachers with an evidence framework against which to observe their students' learning. The assessment materials were trialled in 53 schools and used to monitor literacy learning for 547 students, who ranged in age from 3 to 18 years and represented children and young people with a wide diversity and severity of disabilities. The article reports a new approach to judgement-based performance measurement which directs teachers' observations to meaningful shifts and transformations in foundational literacy skills for students with additional needs.

Wyatt-Smith, C., & Klenowski, V. (2013). Explicit, latent and meta-criteria: Types of criteria at play in professional judgement practice. *Assessment in Education: Principles, Policy & Practice, 20*(1), 35-52.

This paper engages with debates about whether comprehensive prior specification of criteria and standards is sufficient for informed professional judgement. A preoccupation has emerged with the specificity and explication of criteria intended to regulate judgement. This has resulted in criteria compliance in the use of defined standards to validate judgements and improve reliability and consistency. Compliance has become a priority, the consequence being the prominence of explicit criteria, to the lack of acknowledgement of the operation of latent and meta-criteria within judgement practice. This paper examines judgement as a process involving three categories of assessment criteria in the context of standards-referenced systems: explicit, latent and meta-criteria. These are understood to be wholly interrelated and interdependent. A conceptualisation of judgement involving the interplay of the three criteria types is presented with an exploration of how they function to focus or alter assessments of quality in judgements of achievement in English and Mathematics.

Young, V. M. (2006). Teachers' Use of Data: Loose Coupling, Agenda Setting, and Team Norms. *American Journal of Education, 112*(4), 521-548.

This article explores the influence of grade-level team norms and district and school leadership on teachers' data use. Using an embedded-systems perspective to consider teachers' data use in four schools located in two different districts, the research takes the practitioners' perspective on what constitutes data. Findings indicate that establishing rationale for teachers to use particular data, modeling such use, and structuring time for teachers to learn about using data are deliberate agenda-setting activities. Varying degrees

of loose coupling between the case study districts underscore how grade-level norms and agenda setting mediate teachers' collaborative use of data.

Appendix B: Alphabetical list of strategies and practices for using classroom data

A

B

C

D

E-F

G-I

J-L

M-N

O-P

Q-R

S

T

U-Z