2005 - Using data to support learning

Using Data to Support Learning (Conference Proceedings)

Australian Council for Educational Research (ACER)

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Professor Geoff Masters
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Dr John Ainley
Deputy CEO and Research Director National and International Surveys, ACER

Dr Ken Rowe
Research Director, Learning Processes and Contexts, ACER

Ms Margaret Forster
Research Director, Assessment and Reporting, ACER

Ms Marion Meiers
Senior Research Fellow, ACER

Ms Carmel Richardson
Senior Research Fellow, ACER

Ms Kerry-Anne Hoad
Manager, Centre for Professional Learning, ACER
Foreword
Geoff Masters
Australian Council for Educational Research

Geoff Masters is Chief Executive Officer of the Australian Council for Educational Research (ACER). Professor Masters is an international authority in educational measurement and student assessment and has published extensively in these fields. Early in his career he developed the widely-used partial credit model for the statistical analysis of rating scales and professional judgements. Although much of his research has been focused on questions of validity and reliability in large-scale tests and surveys, Professor Masters has a special interest in using developments in modern measurement theory to construct improved tools for professional practitioners.

Research Conference 2005 is the tenth national Research Conference. Through our research conferences, ACER provides significant opportunities at the national level for reviewing current research-based knowledge in key areas of educational policy and practice. A primary goal of these conferences is to inform educational policy and practice.

Research Conference 2005 brings together key researchers, policy makers and teachers from a broad range of educational contexts from around Australia and overseas. The conference addresses the theme ‘Using data to support learning’.

We are sure that the papers and discussions from this research conference will make a major contribution to the national and international literature and debate on the effective use of data.

We welcome you to Research Conference 2005, and encourage you to engage in conversation with other participants, and to reflect on the research and its connections to policy and practice.

Professor Geoff N Masters
Chief Executive Officer, ACER
Keynote papers
Abstract

In order to inform decisions in our schools, information about student achievement has to be accurate and timely. The information also has to be presented in a fashion which encourages teachers and schools’ personnel to make the best possible decisions. One of the most basic pieces of information concerns whether the school is doing a good job educating its students.

This paper will discuss some recent research concerning attempts in the United States to use student proficiency levels and content standards to identify schools that are struggling. It will also discuss a model that combines growth and standards to improve our ability to identify successful schools. Finally, it will discuss the use of an assessment system that fosters improvement in education.

As long as there have been schools, there has been the question of which school is the best. From sports teams to beautiful grounds to academic competitions, this question is discussed daily in coffee shops around the world. While it is clear that there is no ‘correct’ answer to this question, it is not for lack of trying.

In the United States, many folks think that public education is not doing as well as it might. However, these same folks will defend with all their might the quality of education and the quality of teachers at their child’s school. The reason for this strong defence is simple. Parents can see how their son or daughter grows in school from day to day and from year to year. While they might not be able to quantify ‘school success’, they can see their daughter learning to read and growing into a person with profound capabilities and potential.

While the answer to the question of what makes a successful school is not an easy one, it is clear that it involves the amount that a school helps students grow in their knowledge, and in their love of learning. It seems clear that a model for school success that doesn’t include the growth of an individual child is not a very useful model.

This paper will discuss some recent research concerning US attempts to use student proficiency standards to identify schools that are struggling. It will also discuss a model that combines growth and standards to improve our ability to identify successful schools. Finally, it will discuss the use of an assessment system that fosters improvement in education.

Research on US attempts to identify struggling schools

The US federal government has used several approaches to identifying ‘schools at risk’ in the past. To use less loaded language, let’s call this the ‘search for schools that aren’t very successful’.

The current approach that the ‘feds’ are using to identify less successful schools is seen in the AYP (Adequate Yearly Progress) provisions of the No Child Left Behind Act. Under this legislation, schools are judged to be successful or not depending on the percentage of students in each grade and subgroup who can successfully reach a defined level of proficiency in reading and mathematics. The details of the level of proficiency and the content being assessed are left to the states to decide.

The approach taken in No Child Left Behind (NCLB) does not include the growth of individual students. Instead, it looks at the percentage of students who happen to be able to clear a single proficiency hurdle on a single test on a single day of the school year. While this
The NCLB model does not take the

1. Single point-in-time analyses may reflect demographics rather than effectiveness. They cannot distinguish between schools that accelerate skills and those that allow students to languish. Cross-sectional measures do not tell us whether students entered with high or low skills or whether they have gained or lost ground as a result of instruction. Flicek and Wong (2003) characterise the cross-sectional percent-proficient model as one of the least valid evaluation methods.

2. The NCLB model does not take the performance of students above or far below the standard into account. When the goal is to get the greatest number of students to meet the standard in a year, schools quite sensibly direct efforts at those performing just below the cut-off point. Schools earn no credit for improving skills of the lowest performing students or for getting gifted student to work to their capacity. Critics have pointed to this feature of NCLB as a disincentive to excellence, encouraging states to set low standards in order to concentrate on fewer students and look better in public reports (Marion et al., 2002).

3. The current system does not necessarily lead to better placement for students in low performing schools. The examples shown above indicate that students who move to schools with higher percentages of students meeting the standard may not get a better education. As Kim and Sunderman (2004a) note, students who take advantage of transfer opportunities afforded under NCLB often move from schools with support for low performing students to more affluent schools that do not have remedial reading programs, tutors or supplemental Title I money.

4. Expectations of AYP need to be tempered by looking at observed results in exemplary schools. In his 2003 address, as president of the American Educational Research Association, Robert Linn illustrated the gulf between NCLB expectations and observed performance. Using state and NAEP data from across the country, Linn projected that reaching 100% proficiency in twelve years would be highly unlikely. He called for the use of research to establish goals that are stringent, but feasible.

One of the primary outcomes of NCLB has been renewed discussion about what constitutes school success and what school accountability models should look like. Although the law and its implementation have not been straightforward nor without controversy, this extended dialogue and the associated research will definitely improve our knowledge of how schools work for students. Consider a person comparing the Adequate Yearly Progress of two schools and asking the following question:

If two schools finish the instructional year with the same percentage of students above the proficiency levels established by my state department of education, are both schools equally effective?

A prudent person would probably answer this question ‘I don’t know’. We can’t judge student growth by looking at a student’s current level, and without knowing anything about student growth in a school, we can hardly judge whether that school is successfully educating its students. It is possible that some of the students in one school exceeded the state performance standards before they came to this school. Status relative to the performance standards is not sufficient to identify individual or school success. Both student status and student growth are needed to paint a complete picture of a school’s effectiveness.

The graph below shows how students’ fifth grade mathematics status (Average Score) and growth (Growth Index) compare in a group of several hundred elementary schools from throughout the United States (McCall, Kingsbury, & Olson, 2004). Several findings are clear from the graph, but the most important are the following:

- Schools with very similar status levels may differ greatly in the amount of growth they cause in their students (schools A and G, for example)
- Schools with cause vary similar growth for students with very different status levels (schools A and D, for example)
- A high-performing school may not be one where you would want your children enrolled (consider school F, for instance).

These findings mean that some schools are consistently more effective in causing growth for their students, regardless of the students they work with. This is important information about the success that a school is having with its students.
It is clear that implementation of NCLB provides US schools with a variety of challenges, and many opportunities to make education better. Students and educators deserve to know what is expected of them, and states' efforts to set content standards and standards of performance have clearly helped schools bring greater focus to improving achievement. Pursuit of improvement requires that public policy, resources, and sanctions to be applied in a purposeful and prudent fashion. This study makes clear that a key element that is not represented in NCLB metrics is individual growth. A more complete accountability system would reward schools for the growth they nurture in students. Proficiency standards are useful in measuring status, but they can create inequity by focusing schools on the relatively small number of students who are nearly proficient, and diverting their attention from those who are far from proficient.

The Hybrid Success Model

An example of the category of models that include both growth and proficiency is Kingsbury and Houser's (1997) Hybrid Success Model. To measure success of a school with this model, we measure academic growth of each student in the school. To the extent that students are growing as much or more than expected and growing towards or beyond proficiency, the school can be judged a success. To determine this:

- Each student is given a growth target each year, in each content area of interest;
- The growth target, if achieved, will require every student to grow as much as a pre-defined comparison group;
- If the student is below the proficiency level, the growth target will be higher; requiring growth that will result in proficiency within a pre-defined period of time;
- Each student is assessed at least twice yearly, and the student’s growth is calculated and compared to the growth target;
- The school gets credit toward success for each student reaching or exceeding their growth target; and
- The school is judged a success if its total credit exceeds a pre-defined performance level.

That is the entire process. It can be implemented in any setting that has defined curriculum standards and proficiency levels, and uses a measurement instrument that is vertically scaled. It allows every student to 'count' in the measurement of school success, by requiring that very high and very low achieving students continue to grow, and it leads every student to proficiency and beyond. While current legislation tries to help those students who are struggling, the HSM process judges school success by looking at the success of every student in the school. The use of HSM should create a climate with rigorous but attainable standards, to the benefit of all students.

An assessment system that serves students

A high-quality assessment system must meet accountability requirements, but it also must serve the needs of each student enrolled in the schools. In order to achieve this goal, the system might include the following components:

- Content standards that are fairly complete, and flexible to change;
- Performance standards that can be measured along a stable scale that measures growth across grades;
- Performance standards that have
consistent meaning across grades and across subject areas;
• Accurate measurement of student achievement and growth;
• Reporting of results to teachers and administrators in a timely fashion;
• Measurement of student achievement that allows the identification of areas of strength and areas of concern;
• A procedure for changing instruction based on areas of concern and areas of strength;
• Measurement of school success that allows the identification of areas of concern and areas of strength;
• A procedure for using information about school success to change policy based on areas of concern and areas of strength;
• A model for systemic effectiveness that allows a school district to measure its improvement across schools; and
• A procedure to improve a school system based on information about systemic effectiveness.

A simple set of tools can be used to make the assessment system described above a reality. These tools enable an organisation to craft a strong assessment system. The system will be able to meet accountability needs and provide accurate information to students and teachers. The set of tools includes:

• A measurement system that includes a stable, cross-grade measurement scale. An example is found in the NWEA RIT scale, which has demonstrated stability over more than 20 years, and which allows detailed characterisation of a student’s achievement against a map of skills that common to a wide variety of curricula.
• Assessments that are targeted at each student’s instructional level, not the middle of a grade range. Targeted tests or adaptive tests provide the most accurate measurement available today.
• A model for examining school success that incorporates both status and growth. One such model that is currently in use is the Hybrid Success Model. It incorporates reasonable growth for each student as one aspect of success, and incorporates additional growth that will bring every student to the proficiency level as another aspect.
• A reporting system that fosters the use of data to improve education. A variety of models for systemic, data-based change exist, but each one depends on providing meaningful reports to the people who need them before they get stale.

References


From accounting to accountability: Harnessing data for school improvement

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.

In the past several decades, a great deal has changed. The 21st century has been dubbed the ‘information age’. There has been an exponential increase in data and information, and technology has made it available in raw and unedited forms in a range of media. Like many others in the society, educators are trying to come to grips with this vast deluge of new and unfiltered information, and to find ways to transform this information into knowledge and ultimately into constructive action.

Data as a policy lever

Accountability and data are at the heart of contemporary reform efforts worldwide. Accountability has become the watchword of education, with data holding a central place in the current wave of large-scale reform. Policy makers are demanding that schools focus on achieving high standards for all students, and they are requiring evidence of progress from schools that is conceived of explicitly in a language of data (Fullan, 1999). Nations, states, provinces, and school districts have implemented large-scale assessment systems, established indicators of effectiveness, set targets, created inspection or review programs, tied rewards and sanctions to results and many combinations of the above (Whitty et al., 1998; Leithwood, Edge, & Jantzi, 1999). 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 progress to the public.

Not only are schools being judged using data, many of the reforms also assume or require a capacity on the part of schools and school leaders to use data internally to identify their priorities for change, to evaluate the impact of the decisions that they make, to understand their students’ academic standing, to establish improvement plans and to monitor and assure progress (Herman & Gribbons, 2001). School leaders are finding themselves faced with challenges that are ill-structured with more than a single, right answer: They 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. There is not enough time for adaptation by trial and error or for experimentation with fads that inevitably lose their appeal. In this context, research studies, evaluations and routine data analyses offer mechanisms for streamlining and focusing planning and actions in schools.

Viewed from this vantage point, data are not ‘out there’. They are, and should be, an important part of an ongoing process of analysis, insights, new learning and changes in practice in all schools and
districts. Data provide tools for the investigation necessary to plan appropriate and focused improvement strategies. Synthesising and organising data in different ways stimulates reflection and conjecture about the nature of the problem under consideration. Over time, this process gives rise to defensible plans for changes.

**Accountability redefined: from surveillance to informed professional judgement**

When all is said and done, school leaders are the ones who are accountable for the work of the school. High-stakes accountability systems can create a sense of urgency and provide ‘pressure’ for change. However, real accountability is much more than accounting (providing information or justifications in an annual report or a press release or even student report cards). It is a moral and professional responsibility to be knowledgeable and fair in teaching and in interactions with students and their parents. It engenders respect, trust, shared understanding, and mutual support.

**Accounting** is gathering, organising and reporting information that describes performance.

**Accountability** is the conversation about what the information means and how it fits with everything else that we know, and about how to use it to make positive changes.

Earl & LeMahieu, 1997

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### Choosing accountability through informed professional judgement

Michael Barber (2002), a national policy advisor on education in England, uses the following graphic to describe trends in educational reform over the past 50 years as a function of the knowledge base on which it has been founded and the locus of responsibility and decision-making.

He portrays the 1970s as a time of ‘uninformed professional judgement’, in which educators operated largely as individuals within broad policy guidelines, relying on their personal professional perspectives to make decisions. The 1980s were a time of ‘uninformed prescription’ where governments took direct control of education and dictated prescriptive directions, often without appealing to any knowledge base other than their own ideological views. National or federal programs proliferated, with centrally directed curriculum and assessment systems. In the 1990s governments still controlled the educational agenda, but they began to draw on research and other evidence to inform their policies.

Barber sees the 2000s as an era of ‘informed professional judgement’, in which control of education ought to be returned to educators, but now with explicit requirements to be informed professionals. And that means using evidence and research to justify and support educational decisions.

Many school leaders are ready for ‘informed professionalism’ but that requires a concerted emphasis on becoming and staying ‘informed’.

### Using data to ‘take charge of change’

Using data does not have to be a mechanical or technical process that denigrates educators’ intuition, teaching philosophy and personal experience. In fact, using data wisely is a human thinking activity that draws on personal views but also on capturing and organising ideas in some systematic way, turning the information into meaningful...
actions and making the interpretation public and transparent (Senge, 1990). Having data is a beginning, but it is not enough. Schools need to move from being data-rich to being information-rich and knowledge-rich as well.

Information becomes knowledge when it is shaped, organised and embedded in a context that gives it meaning and connectedness. Using data is not separate from planning and from routine decisions in schools. Instead, data are a necessary part of an ongoing process of analysis, insight, new learning and changes in practice. Synthesising and organising data in different ways stimulates reflection and conjecture about the nature of the problem under consideration and provides the vehicle for investigating and planning focused improvement strategies.

The implications for leaders are vast. If data are to become part of the fabric of school improvement, however, leaders in schools must become active players in the data-rich environment that surrounds them (Earl & LeMahieu, 1997).

### School leaders as data artists

Using data for improvement puts school leaders into new roles in which they must operate like artists, painting a gallery full of pictures to characterise the complexities and subtleties of the subject. Artists are always gathering and using data. They are constantly observing, investigating, and responding to colours, textures, and images. And, they use their considerable interpretive talent and experience to draw the salient features to the foreground, emphasise important dimensions and communicate a mood and a message to the audience.

Educators need to use data in many different contexts – to establish their current state, to determine improvement plans, to chart effectiveness of their initiatives and to monitor their progress towards their goals. This process can serve a model at any stage in their planning and as a guide as they become comfortable with using data in their work. In another publication we have identified what we believe are the key capacities for leaders in a data-rich world (Earl & Katz, 2002). Leaders for informed professionalism will need to:

- develop an inquiry habit of mind,
- become data literate and
- create a culture of inquiry in their school community.

The panels in the graphic are organised around the three key capacities and use the painting metaphor to detail the process of using data.

### Inquiry habit of mind

The first stage of the process is both simple and profound. Professional decisions in schools have historically been based on tacit knowledge, knowledge that is embedded in individual experiences and involves intangible factors like personal belief and values. But, schools today are very complex places and the kinds of challenges that demand reflection, consideration of many points of view and attention to context and evidence.

As Fullan (2001) argues:

> Schools are beginning to discover that new ideas, knowledge creation, inquiry and sharing are essential to solving learning problems in a rapidly changing society.

An inquiry habit of mind for organisational improvement means developing a habit of using inquiry and reflection to think about where you are,
where you are going, how you will get there, and then turn around and rethink the whole process to see how well it is working and make adjustments.

**Setting the canvas**

Artists begin their work by preparing their canvas and deciding about the dimensions and scope of the work. For educational leaders, setting the canvas means establishing the background for an issue, deciding why they are dedicating resources (especially time) to this issue and identifying all of the people who need to be involved in one way or another. Before making any serious educational decisions, the leadership team needs to be explicit about their purpose, about who should be involved in the decision; about the audience for the judgement and about their own responsibility in the decision-making process.

**Planning this picture**

In the second panel, the team situates the issue by establishing the current state of affairs and explicitly deciding about the ideal outcome of their work. It is important to have a clear picture of the present before jumping into making plans and some image of what you are hoping to accomplish.

**Data literacy**

Most school districts have lots of data available in their district information systems, although they may not be easily accessible or organised in a way that they can be easily used by individual schools. Schools are also likely to have various kinds of other formal and informal data that tend not to be electronically stored – data like classroom records, classroom assessments and program descriptions.

Educators can draw on many different forms of evidence – research studies, test results, surveys, observations, testimonies and witnesses all qualify as data. The challenges come in deciding what data are appropriate and useful for their purposes, ensuring the quality of the data and doing the kinds of analyses and interpretations that will help them make sense of the data.

**Blocking the canvas**

Once the team is beginning to get a feel of the contours of the issue, they can begin to think about what data will help them make the image visible to themselves and others. They are ready to decide what data they need – to choose their palette of colours, define the scope of the work and make decisions about composition and design. This is not as simple a process as it may appear. Getting the right data depends on asking the right questions.

**The first strokes**

The value associated with data come from skill in discerning the quality of the data, organising it, thinking about what it might mean and using it wisely to make decisions. Making sense of data, like painting pictures, is an iterative process. One idea leads to another. Some ideas lose credibility in the process. Others get clearer. New information leads the work in a different direction.

At this point, the team considers data in a range of different configurations, spends time trying to make sense of it through analysis, discussion and interpretation and transforms data into knowledge that they can use. This is the process that determines what the picture looks like – what story it tells, what images come into foreground and which recede into background; what mood it creates, and so on. This is also where technical assistance becomes an important part of the process. Educators are not likely to have the technical expertise to do all of the necessary analyses and they don't need to become data analysts. What is much more important is that leaders are aware of the value and the constraints that are associated with various kinds of data, as they use it to think about their work. Then they can call on others to serve as 'critical friends' to help them with analysis and even with the interpretation.

**A culture of inquiry**

Educational change depends on collaborative professional learning. We have known for a long time that mandating change doesn't work. Mandates may create an awareness that changes are necessary but real change depends on people working in schools, engaging in new learning, individually and collectively, to refresh their knowledge, understandings and skills and to deal with and take charge of change.

Becoming inquiry-minded and data literate are major changes in practice that are consistent with the notion of professional learning communities and that warrant concerted attention to new shared learning. When educators come to the planning process as investigators, wanting to understand and interested in working together and with others to find the best solutions, they find themselves engaged in a very different kind of organisation; one that values dissenting voices and is determined to generate and share knowledge, even when the new knowledge may mean having to make dramatic changes and even reinvent themselves.
The image grows
As the team considers the data and talks about what they are learning, their painting begins to materialise and they become more aware that there are many possible interpretations and many possible strategies for improving what they do in schools. But even more important, the data suggest that there is work to be done. It is time to use their new learning to change what they are doing.

Displaying the picture
The team also finds that they are not alone. There are many people in the community who care deeply about what happens in schools. They can start to think about what they need to communicate to whom and about how others can contribute to their ongoing quest for deeper understanding and better solutions.

The painting metaphor gives the leadership team a process for using data to produce a static image of an issue at a point in time. Once there is an initial image, it becomes the basis for public engagement and for changing practices.

In this metaphor, the picture is the stimulus for action, not the end result. The process now shifts to sharing what has been learned, listening carefully to the responses from the various people who care and deciding what has to happen next. This is not a showcase event; it is an ongoing, active exchange of ideas and decisions about action.

A gallery full of paintings
Using data to make decisions is hard work. Although it may be tempting to mount the picture and accept the accolades, educational change is a never-ending process and there is never a single final image. Instead, each image is one in a series that will emerge as the team revisits the issue and considers what has changed and what needs adjustment. When schools engage in ongoing school improvement, they find themselves in a continuous cycle of change. It gets easier as they internalise and embed the technical skills, organisational processes and values into routines in the culture of the school.

References
What is the nature of evidence that makes a difference to learning?
evidence, we could get those teachers operating at higher levels of efficiency. Another form of accountability assumes that if only we could collect sufficient system-wide evidence, we could convince the parents/voters not to be critics. Both miss the mark.

Most depend on the thermometer theory of traction – although the abject failures of this model are already causing untoward damage to our profession of teaching, to the role of principals, and leading to students’ lack of engagement. Perhaps the most visible form of accountability that illustrates these issues is the US ‘No Child Left Behind’. While I see some merit in some of its claims (e.g., ensuring all students, and not just the ‘average’ student, succeed within a school) the implications of this USA-wide accountability system have become most clear in its negative effects. It has made the teachers teach what they expect is coming in the test; it ensures students are focused on this teaching; it judges the success of the school in terms of whether teachers are doing this job of teaching to the test; it rids the school day of ‘peripherals’ that are not tested (such as physical education, music, art, and self-respect); it cuts vocational and career education programs in high schools which are desperately needed by many students whose alternative is to drop out, and it punishes those who do not do their job and teach to the test (see Hattie, Brown, & Keegan, in press; Linn, 2003; Shepard, 2000). It ensures that (a) there is a quick gain as all learn how to ‘game’ the test, (b) that the curriculum is altered downwards to ensure that there is reasonable success for more students, (c) it introduces procedures to remove those who may bring scores downward (e.g., ‘accommodating’ special education students out of the test room, retain back students from moving up a grade, using suspensions and not enrolling students who may detract from the scores of high schools, and so on). It is not the model worth moving towards.

As Robert Linn (2003) has demonstrated, it would take an innovation of atomic bomb proportions to get the average yearly gains needed to reach the stated goals by 2012 – the target year (he estimated that it will take 150 years at the rate of annual yearly progress of the past 10 years to reach the targets set for 2012). As Australia moves towards national testing, it will become more awash with data, it will de-contextualise schools, lead to more claims for ‘school choice’, increase the flight out of the public schools, will lead to more schools in lower socioeconomic areas stumbling and more schools in higher socioeconomic areas cruising, and, most of all, it will feed the belief that the quality of schooling in the State/Territory/Australia is declining. I see none of this enhancing the quality of teaching and learning.

But we need to remind ourselves who is asking for more tests – it is incorrect to blame the politicians. They are clearly listening to the voters – who want more accountability (which they interpret as tests and data) in the same way politicians wish to return evidence that their investment in schooling is paying off. Let me make two claims here.

First, schools have failed in their efforts to provide appropriate and defensible data to parents about their children – hence the clamour for more tests. We (Hattie & Peddie, 2003) published a study based on school reports to parents from 156 schools in New Zealand. Only 12 included information relating to the official curriculum levels; half included no information on achievement relative to any standard; half talked about students in agricultural terms (developing, needing more, emerging, growing); and half included a specific section relating to effort. On the basis of these reports 98% of students had positive comments about their achievement, were putting in effort, and were ‘a pleasure to teach/joy to have in my class’. With few exceptions, the majority of students in these schools were achieving above average! No wonder parents demand more ‘tests’, accountability, and ‘teacher-proof’ information from our schools.

Second, there is not a lot of evidence that the massive increases in state/federal monies have made a difference to the quality of teaching and learning. Hanushek (2005) has presented information (in current dollars allowing for inflation) of changes in public schools’ resources in the United States over the past 40 years (Figure 1). The achievement curve (from NAEP) has remained constant over this period. If we, as educationalists in classrooms and schools do not provide the evidence that increased resources make a difference to student learning and outcomes, then we will soon be on the back foot, arguing why there should not be decreases in resources.

My major theme is that we need models of school/teacher/student accountability located at the system and school level that maximises the probability of enhancing learning and outcomes. Indeed, we must develop an
accountability system that is located from the student level upwards, directly involving and influencing the teacher and principal level, as such a system is more likely to have major effects on the quality of teaching and learning. Such a system, which I intend to outline, can also serve the systems’ needs of providing evidence of curricula, resources, and equity issues.

What makes a difference to teaching and learning?

The reason for locating the power of data to enhance student outcomes at the teacher level comes from the many recent studies on the epicentre of casual effects on learning: the teachers. At this same ACER conference, two years ago I presented on the factors that make a difference to teaching and learning and divided them into six parts of the cake (Hattie, 2003):

- This is a summary of what is, not what should be – as I certainly can note the power of peers as co-learners, the role of principals to make a difference to instructional leadership, and so on. It is clear, that the major factor in this equation is the student – but most of you have to take what the neighbourhood produces and discussions of ‘choice’ too often means that schools get to choose the students they want (and many students in certain neighbourhoods are denied the choice they want). Maybe there is merit in ‘choice’ but most of us get what comes through the school gates from the local areas. Similarly absurd notions of brain waves, learning styles, multiple

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intelligences and other pop-educ claims are more befitting brain surgeons than the cut and thrust of the teaching and learning conundrums. The major influence on student learning is the teacher, and here is where I wish to locate the issue of ‘What data would support a teacher to enhance teaching and learning?’ and thus how can we devise systems to ensure that such data is obtained, and when obtained that it makes a difference! While there are other sources of data useful to a system, the key to any accountability model should orient around this question.

What are ‘learning outcomes’?

This question begs the question: What is it that we wish to enhance? This question has occupied the minds of curricula reformers for decades, and we seem to experience a once-a-decade-bump where the old curricula is repackaged, new names invented, much is added and little is subtracted, and the classrooms continue on much as before. The latest craze, begun by the OECD is to include key competencies or ‘essence’ statements and this seems, at long last, to get closer to the core of what students need. Key competencies include thinking, making meaning, managing self, relation to others, and participating and contributing. Indeed, such powerful discussions must ensue around the nature of what are ‘student outcomes’ as this should inform what kinds of data need to be collected to thence enhance teaching and learning.

Outcomes from curricula must have a sense of achievement progression. From our New Zealand research, it is most defensible to claim that a common understanding among teachers of progression is probably the greatest chokepoint to the enhancement of learning outcomes for students. While there can be sharing of activities and stories about students and incidents, it is rare to hear discussions among teachers about the levels of understanding, the degree of challenge and expectations required and attained — such that each year teachers revisit the students in terms of their internal beliefs about what levels of performance are required — allowing students to gain or drop according to these (often untested) beliefs about the desired levels of progression (Robinson & Lai, 2005; Timperley, 2005). One of the major purposes of an accountability system is to assist in articulating a common language of progression.

The nature of ‘data’

Before venturing into the recommended model, it is important to comment on the nature of ‘data’, as this is a most contested term. A current fad radiating out from the United States is the notion of evidence-based decision-making — and this term has been hijacked to mean a very narrow form of evidence. Liberty and Miller (2003), for example, consider ‘evidence-based’ relates to meeting peer-review standards, and including evidence directly impacting on children’s learning (not correlates, see Scriven, 1988). This cuts out so much of today’s literature and I note an excellent summary of the surviving literature by Alton-Lee (2003). But an extra condition has been added, that of the type of research designed to collect data: preferably random assignment to various groups (Mosteller & Boruch, 2002). While this may be exemplary, it is not the only design of merit. Moreover, in classrooms, teachers still need to base their evidence on data from their students and from their teaching, and rarely does random assignment occur. It is this form of teacher-available data that is of interest to my forms of accountability.

Such classroom-based data is also contested — and while it can consist of scores on tests, it can also consist of teacher judgements, student ratings, and so on — provided such evidence can be defensibly accumulated and is open to scrutiny. It is the judgements or interpretations based on these data that is of most interest. The asTTle model outlined in the presentation allows such evidence to be defensibly accumulated and contested — and this is how it should be. We must contest the evidence — as that is the basis of a common understanding of progression.

The location of ‘evidence’ starts in the classroom

The argument in this presentation is that the location of evidence that makes a difference to teaching and learning must be located at the ‘teacher’ level. Of course, the students are implicitly involved — but they are not the core. This is because it is most common to locate students in groups (i.e., classrooms) critically influenced by the teacher. Indeed, my theme is that if we form the accountability model around providing teachers with excellent diagnostic and formative evidence, we have not only an excellent model but one that influences teaching and learning. Basing a model on students can help those students who learn in a diagnostic and formative manner about such accountability evidence but this would exclude most students. Similarly, basing it on parent’s privileges (those who have the home-resources to add value to this evidence) would again
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exclude so many parents, particularly those who do not have command of the language of schooling and learning (Clinton & Hattie, 2005).

The first part of the model is to address teachers’ expectations and target setting, as these are key drivers in the enhancement of learning – or can be the greatest barrier to such enhancement (Rubie, Hattie, & Hamilton, in press). These expectations also are underpinned by the teacher’s conception of progression. During the conference presentation I will demonstrate a target setting process for individual students that allows immediate aggregation to the class and school level to ask whether the target setting is reasonable, enhancing, and defensible. The critical features include the following: it is in the language of teaching and learning and not assessment; it leads to discussion among fellow teachers about the nature of teaching and learning; and it provides school leaders with information to form a school-wide discussion about targets. Similarly, I will demonstrate a school profile also provided by the asTTle package that shows current performance and how it can be used to evaluate the degree of attaining these targets. Similarly, for both sets of evidence the national norms (for the country, or for ‘schools like mine’ can be interpolated).

The emphasis is on growth, and avoids many of the current problems with value-added models. The latter have been too dependent on measuring only at two time points, with all the incumbent problems (Cronbach & Furby, 1970). The current model, however, incorporates many time points and is thus conducive to an interrupted time series analysis – which has much more power to provide information on the value added by teachers and schools (see Hattie & Rowe, 2004). At least it moves the discussion beyond the status of the students, which is what must accrue from state-nation-wide models and to include the critical questions relating to growth.

The asTTle model is based around three major questions: Where are we going? How are we going? and Where to next? Thus, target setting is critical, as is evidence of the gap between current and targeted performance, and the manner in which teachers are going to reduce this gap for all students. Other graphs from the asTTle application will be shown that will demonstrate how a national system can provide evidence on these issues, in an immediate way, to teachers and students. There is evidence of individual student achievement, class achievement, the distribution of achievement across cohorts, school-wide analyses, and linkages to appropriately challenging curricula materials. These analyses can be conducted at the individual as well as at the cohort, class, and school levels.

**Evidence-based curricula development**

Curriculum is also a contested domain, and too often, it is resolved by asking a group of experts to devise a new version – often tinkering at the edges, choosing new names to dominate the centre, and the teachers do much the same as they did before. Instead, it is argued, curriculum development should start with evidence based on what students know and can do.

Take mathematics as an example. It is easy to imagine a group of experts arguing for some new twist or development in mathematics. The current vogue seems to be number strategies, and in New Zealand a group has decided there are six of these strategies, they are hierarchical, and that it is desirable that students, as early as possible, learn to strategise using the highest step in the hierarchy. My point is not to question the merit of this claim (although see Ell, 2002; van Gardaren, 2002) but to highlight that number operations are considered in most need of curriculum innovation.

We have accumulated evidence based on about 25,000 students undertaking over 1500 items from across the mathematics curricula (from the asTTle norming sample). Then we can present the growth of number (in its three forms) and can see a steep learning curve right throughout the Years 5 to 12. But in Geometric Knowledge we can see a shaky start in primary school; there is a decline and then no growth during Years 5 to 7; and then over the latter years of schooling, a less steep growth than for Number. There should be a major set of questions here about the teaching of geometry in primary schools – perhaps dropping it completely!

We can drill down deep below this level of aggregation and also ask about specific objectives within Number and within Geometry, and this is the nature of evidence-based curriculum development. Such discussion, based on evidence about learning can contest deeply held beliefs about what should be undertaken in the name of curriculum form, and can lead to asking direct questions about where the curriculum needs to be reformed, and where to be left alone.

**Evidence based within-school development**

There are many within-school debates about the nature of evidence that makes a difference to learning? Let me illustrate six.
The importance of asking relative questions of effectiveness

If you could sum up all the studies on what makes a difference to students’ achievement, there are very few that do not report some success. Nearly everything enhances achievement, thus any teacher claiming that they can show evidence of enhanced learning is not saying much. For example, based on my syntheses of evidence on this question (Hattie, 1999; in prep), I have determined the effect-sizes of over 100 major innovations from over 300,000 studies. For example: zero is when there is no effect on achievement, a negative effect is when the innovation reduces achievement, and a positive is when the innovation enhances achievement. These innovations include structural changes (reducing class size, ability grouping), curricula innovations, teacher effects (questioning, direct instruction, reciprocal teaching), and so on. Virtually everything we do enhances achievement (note how few are below the zero effect-size). The critical question is whether we can implement those effects that enhance achievement by more than the average (.40 effect-sizes). Anything less is holding back a student, as at least half the effects can attain growth greater than .40.

The use of effect-sizes in classrooms to underpin the discussion on effectiveness

The power of effect-sizes (the difference between two groups or between two time points divided by their pooled standard deviation) is relatively easy to implement in schools. Phillips, McNaughton, and MacDonald (2001) have used effect-sizes in their implementation of school-wide literacy programs in schools from lower socioeconomic areas, with much success. Their success is not only to provide policy makers with evidence of the success, but more importantly to assist teachers in the delivery of the literacy program.

Another advantage of using effect-sizes is that they force schools to have clear goals and standards of student performance, as only then can teachers collect and review information to inform themselves about their levels of success with their students in reaching those standards (Newmann, King, & Rigdon, 1997; Timperley, 2004). Turning such evidence into tools for teachers is the key to evidence-based teaching. Timperley (2005), for example, worked with teachers in one low socioeconomic area, and began by collecting a range of literacy achievement information:

This information, on individual student profiles and held in each teacher’s filing cabinet, was vast and encompassing. The more formal assessments (using standardised measures like the Reading Observation Survey, Clay, 1993) was considered by the teachers as something collected for the assistant principal’s use, not theirs. Teachers considered that the most relevant planning evidence was anecdotal observational data collected on a daily basis in their classrooms. They considered such data was relevant and trustworthy in contrast to the more formally collected information. The assistant principal, however, was concerned about the low quality of these anecdotal observation data particularly because they did not give the teachers an understanding of the adequacy of their students’ progress in comparison with other students in the country. When explaining the national data for their students, teachers had many reasons to exclude the information (the national kids are not like mine, I teach to the best of my ability given whom I am given, I should not ‘teach to the test’, the tasks are not ‘authentic’, others fail to understand what my kids can do, I have too many students in my class, I need more time if this is going to impact on me, and so on.

Timperley (2005)
Timperley highlighted the power of ‘surprise’ to ensure more ownership by the teachers: “One of the ways in which data can be powerful in creating change is the possibility that they may be discrepant with previous beliefs and create surprise, thus challenging those beliefs” (Schutzwohl, 1998; Timperley & Robinson, 2001). When teachers compared their students’ growth with that of students of other teachers, they were surprised. The most important aspect of this study was moving the teachers from expressing outcomes in terms of the students they received, the working conditions of teaching and learning, to a set of contingencies based on learning outcomes.

3 The importance of learning intentions and success criteria

Using effect-sizes, or any evidence of enhancement comes back to the issues of merit and worth of the outcomes. Within the classroom, we have articulated these as learning intentions and success criteria. Our work in schools too often shows that students rarely know the learning criteria for a particular lesson, are confused as to what success would look like for this intention (often claiming that something long, spelled correctly, and neat is indicative of the success criteria), and do not see how the assessment relates to the success criteria nor the learning intentions. We have spent much time writing about making learning intentions and success criteria explicit, and have seen many classes and schools transform with these simple but powerful ideas (Clarke, Timperley, & Hattie, 2003). To illustrate:

Learning intention: ‘To understand the causes and effects of events that have shaped the lives of a group of people.’ The context might be the diseases that affected Māori after the arrival of the British colonists.

Success criteria: By week 3 of this unit, students will be able to describe the trends in Māori population between 1820 and 1920. By the end of the unit, the students will be able to explain the effect of British colonisation on Māori health at the beginning of the twentieth century and how it influenced Māori population trends and make predictions about the health effects on indigenous peoples by colonising countries.

How success criteria will be assessed: Students will be able to write a paragraph that relates three pieces of information: the arrival of British diseases, the population trends of Māori, the contribution of previously unknown disease to the decline in population.

Evidence is now easy – it relates the teacher’s intention (from the curriculum) to the task and activities, clearly specifies the criteria the teacher would use to judge student learning, and indicates how data could be collected specific to these criteria. And even more powerful if the learning intention, success criteria, and assessment are shared with the students (as they commence the task). At a minimum, it stipulates the notion of what the learning outcomes are, can lead to debates about sufficiency, challenge, appropriateness, time, resources, and can indicate to other teachers and students (and parents) the level and depth of the learning.

4 Assessment data is optimised when teachers conceive such data as about them (and not about the students)

One of the powerful ideas in evidence-based models of teaching and learning is that teachers need to move away from considering achievement data as saying something about the student, and start considering achievement data as saying something about their teaching. If students do not know something, or cannot process the information, this should be cues for teacher action, particularly teaching in a different way (the first time did not work!). Merely ascribing to the student the information that they can or cannot do something is not as powerful as ascribing to the teacher what they have or have not taught well.

A similar powerful idea is that teachers have differing conceptions of assessment (Brown, 2004), and understanding these differing conceptions may be critical before encouraging teachers to collect more evidence. Brown (2004) has discovered four major conceptions: assessment improves teaching and learning, assessment makes schools and teachers accountable, assessment makes students accountable, and assessment is irrelevant. If teachers consider assessment is irrelevant, then this needs to be attended to before inviting such teachers to consider evidence-based models of teaching and learning. They will depend overly on anecdotal evidence, believing that completion of assigned tasks (regardless of difficulty and challenge) and similar such engagement-related activities are more critical than any ‘surprises’ and evidence based on dependable testing procedures.

It may be necessary for teachers to listen to students more closely and thus use other sources of classroom evidence. Bishop, Berryman, Tiakiwai, and Richardson (2003) interviewed Māori students about how to best improve their educational achievement.
The students claimed that the major changes needed to be how teachers related and interacted with Māori students in their classrooms. Too often these interactions were based on deficit theorising by teachers about these students, and too often these relationships were based on denying that the students had a rich cultural heritage that they brought to the classroom. This led to low expectations of Māori students and collecting evidence to confirm these beliefs, thus creating a downward spiralling, self-fulfilling prophecy of Māori student achievement and failure. Based on these student experiences, the Team developed a professional development intervention, that when implemented with a group of 11 teachers in four schools, was associated with improved learning, behaviour and attendance outcomes for Māori students.

Similarly, Irving (2005) has found that students are very adept at identifying excellence in teaching and the major question may be ‘Why primary and secondary teachers do not use more student evaluation of teaching?’ Irving used the standards of the National Board for Professional Teaching Standards to create a student evaluation instrument (for high school mathematics). Using a sample of NBC and non-NBC teachers, he found that students could dependably discriminate between these two groups of teachers. The data are there but is the courage to use it there?

5 Movement towards student empowerment of teaching and learning

If you believe in student self-assessment, self-monitoring, self-teaching, self-learning, and self-responsibility – then it is critical that the student has dependable evidence on which to base their decision-making. Instead, we so often promote the power of self-regulation but fail to realise that it is premised on evidence of learning performance.

6 Enhancing teacher performance to improve student learning is conditional upon evidence

Timperley (2005) recently noted that the notorious lack of success of teacher PD is too well known to keep hiding or assuming that we should continue as if this evidence is not aplenty (DuFour & Eaker, 1999; Lewis, 1997; Louis & Leithwood, 1998; Timperley, 2005; Wald & Castleberry, 2000). A major reason for this lack of success is that too much professional development for teachers does not have enhancement of student learning as the contingency of success. Too often, PD is more related to working conditions (of teachers and students), and correlates of student learning. Indeed, in her recent synthesis of literature Timperley was able to locate only 17 articles that related the effects of PD on student learning! She continued:

Generic delivery models of much external professional development have often proved ineffective in creating the depth of shared professional knowledge needed if staff are to address complex teaching and learning issues in their schools, particularly in those schools facing challenging circumstances (DuFour & Eaker, 1999; Lewis, 1997; Louis & Leithwood, 1998; Wald & Castleberry, 2000). Part of the depth required is an understanding of the contextual conditions in which the new learning must be applied (King & Newmann, 2000).

Every school contains a diverse mix of teachers and students with varying competencies and attitudes and a unique set of social, cultural and political conditions, all of which have a powerful influence on teaching and learning (Bryk, Sebring, Kerbow, Rollow, & Easton, 1998; Lytle & Cochran-Smith, 1994). These complex conditions often present obstacles for teachers attempting to apply new ‘generic’ learning from conventional professional development programs to their own classroom practice (Clement & Vandenberghoe, 2000; DuFour, 1999; Hord, 1997; Lashway, 1998; Leo & D’Ette, 2000; Leonard & Leonard, 1999; Louis & Leithwood, 1998; McLaughlin, 1993; Rosenholtz, 1989; Smylie, 1995).

From such an analysis, Timperley recommends developing a culture of using data to support learning and how this ‘needs a mind shift that will rock the foundations of what we do and how we do it.’ She proposed five elements of professional learning communities:

1 The development of shared values and expectations about children, learning, teaching and teachers’ roles and the relationship of these to the environment (Bryk et al. 1999; Louis et al. 1996).

2 The collective focus on student learning that then becomes part of the normative control of the professional community (Bryk et al., 1999).

3 Collaboration, whereby professional communities foster the sharing of expertise and faculty members call on each other to discuss the development of skills and create shared understandings of effective practice.

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4 Deprivatised practice, and much time and opportunity to talk to each other about teaching.

5 Reflective dialogue, implies self-awareness about one’s work as a teacher through engaging in in-depth conversations about teaching and learning (Louis, Marks et al., 1996).

These all require a serious commitment to evidence, debates about the contested nature and value of evidence, and actions based on evidence. This is a major culture shift for many schools, where privatised teaching occurs, discussion is more about curriculum and students and less about teaching, and evidence of growth in learning is rarely shared across the school.

Concluding comments

The major argument of this presentation is to move the discussion away from data towards interpretations, from student outcomes to teaching successes and improvements, and from accountability models located about schools to located first in the classroom to support such evidence-based teaching and learning. The asTTle model, which has been developed in New Zealand, will be used in the Keynote presentation to demonstrate such a model. By locating evidence in the classroom we can improve the quality of information and interpretations sent to students, parents, Ministries, Ministers, and thence the community. We can influence the major agent that influences student and learning – the teacher, can highlight the debate about what is worth teaching, and, most importantly, can begin to establish a teacher-shared language about the achievement progression.

The model is based on target setting, on ensuring the implementation of the curricula, and by comparisons to appropriate national and local standards of performance. The major sources of evidence relate to diagnosis and formative assessment models and are centred on three major questions: Where are we going? How are we going? and Where to next? All analyses can be conducted at the individual as well as at the cohort, class, and school levels. The evidence can also be used to contest deeply held beliefs about what should be undertaken in the name of curriculum reform, and can lead to asking direct questions about where the curriculum needs to be reformed, and where it should be left alone.

Within schools, this evidence-based accountability model can be used to ask relative questions about the effectiveness of teaching, can be recast in terms of learning intentions and success criteria, and evidence provided about the quality of teaching rather than the quality of the students that a school receives. It is important to consider teachers’ conceptions of assessment, and to use evidence as the basis for professional development programs. Perhaps students’ evaluations of teaching could be also used as part of this evidence base.

The move to collecting more data needs to be stopped and the move to making more defensible interpretations about teaching and learning upgraded to priority levels. Evidence that informs teachers about their teaching is the most critical evidence that can be provided and too many current models ignore such evidence. It is possible to devise a national accountability model based on evidence critical to teachers, and such a model can also serve to evaluate the state of learning in the nation, to provide evidence for curriculum reform, to create debate about what is worth learning in our schools, and to develop a common language about the progression of this learning as students advance through their schooling.

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Concurrent papers
Gabrielle Matters
Australian Council for Educational Research, Queensland

To June 2005 – Director, Assessment & New Basics, Queensland Department of Education and the Arts
From October 2005 – Principal Research Fellow and Manager Brisbane Office of the Australian Council for Educational Research

Professor Matters has been keenly interested in educational measurement since she was a pup – as a teacher, school administrator, bureaucrat, researcher, advisor, test developer, writer, and mother. Her major achievements include:

• teaching students to use their minds well (taught Chemistry and Physics for 20 years in Independent, state and Catholic schools, including 5 years as a deputy principal)
• leading teams of talented educators on various projects (e.g. QCS Test, Assessment & Reporting, New Basics)
• writing journal articles, books and conference papers on test design and marking, test-taking behaviour, assessment/testing formats, the underachievement of boys (before the topic became trendy), the curriculum wars, the relationship between pedagogy and assessment, ‘death by assessment’, school reform, and standards-based assessment
• having fun working across academe and the bureaucracy.

Introduction
The New Basics Trial in Queensland (2000–04) was about improving educational outcomes. At its heart was the idea that, to do this, there must be an orchestration of the message systems of curriculum, teaching and assessment – and that these changes must be in practices, not merely in statements of intention or expectation.

What were the changes? We changed the curriculum by introducing three suites of Rich Tasks covering three 3-year spans from Year 1 to Year 9. To determine their curriculum plans, teachers had to map backwards from these tasks — each of whose specification was given on a single A3 page [Education Queensland. (2004)].

We changed assessment by introducing a system of social moderation aimed at achieving state-wide comparability. This system required teachers to talk among themselves and compare their opinions about student work, not just within their school but also across schools.

And we changed teaching by ‘upping the ante’ intellectually, challenging teachers professionally, and connecting what was done in the classroom to the real world.

The Rich Tasks at the centre of the New Basics embodied the changes that we sought. They were rich in the sense of having variety, scope and depth; in requiring academic rigour; and in being multidisciplinary. Student performances on Rich Tasks were assessed in rich ways — the final grade was not the result of some scoring algorithm but of on-balance judgements made by teachers considering each performance from multiple perspectives.

We learnt many things from the Trial about many areas of the education system; this paper covers two — our experience with policy makers before, during and after the Trial; and the highs and lows of what teachers will (and will not) do.

We learnt that policy makers come and go — the ones you finish with are often not the ones you started with. (The same is true of teachers and principals!)

Commitment to school reform can wax and wane, and be influenced by factors outside anyone’s control. We learnt that there are some teachers who are excited by opportunities and grasp the nettle for the betterment of their students. There are also some who are not excited, and who avoid the nettle.

There were different challenges in the primary and secondary years – the Trial deliberately spanned the two. In the primary years, the challenge was to the view of the teacher as the fount of all knowledge that mattered; in the secondary years the challenge was to the existence of ‘silos’ that compartmentalise knowledge and the disciplines. Teachers’ threshold knowledge was often found wanting (especially in Mathematics and the physical sciences), but we also often found teachers willing to learn new approaches, new concepts and new skills.

The New Basics research findings were considered by the Minister for Education in presenting the Government’s position on how to improve student learning and to increase comparability of assessment and reporting across schools [Education Queensland (2005)].

Evidence-based policy making
The New Basics research and evaluation reports (Department of Research Conference 2005)
Education and the Arts, 2004; Australian Council for Educational Research, 2004) were considered by the Queensland Minister for Education in presenting the Government’s position on how to improve student learning and to increase comparability of assessment and reporting across schools (Department of Education and the Arts, 2005).

The New Basics approach to curriculum, teaching, assessment, reporting, and school organisation was developed and trialled because of a widespread recognition and acceptance in 1999–2000 that major changes in education were absolutely essential, particularly in the compulsory years of schooling.

This view is confirmed by our most recent research, which, furthermore, strongly suggests that change is still needed. The New Basics research program demonstrated ways in which it might be possible to bring about such change.

There were four aspects to the New Basics trial: development of an integrated framework for curriculum, pedagogy and assessment for new times; implementation of the framework in volunteer state schools that were selected, quarantined, resourced and supported; a research program comprising 25 individual research activities; and an independent external evaluation.

Ultimately, there were three objects of learning from the New Basics trial: the New Basics per se (which was the aim of the exercise), the management of intervention, and the education system itself. In this paper, I focus on two of them: one, the strengths and weaknesses of the New Basics idea in practice; and two, the critical issues that have been identified as applying across the State beyond New Basics and beyond state schools.

This paper spans the trial period (2000–04) and the immediate post-trial period (2005), showing how research evidence informed policy-making.

New Basics Framework

A comprehensive history of the development of the New Basics Framework and its implementation in 58 state schools can be found in ‘The New Basics: Narrative and Commentary’, within the research report. A summary of the key components follows.

- What is taught: Four categories of essential practices for new times: Life pathways and social futures, Multiliteracies and communications media, Active citizenship, and Environments and technologies.
- How it is taught: Four categories of effective teaching strategies: Intellectual quality, Connectedness to the wide world, Recognition of difference, and Social support.
- How learning is displayed: Three suites of transdisciplinary tasks in three 3-year spans within Years 1–9: First suite – 5 tasks; second suite – 7; third suite – 8. Rich Tasks are published in an A3 ‘artbook’ as a collection of double-page spreads, one for each task; giving the task description; New Basics referents; targeted repertoires of practice; task specs; ideas, hints and comments; task parameters; and assessment criteria.
- How the evidence of learning is assessed and reported:
  - Pre-set standards for each task – as indicated by the desirable features of high-quality performance and the features of acceptable performance;
  - Rich Task assessment model – a variant of the traditional criteria/standards matrix;
  - Moderation strategy – four stages beginning with clarification of task intent and concluding with ratification of teacher judgements of the standard of student work;
  - Common-format reports – of the results of formative assessment at the end of a 3-year span, as an overall grade for each Rich Task in the suite, with associated legend for ease of interpretation, and with state-wide comparability assured.

Differences between KLAs and New Basics

At the same time as the New Basics Program was being developed and implemented in Queensland, another program of educational reform was in progress across Australia – the Key Learning Areas (KLAs). The differences between the two need to be understood.

- The KLA curriculum is organised into eight areas, which are based on composite fields of knowledge, each with its own content and context. The New Basics idea organises a futures-oriented curriculum into four categories, each of which has an explicit orientation towards researching, understanding, and coming to grips with newly emerging economic, social and cultural conditions.
- The KLA curriculum is organised into eight areas, which are based on composite fields of knowledge, each with its own content and context. The New Basics idea organises a futures-oriented curriculum into four categories, each of which has an explicit orientation towards researching, understanding, and coming to grips with newly emerging economic, social and cultural conditions.
- Within the New Basics Framework, productive pedagogies are a mandatory rather than desirable component.
• In the KLA idea, outcomes are expressed in terms of what students are expected to know and to be able to do within a composite of specific fields of knowledge at certain stages. In the New Basics idea, outcomes are expressed as Rich Tasks – the specific activities with real-world value and use, through which students are able to display their grasp of important ideas and skills.

• The KLA idea incorporated a staggered implementation of syllabuses as they became available over a span of years. The New Basics idea made all Rich Tasks available at once.

• The KLA syllabuses are silent on the body of evidence required for assessment. The New Basics documents are prescriptive.

• The KLA syllabuses do not contain assessment criteria. In Queensland, the Core Learning Outcomes are indicators of standards. Rich Tasks have task-specific grading masters. The desirable features are indicators of standards.

• The KLA syllabuses follow a constructivist approach to learning. The New Basics Rich Tasks realise the reconceptualist paradigm.

Research program

A research program was developed around three key questions: Is the New Basics likely to lead to the changes that are wanted? Is the New Basics likely to be accepted? Is the New Basics feasible on an extended basis? These three questions spring from the central research question: Is the New Basics viable?

These questions gave rise to 25 separate research activities (see ‘New Basics Research Papers: In Essence’ in the research report). The research program used a mixed methods approach – from case study to multilevel modelling, critical discourse analysis to psychometrics.

The method, results and conclusions for each of the research activities were scrutinised by the Framework Research Advisory Group, four internationally recognised researchers working independently of Education Queensland (EQ). The conduct of the research and the validity of the research findings were the subject of a commissioned external evaluation.

Eleven key messages

The following messages from the research report relate specifically to New Basics in the EQ context in which the Trial took place.

1 The Trial of the New Basics provided value for money, demonstrating the capacity of the New Basics package as a complete system.

2 The New Basics package (curriculum, teaching, moderated assessment and reporting) can be used to revitalise the education system, to reform schools, and to achieve the student learnings necessary for the new world.

3 Schools and teachers experienced real challenges but also significant rewards in doing New Basics, in the development of the professional community, the public accountability, and the links with the world outside the classroom.

4 Associated with educational innovation are real tensions in accommodating the oft-competing demands for academic excellence and public administration. It can be hard to find the resources (people, money and priorities) needed to support the long-term developments that bring real and substantial change.

5 The Department of Education, in opening itself up to information about the state/health of the system through the trialling of the New Basics, reveals aspects of a mature system that is ready to face the demands, obstacles, uncertainties and risks of successful operation in the 21st century.

6 The changes needed to align the schools and classrooms of public education with the needs of the future can be achieved without high additional cost and without detracting from the ‘old’ basics.

7 As a curriculum project alone, unaccompanied by a powerful assessment system and the development of schools as learning organisations, the New Basics is not likely to have continuing impact.

8 Since the New Basics is about fundamental change in schooling, it will be necessary to ensure schools (and EQ structures) are learning organisations.

9 Real, sustained and substantive changes in professional practices, which are not at the heart of teaching and schooling, are not effected overnight or on the basis of an edict.

10 Any approach to extension should be sensitive to the preconditions identified during the Trial for optimising the chances of success for schools implementing the New Basics package.

11 Any implementation of changes based on learnings from the New
Basics should be gradual, consistent with the need to develop the capacity of the system and its schools.

**Selected research findings**

- The Rich Tasks were found to be richer than the best student work from non-trial schools (themselves selected to be the best of their type) in Year 6, and as rich in Years 3 and 9.
- In general, Queensland teachers take the view that assessment is relevant to, and has a positive effect on, teaching and learning. Simultaneously, the general view is that assessment lacks validity and is inaccurate. Teachers do not appear to be convinced that assessment is a tool for school accountability (the opposite of their NZ counterparts).
- Students in New Basics schools held their own on conventional standardised tests of literacy and numeracy.
- Teachers’ participation in various stages of moderation was one of the most important contributors to professional skills enhancement and to developing confidence in applying the model for grading students’ Rich Task performances.
- The New Basics assessment system is able to withstand pressure and respond to challenges that arise in the quest for comparability.
- Factors that might explain students’ performances across Rich Tasks are:
  - Year 3 – technology, performing, verbal language;
  - Year 6 – non-traditional learning frames;
  - Year 9 – individual discourse in formal registers, project management of group endeavours, non-traditional learning frames.
- Test scores of students in trial schools on the International Schools’ Assessment (ISA) (a standardised test of Reading Literacy, Mathematical Literacy and Writing), improved significantly over time, but did so to an extent not significantly different from the extent of improvement of students in non-trial schools (including non-state schools).
- Year 6 students in trial schools who identified as Aboriginal or Torres Strait Islander students improved more than other students in the domain of Reading Literacy on ISA.
- Very few students (from trial and non-trial schools alike) performed very highly according to the criteria for assessing problem-solving on the World Class Tests.
- Queensland students are not test-wise, and state-school teachers (of students in Years 3 to 9) do not have a positive attitude to external tests.
- The QSRLS-observed decline in intellectual quality and connectedness from primary to Year 8 was checked.
- Students in trial schools rated teacher classroom practice in three of the four dimensions of a measure of ‘enacted pedagogy’ higher than did students in non-trial schools.
- Teachers were surprised that some of their students performed so well.
- A not-insignificant proportion of students met the ambitious aspirational standards set for award of A-grade.

**Strengths and weaknesses according to the external evaluation**

- Quality of student work
- Development of an assessment system
- Changes in approaches to teaching ↔ Performance on standardised tests
- Congruence with other aspects of the school system and its context
- Differential impact between year levels

Research involving real student work indicated that the New Basics could lead to the types of changes that are wanted, with student performances changing not just in depth but also in nature. Research also indicated that moderated assessment could deliver shifts in teachers’ classroom practices. Reactions of principals and teachers to external testing and the subsequent performance of students on those tests indicated a lack of test-wiseness that could be detrimental to Queensland students in other stressful testing environments.

System blockages included the transfer of principals out of New Basics schools in juncture years, IT processes, and the changing role of district director during the Trial.

There were different challenges in the primary and secondary years – the Trial deliberately spanned the two. In the primary years the challenge was to the view of the teacher as the fount of all knowledge that mattered; in the secondary years the challenge was to the existence of silos that compartmentalise knowledge and the disciplines. Teachers’ threshold
Knowledge was often wanting (especially in mathematics and the physical sciences), but teachers were willing to learn new approaches, new concepts and new skills.

**Change was – and still is – needed**

The New Basics Research Report suggests deeper issues about the state of education in Queensland than those identified in 1999–2000, and also suggests how change can be achieved. These perspectives are supported by the findings from another study – Assessment & Reporting Framework (ARF) Pilot Study (Education Queensland, 2003).

An Assessment and Reporting Taskforce was established in 2001 because it was clear that there was no coherent approach to assessment and reporting in P–10. In 2003, the ARF Pilot Study explored assessment in the context of KLA syllabus implementation in Queensland state schools.

As a result of these two studies, together with the earlier Queensland School Reform Longitudinal Study (QSRLS) (The University of Queensland, 2001), the Department of Education came to possess a large volume of hard data and rigorous analyses about what is happening in classrooms, which made it possible to describe crucial aspects of education across all state schools Years 1–9 (a description that can reasonably be extrapolated to P–10).

Some of the research studies were absolute: What is happening in trial schools different from what is happening in non-trial schools?

### Findings not just about state schools

Because comparative studies were incorporated into the New Basics Research Program, it was necessary to collect data from many more schools than just the trial schools. Data were collected from other state schools and from some non-state schools. For certain studies, matched or ‘like’ schools were selected whereas, for other studies, schools were selected because they were known to be outstanding (‘the best’). Therefore, the critical issues that were identified apply across Queensland schooling in Years 1–9, beyond the New Basics.

### Critical issues

The expression of the critical issues is deceptively simple and falls under five headings – curriculum, schools, schools’ communities, teachers, and the education system.

- There are large gaps between the intended curriculum and the enacted curriculum.
- Some schools can handle change and meet future needs; some act to contain or neutralise change.
- Diversity in the nature and intensity of, and attitudes to, the relationships between schools and their communities is huge.
- In general, teachers do not possess high levels of content knowledge, are not confident about assessment, and are not sure what students are learning.
- Queensland education’s message system lacks coherence.

Possible responses to this less-than-palatable news were many and varied, as were the options for action.

### Options for action

One could tinker with the existing situation, but the results would not meet future needs. One could ignore what the research is saying, but the tension between what is needed and what has been achieved is already widely known. One could put resources into more documents, or more bolt-on professional development programs – the usual response in such situations – but this is an expensive solution that has been tried in other places at other times. One could interpret teachers’ need for support in their basics (assessment, pedagogy, curriculum) as showing that they need very detailed specifications, but this approach would de-skill the profession.

Since the cost of the Trial ($10.7m over four years) was, amongst other things, the cost of finding out that change can occur and can be accepted, one could draw on the research evidence for methods of bringing about change. This is not to say, however, that simply extending the New Basics is the answer. And so, in June 2004, the Director-General stated:

December 2003 marked the end of the Trial, but that was by no means the end of the New Basics. I have authorised 58 schools that have been involved to date to continue with the New Basics while we take the time to reflect on the learnings from the Trial and determine how they can be transferred to all schools.

Later this year, the Minister for Education will present the Government’s position on how best to report student
It seemed that the way forward was to identify the core values of New Basics and incorporate those into all schools, setting aside territorial aggrandisement and simply using what is useful. This is not the same as arguing for or against implementing the New Basics in more schools, all schools or no schools.

Core values of the New Basics in action

Did the New Basics per se trigger the desired changes in trial schools? Probably not. It was more likely to be the different way of doing business — of ‘doing school’ according to the core values of the program; namely, curriculum values, teaching values, assessment system values, and action values. Curriculum values are expanded on below. For brevity, other values are merely listed under each of the other three headings.

Curriculum values

Futures orientation: Curriculum is designed around tasks that prepare students for new workplaces, technologies and cultures. Some of the tasks involve traditional ways of doing things; others are responses to new times. Some of them require existing practices and skills, some require the blending of old and new, while others require students and teachers to construct and explore new problems, new learning strategies and new solutions.

Focused and uncluttered: Curriculum planning requires a principled selection of learnings from various disciplines and skills (social, cultural, cognitive and linguistic) rather than universal coverage of prescribed ‘atomistic’ learning outcomes. Students study fewer things in greater depth in order to achieve greater levels of understanding.

Fluid and responsive: Curriculum development does not focus on sets of documents and lists of outcomes that have been composed over several years in committee but, rather, is thought of in terms of a renewable and criticisable resource that is dynamic, changing in relation to new contexts, renewed and sustained by teachers and curriculum developers.

Transdisciplinary: The transdisciplinary (or multi-disciplinary) approach to teaching and learning draws on practices and skills across disciplines while attempting to retain the integrity of each discipline; as opposed to the thematic or interdisciplinary approach that seek links between disciplines often with a dilution of discipline-specific expertise. Caution: Before ‘going trans’, teachers need to be able to work confidently with the disciplines.

The ‘old’ basics: The old basics remain at the heart of the New Basics but are not considered to be sufficient as the substance of modern education. The New Basics, in emphasising the skills that students need to complete intellectually challenging, integrated, real-life tasks, should not sacrifice basic skills development.

Teaching values

Upping the intellectual ante
Connecting students to the wider world
Generating a supportive classroom environment
Recognising difference.

Assessment system values

Rigour
Comparability
Validity
Accountability.

Action values

Prescribing the required outputs (goals) but not the way to get there (process)
Developing school–community links
Closing the loop with monitoring, feedback and support
Strengthening teachers’ content knowledge and assessment skills through built-in, not bolt-on, approaches to professional development
Enhancing learning organisations at school and system levels
Using program values to drive planning and organisation.

Queensland Curriculum, Assessment and Reporting (QCAR) Framework

The policy-makers decided that any policy statement and action plan for progressing the integration of curriculum, teaching, assessment and reporting should be based on research, including the New Basics research. They sought and received Cabinet
endorsement of 12 evidence-based characteristics of an effective schooling system.

**Clear governance**
There are clearly articulated roles and responsibilities for all parties involved in policy making and practice in curriculum, teaching, assessment and reporting.

**Research-based**
Decisions on educational policy and practice in curriculum, teaching, assessment and reporting are informed by rigorous research.

**Equality of opportunity**
Every young Queenslander, regardless of economic or social circumstances, is given the opportunity to acquire essential knowledges, skills, understandings and capacities.

**Transparent**
Queensland schools are able to benchmark their performance on the basis of data about schools performance as well as data on student achievement in areas of learning at key junctures.

**Flexible**
Curriculum is readily renewable and responsive to new contexts.

**Intellectually challenging**
Learners study fewer things in greater depth, achieving deeper levels of understanding. Learning experiences draw on specific fields of knowledge as well as integrate ideas, concepts and information across fields of knowledge.

**Authentic**
Knowledges and skills from real-world sources such as industry flow freely back and forth between the wider community and the learning environment.

**Inclusive**
Individual needs and learning styles are accommodated, diversity is recognised and celebrated, and student participation in decision-making is encouraged.

**Supportive**
Students receive clear guidelines on what they are learning, how they will be assessed, and how they can influence practices in the classroom. Students are encouraged to take risks in a safe environment and be responsible for their own behaviour and learning.

**Accountable**
Schools convey high expectations and students are able to demonstrate their learning through valid assessment tasks, and assessment results that are reported on are comparable across the State.

**Teacher professional community**
Teachers participate in sustained intellectual work, and use a range of teaching strategies to provide flexible and innovative learning experiences for individual students and groups of students.

**Adaptable**
There is a willingness to try new ways of working and be responsive to emerging technologies, and societal and organisational change.

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**Highlights of the new QCAR Framework**

- Define what is essential curriculum for all students in Years P–10;
- Set standards of student achievement in the essential curriculum.
- Create a bank of assessment tools for teachers that link to the essential curriculum and standards.
- Establish, at key points in the P–10 years, rigorous comparable assessment against the defined standards.
- Specify a common framework for reporting student achievement against standards.

The policy direction for the framework was developed by the Department of Education and the Arts in collaboration with the Queensland Catholic Education Commission, the Association of Independent Schools Queensland, Education Queensland, and the Queensland Studies Authority (QSA). The Queensland Government will set parameters to guide the creation of the materials and tools that make up the QCAR Framework. The QSA will develop the materials and tools in consultation with key stakeholders, ready for implementation state-wide in 2008.

**References**
All documents cited in this paper can be found at:


Moving on from Count Me In Too: Evidence-based teaching and learning in numeracy in the early and middle years of schooling

Lynn Tozer
Dunedin College of Education, New Zealand

Lynn Tozer is a Mathematics Adviser at the Dunedin College of Education where she has worked in Educational Support to primary schools since 1999. Lynn has been a deputy principal and has taught at all year levels of the primary school. She also has a passion for literacy and is a trained Reading Recovery teacher. During 1999–2000 Lynn spent time at the University of Delaware as a Fulbright Scholar. Lynn is an original member of the numeracy development team having been involved since 2000 in all pilot projects, Count Me In Too, the Early Numeracy Project, the Advanced Numeracy Project and the Intermediate Project. She is also currently the Numeracy Project Coordinator for schools in the Otago-Southland region and a National Coordinator, contributing to Ministry policy developments in numeracy. Lynn has also been co-author of several mathematics publications and writes for the New Zealand maths web site.

Her day-to-day facilitation work is focused on the numeracy professional development of practicing teachers, is student-centred and predominantly classroom-based.

Marilyn Holmes
Dunedin College of Education, New Zealand

Marilyn Holmes is an Adviser in Mathematics at the Dunedin College of Education. Mrs Holmes holds a Masters in Science from Curtin University of Technology and is currently working on her doctoral studies. She is a highly experienced primary teacher, having taught children aged from 5 to 13 years in many different types of schools in every decade since the 1960s.

Mrs Holmes has been a Senior Lecturer in Mathematics Education at Auckland College of Education, 1997–2001 and has also lectured in several curriculum areas at the Dunedin College of Education, 1994–1996.

She is one of the original group of lecturers, mathematics advisers and Ministry personnel who developed the idea that grew into the Numeracy Project as it is today. Mrs Holmes has contributed further as a facilitator for the project pilots since 2000: Count Me In Too Project, Early Numeracy Project, Advanced Numeracy Project, and Intermediate Numeracy Project.

She continues to inform the development of the project through her involvement in teacher professional development as well as contributing to teacher resources: Ministry of Education numeracy booklets, Figure It Out booklets and the New Zealand Mathematics web site.

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.

Introduction

Change is inevitable in education. As New Zealand pushes towards its goal of a knowledge based economy the impact is on a teaching community where change is not carefully drip fed but is geared towards an accelerated pace. Managing change becomes an issue that is imposed on teachers who generally regard it with trepidation or uncertainty. Mesnik (2004) writes that “practically all forms of human behaviour involve decision making under the supervision of a mysterious guide – uncertainty”.

How can teachers then be certain that they are making the best decisions for
children’s learning in mathematics? It is especially hard when their professionalism appears to be undermined by statements such as “…transition to evidence based practice has yet to occur in education…this is despite there being millions of studies that move education beyond craft and opinion” and “many of those outside education find it hard to believe, after a century of scientific and technological progress… that the primary aim of teacher education is to reproduce rather than to improve existing teaching practice” (Hattie, 2003, p12). Shulman (1989) gives credence to teachers by acknowledging “their accumulated wisdom of practice which in many cases is as important a source of guidance for practice as the theory or empirical principles”.

Experienced teachers are not to be underestimated; they have a wealth of knowledge. The sample they draw their evidence from is the hours, the months and the years they spend with several hundreds of children. The New Zealand Numeracy Project helps teachers to manage the inevitable changes, allay their uncertainties, challenge their beliefs and at the same time create an environment where teachers feel a certainty about their professional judgments for children’s learning (Higgins, 2001, 2002, 2003; Irwin, 2002, 2003; Thomas & Tagg, 2004; Thomas, Tagg & Ward, 2003; Thomas & Ward, 2001, 2002).

Background

The New South Wales Department of Education and Training initiative Count Me In Too (Years 1-3 children) provided a well researched base from which to develop the New Zealand Numeracy Project. Following a successful pilot of Count Me In Too in 2000, the Early Numeracy Project, was implemented into New Zealand schools in 2001. Milestone Reports and Evaluations have annually documented evidence from teachers, facilitators, researchers and policy analysts and have continued to inform further development of the Numeracy Project. It must be stressed that this is not a static project; it is an evolving discipline. Today the project includes work in schools for Years 1-8 children; a growing secondary component for Years 9-10; Te Poutama Tau an initiative in Maori; and supporting material (refer www.nzmaths.co.nz for further information).

Facilitators, principals, and teachers are interdependent in effectuating the successful implementation of the Numeracy Project. Schools are encouraged to either work in the project by syndicates or as whole school professional development. Having several teachers involved at once means the commitment is easier to maintain, through the support they give each other. Built into the contract between the Ministry and the school is an obligation from the principal to participate in initial workshops, with a moral responsibility to lessen the workload of teachers by engaging in one major professional development; the Numeracy Project.

Key aspects

Three aspects have been named as pivotal to the Numeracy Project; the teacher development programme, framework and diagnostic interview (Young-Loveridge, 2004). However, it could be argued that the teacher development programme is the cocoon around the framework, diagnostic interview and the teaching model (Holmes & Tozer, 2004). The triangulation of these three, form a strong core for the teaching learning process. The interview provides the teacher with the child’s existing knowledge and strategies ‘what do they know’, the framework gives the direction where am I taking them’ and the teaching model gives the vehicle to make connections between the process of teaching and the child’s process of learning ‘how will I get there’.

The New Zealand Number Framework has two main sections: knowledge and strategy. The dichotomy is for teaching purposes and to focus teachers on teaching strategic thinking through the teaching model. It is the strategy framework that requires teachers to reflect on their beliefs about how children learn and what children know about number concepts. The Strategy section describes the mental processes children use to solve operational problems with numbers. It consists of a sequence of nine global strategy stages (see Figure 1) with three operational domains: addition and subtraction, multiplication and division and proportions and ratios.

Counting strategies

0. Emergent
1. One to one counting
2. Counting from one on Materials
3. Counting from one by Imaging
4. Advanced Counting

Part-whole strategies

5. Early Additive
6. Advanced Additive
7. Advanced Multiplicative
8. Advanced Proportional

Source: Ministry of Education, 2004

Figure 1 The number framework
The Knowledge section describes the key items of knowledge that students need to learn to provide the foundation for strategy development and consists of five aspects: numeral identification, number sequence and order, grouping/place value, basic facts and written recording.

Data collection

The gathering of data and subsequent analysis are 'part and parcel' of the Numeracy Project. The assessment tool is an individual task-based oral interview in which carefully sequenced questions are couched to elicit a variety of responses. Teachers are supported with their first diagnostic interviews by their facilitators who coach teachers in the use of the tool and in clarifying their understandings of children's thinking about number. Ongoing formative assessments can be complex but for an empowered teacher who knows, understands and applies the detail of the number framework to daily interaction and observation these are made simpler.

A characteristic of good data is its potential to help teachers make good decisions about children's learning. Data tell a story. Each Diagnostic Interview provides the classroom teacher with immediate and detailed information about the child's number knowledge and mental strategies and allows behavioural observations to be made in response to the oral questions.

Understanding data and actions for improvement

The two questions uppermost in teachers' minds should be: What does it all mean and; how can we use it to improve children's achievements?

A cameo involving one child is used to show how data could be understood and acted upon. Joanne is representative of many Stage 4 (Advanced Counting) children and it is through her data that we trace her journey and what it means for her.

Joanne's story

Joanne has transferred to Kapai School at the beginning of her fifth year at school. In her interview, her teacher notes that although Joanne is normally outgoing and confident, she is now tentative in her responses and has difficulty explaining her thinking. Her interview data show:

**Strategies knowledge**

<table>
<thead>
<tr>
<th>Add/Sub</th>
<th>Mul/Div</th>
<th>Prop/Ratios</th>
<th>FRAWS</th>
<th>BNWS</th>
<th>Basic Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 4</td>
<td>4</td>
<td>4</td>
<td>2-4</td>
<td>4</td>
<td>2-3</td>
</tr>
</tbody>
</table>

Data interpretation gives a simple clear profile statement. With reference to the Number Framework, what strategies in the three domains did Joanne show that placed her at Stage 4? To solve the single digit addition problem 8+5, Joanne counts on from 8, saying 9,10,11,12,13. She keeps track on her fingers. The problem 37-9 is solved by counting back on her fingers, however in crossing the decade, 30 is omitted and her answer is 27. Counting on or back from the biggest number is her most advanced addition and subtraction strategy. Her response to a multiplication problem presented as an array, brings out fingers again as she skip counts the rows in 5s. To solve the simple problem _ of 12, she shares out the beans one by one into three piles, and answers 4, voiced as a question. Joanne looks to the teacher for confirmation for many of her responses. Knowledge data show that Joanne can read and sequence numbers both forwards and backwards up to 100. Numbers bigger than this prove challenging. She has already shown that her backward counting over the decade is not secure. She is unable to recognize common unit fractions. Her place value knowledge is limited to knowing how many tens there are in numbers to 100 only. She appears to know basic facts to 10, her doubles to 20 and teen numbers.

The teacher looks to the Number Framework to provide specific identifiable learning steps when planning for Joanne's needs. The analysis of one short line of data show that, for Joanne, as a Year 5 child, these results are cause for concern because at Kapai School 80% of the children, at the beginning of Year 3, are Stage 4 in addition and subtraction. Behavioural observations show Joanne's hesitancy, the use of fingers, her need for reassurance, slow responses and the absence of mathematical language to explain her thinking. It would suggest that the power of the face to face interview cannot be overstated when compared with a silent pen and paper test.

Joanne's class

At a class level the results of individual interviews provide substantial diagnostic assessment information. There are 28 children in Joanne's class. Each set of individual's data contributes to a detailed class profile, part of which is in Figure 2. The diverse range of children's numeracy needs as evidenced by the data cannot be ignored. The challenge is for the classroom teacher to plan a classroom programme in response to the highlighted strengths and weaknesses in student knowledge and strategies. To effectively manage a
response to this data, children are grouped according to their strategy stage. Joanne joins five others from her class for accelerated learning of part-whole thinking strategies taught through the numeracy teaching model; using materials, using imaging and using number properties. Research indicates the importance of including children in their learning (Alton-Lee, 2003; Askew, Brown, Rhodes, Johnson & Wiliam, 2002). Joanne’s teacher does this by:

- discussing the learning intention of the lesson
- using open and high order questions
- allowing wait time for considered responses
- actively listening
- encouraging student to student conversations

- providing immediate scaffolding and feedback
- making connections to existing concepts
- stimulating metacognition and self assessment
- shared identification of next learning steps.

These teaching techniques are all part of the synchronicity of quality responsiveness to Joanne and what her data tell us. Intuitive and informally collected evidence informs the next teaching step for the experienced teacher. However; “the intuitive and implicit” must be “made explicit” to the children (Timperley & Parr; 2004, p69). Therefore, the teacher concludes the strategy lesson with Joanne’s group in an informal and immediate student self-assessment. The teacher shares her observations, and a clear direction for the next lesson is openly discussed and understood by all parties.

**Joanne’s school**

Management at Kapai School has made it clear that teachers will gather valid and consistent diagnostic and formative data throughout the year so that a detailed school-wide numeracy picture emerges. Problem-solving discussions can now focus on the story told by data. From a close analysis of trends, achievement targets will be set and these are critical to informing the direction for future staff professional development. Alton-Lee (2003), in her best evidence synthesis of quality teaching states that “the gathering and
analysis of high quality student achievement data and the use of externally referenced benchmarks have been found to be powerful tools in bringing about changes in teacher practice that facilitates higher achievement for students” (p19). Timperley’s research in 2004 also found that significantly higher achievement was accomplished when syndicate and school staff meetings were focused on data analysis and discussing implementation issues arising from the evidence. In their study, Thomas and Tagg (in press) found that thirteen longitudinal schools, which set school-wide targets for numeracy and collected achievement information to rate performance, outperformed the six longitudinal study schools which did not.

Joanne’s country

Kapai School results are entered into the national database located on-line. This database has been contributed to by all schools involved in the Numeracy Project since 2000. By the end of 2005 data on over 400 000 students will have been entered. The annual analysis of this data has provided a rich statistical source upon which Kapai School can base its numeracy achievement comparisons with a national picture. The database provides, by norm referencing, the capacity for Kapai School to compare, by year level and domain, the performance of its children with other schools of similar decile and with children of similar ethnicity or gender. The facility also allows Kapai to make in-school comparisons of its own progress from the beginning of the year, between years and over time. A strength of the database is the facility to transfer both group and individual student data from class to class and, in the near future from school to school. This ensures the continuity of student information for successive classroom teachers.

A national numeracy story is the last which the data tell. The national trends and patterns revealed in the data (Christensen, 2003; Higgins, 2003; Irwin, 2003; Thomas, Tagg and Ward, 2003) continue to confirm that the Numeracy Project is having a significant positive impact on children's achievement and to inform expectations and practice for the school, in the classroom and ultimately, for the child.

Conclusion

It is clear that data tell stories for all: the child, the teacher, the school, the parents and the nation. Without informed analysis or in fact “interrogation” of data and a precise understanding of the story it tells, little or moderate impact will be made on children's achievement. The data provides the base for constructive management of the implicit complexities of teaching in a dynamic classroom. “There is impartiality about achievement data if it is handled legitimately and that, unlike a person expressing an opinion, data is an objective messenger that is hard to shoot” (www.nzmaths.co.nz/numeracy/Lead_Teacher).

Never before have we had such a complete picture of a child’s mathematical understandings of number (A. Robertson, personal communication, May 26, 2005). Nor have teachers had the opportunity to be certain and confident that they can and are, making a significant impact on children's achievement.

Acknowledgement

The opinions expressed in this paper do not necessarily represent those of Dunedin College of Education or the Ministry of Education, New Zealand.

References


Using Data to Support Learning
Getting SMART with data in schools: Lessons from NSW

Max Smith
Department of Education and Training, New South Wales

Max Smith [B.Ec Dip.Ed M.Ed.Stud PhD] is Manager, Systems, Data Analysis and Regional Support with the Educational Measurement and School Accountability Directorate, Department of Education and Training, New South Wales. Dr Smith’s research over the past decade has focused on the development and use of school performance indicators including measures of value added, relative effectiveness and attitude towards schooling. This work is supported by an extensive background in teacher and classroom-based research, and 17 years of teaching experience in secondary schools. Current projects include the development of reporting and analysis tools for use with external test and assessment data, and tools for gathering and analysing information on social and affective outcomes in schools and their communities. His regional support roles include responsibility for the analysis of outcomes information, school reporting, school review policy, and software development and computer systems.

Abstract

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.

Essential to this framework is the vast store of information available within the system and its schools on student outcomes: academic, social and affective. Accessing, managing, analysing and interpreting this store of information are tasks fundamental to the success of the Department, its schools, and for high quality provision for the students in their care. Significant challenges have been overcome through the development of state-of-the-art information and communication systems (ICT) that bring complex data to the finger tips of staff in schools and regions in highly usable forms. An outstanding example is the School Measurement, Assessment and Reporting Toolkit (SMART) that facilitates the gathering, monitoring, analysis and reporting of data in NSW public schools.

This paper looks at the strengths of the SMART package, its role in engendering educational progress in NSW and the plans the Department has for its future development. The paper will describe how SMART can play a crucial part in striking a balance between internal and external assessment, and between assessment for instruction and assessment for accountability.

Introduction

Governments everywhere are seeking reassurance that their school systems are delivering the results students need to succeed in an increasingly complex society. At the same time, schools have been given greater autonomy and freedom to manage their own affairs and develop school-specific instructional and improvement strategies. These two sets of forces have given rise to more sophisticated monitoring and analysis systems to ensure that standards are improving and that schools are being adequately supported in their work.

A consolidated school development and accountability framework, the Framework for Development and Accountability, has been devised by the NSW Department of Education and Training to bring together elements contained in existing departmental policies and agreements.

The Department’s accountability and improvement functions have been supplemented in successive restructures, most recently and explicitly through the appointment of 78 School Education Directors with line management responsibility for principals, both formally through annual review and professionally in terms of leadership support and professional growth. Thirty School Development Officers attached to regions have also been recently appointed to provide additional leadership and guidance to schools in self-evaluation, planning, development, data analysis and reporting.
The Framework for School Development and Accountability

The Framework for School Development and Accountability is based upon the following principles:

- the need for accurate, reliable data about each school
- supplementation of student outcomes data with the results of in-school evaluation
- evaluation of school performance as the first step in a process of school development and improvement
- effective school planning to stimulate the development cycle
- school planning will suggest goals that form the basis for reporting to the community
- balance between school accountability and development activities
- evaluation of school performance to provide the foundation for reporting on accountability.

A framework based on these principles will necessarily lean heavily on the vast store of information held by schools and the system on the achievements and demographic features of students. The paper will now consider more closely the role of testing and assessment in NSW.

Testing and assessment

The tension between the twin goals of development and accountability is reflected in the imperative to strike a balance between instructional assessment and performance measurement at both the school and system levels. Cizek (2005) regards high stakes [accountability] tests as incapable of providing high-quality information for instructional purposes and queries if relative group performances have anything meaningful to say at the school level. The NSW experience is that the right sort of tests and support materials can strike a balance between the micro and macro-reporting levels and win support from the profession for state-wide testing. In a wide-reaching evaluation of assessment practices in NSW, Eltis (2003) found surprisingly little hostility remaining amongst teachers towards the expanded level of state-wide testing. State-wide tests have come to be valued by school leaders, teachers and parents for their diagnostic scope, as well as for their ability to locate the performance of the school’s students relative to other

Figure 1 NSW framework for school development and accountability
students across the State. Eltis found the availability of quality diagnostic information from the testing programs and professional learning opportunities for teachers and school leaders were major contributors to the growing success of these tests.

Internal and external assessments

Parker and Rennie (1998) raise the issue of the relative value placed on internal and external assessments. Clearly, both forms of assessment can provide measures of achievement; however, external (most often test-based) measures remain the focus of many, but no longer all, tertiary institutions and employers. Assessments based on a wider sampling of the curriculum over a greater period of time are arguably a more valid but under-reported construct compared with one-off external tests. Nevertheless, lower value is often placed on the internal school-based assessment, even within education systems and schools themselves. The origins of this perception probably lie in the perceived limitations of school-based assessments as expressed in the concern for consistency of teacher judgements, between teachers and over time, and between students, and hence concern for the fairness of the assessment (Linn & Gronlund, 2000). Eltis (2003) suggests a closer alignment is needed between internal and external assessments, using external assessments as a part of a broader framework for reporting and cross-validating internal school-based assessments.

In NSW, the provision of high quality tests and ICT systems to align internal and external assessments are seen as crucial to effective assessment practice and a key development in the State’s school improvement and accountability systems. The ICT systems will now be discussed.

School Measurement, Assessment and Reporting Toolkit (SMART)

The NSW Department’s Data on Disk software was developed in 1997 following recommendations put forward by schools in the 1995 Review of the Basic Skills Test for software to be developed that would enable schools to analyse their results electronically, freeing school staff from the many hours needed to analyse and copy data from the paper versions of the reports. Prototypes were developed and trialled in 150 schools across NSW in 1997 and 1998. Feedback from the trialling was used to strengthen the software’s functionality and in 1999 the software was rolled out to schools. The software has undergone significant enhancements since 1999 and provides schools with what can be described as an outstanding set of analytical tools to support schools in making informed decisions on pedagogy, quality teaching and learning and improving student learning outcomes. The software has been widely accepted and used in all NSW government primary schools, and also by South Australian government and Catholic schools, NSW Catholic Education Commission schools, NSW Independent schools and many overseas international schools, including one in PNG.

Until 2004 the software was only available to schools participating in the Basic Skills Testing Program. Since then the Educational Measurement and School Accountability Directorate has consolidated and streamlined the reporting software, now known as the School Measurement, Assessment and Reporting Toolkit (SMART for short), and made it available to all schools participating in all the NSW state-wide testing programs including the Basic Skills Test and Primary Writing Assessments in Years 3 and 5, the Computer Skills Assessment (CSA) in Year 6, and the English Language and Literacy Assessment (ELLA) and Secondary Numeracy Program (SNAP) in Years 7 and 8. The most recent additions to the package provide analysis of the School Certificate and Higher School Certificate examinations. NSW’s innovative Essential Skills in Science Assessment will come on-line in trial form in 2006. Other modules under current development will see the package expanded to include teacher assessments of students, questionnaire and survey tools, and an assessment item data bank. Figure 2 presents the structure of the SMART package in graphical form.

Plate 1

SMART is an outstanding schooling outcomes analysis package. It offers Principals and senior teachers in NSW schools an innovative tool for analysing and comparing a school’s learning achievement results by drawing on the most extensive student outcomes database in Australia. The sophistication of the package means that in-school and across-schools comparisons can be made easily, incorporating data drawn from a number of years across a variety of assessment situations. I believe the applicability of the package to...
NSW legislation protects privacy and personal information, and prevents the publication of test results for individuals or schools that could be used for the creation of league tables. One of the core functions of SMART is to ensure that all data is appropriately locked preventing unauthorised access to individual and school results. This has been achieved through a sophisticated process of data encryption and unique passwords that still enable backward compatibility to previous data sets. The passwords also manage permissions to access various levels of the data. Regional passwords allow access to all school data for the Region and its associated education areas, and school passwords only allow access to their data at administrative and class teacher levels.

The data and analysis functionality available to schools for the testing programs is impressive and includes:

- the ability to create Custom Groups of students such as class groups and students involved in special programs such as Reading Recovery
- tables in PDF format, including school summary information and the ability to regenerate detailed reports on individual student for the information of parents and teacher
- access to analysis for groups of students across the performance bands (skill bands) including the students in custom groups – this is particularly powerful for providing evidence of improved student learning outcomes and effective pedagogy
- schools can access information concerning the performance of students on individual items at the group or school levels – this includes patterns of student responses and additional distractor information detailing the reason why students chose particular options.

Plate 2

I firmly believe that for large-scale assessment programs there is a need to make an overt link that the data that emerge from such programs are part of a continuous stream of information that tracks the progress of students and programs over time. Another part of the stream is the data that emerges from the teaching and learning process that takes place on a day-to-day basis. Together they give a better picture of student progress than either of them individually.

SMART provides a conceptual link between the state-wide assessment programs and school-level use of the same data in promoting student learning. The Program is user-friendly and enables teachers and administrators to “drill-down” into the test results in a very systematic and logical way. The feedback is linked directly to the curriculum so in that sense it reinforces the notion that the curriculum is the unifying construct underpinning teaching, learning and assessment.

Professor John Pegg
Director; National Centre of Science, Information and Communication Technology and Mathematics Education for Rural and Regional Australia
University of New England, NSW

Plate 2

- Information investigating Individual Student Responses to various questions. Details provided include links to the relevant NSW Syllabus, to ESL scales and advice as to where to access teaching strategies to support teaching and learning.
- The most recent release of SMART includes linkages to teaching and learning strategies and resources with wide-reaching implications for professional learning and program development.
- Local area, customised comparative school groups, like school group and state trend data is available to all schools. Trends for various test aspects are also available disaggregated, for example, by gender.
- Item analysis enables schools to filter information on the performance of the school or for various groups of students for particular skills. This is an extremely powerful tool in filtering performance, for example, by literacy/numeracy, by subject and by sub-strands.
A common reporting scale is used to map student progress between, for example, Year 3 and Year 5 or Year 7 and Year 8. Student Progress Maps allow the user to identify individual students and drill down to the specific performance of the individual student directly from the graph.

Important information on the overall progress of students within the school can be discovered when they are compared to the rest of the state in value added terms. Individual student performance can be compared to all other students of similar prior ability. Value-added measures are also prominent in the new packages developed for Years 10 and 12.

Schools can export data from the software into various spreadsheet applications. This enables schools to add additional information to individual student data and then perform further analysis.

Other SMART modules

**School-based assessment module**

The most recent developments in SMART include a module for the capture, analysis and reporting of teacher school-based assessments. There is no universally available software in NSW to help with capturing data in schools on the achievements of students against standards frameworks. The module will facilitate data entry and data import, make links to external tests and examination results, allow schools to design biannual reports to parents on the achievement of students, allow analysis of the data and facilitate the accumulation and presentation of data for school and system planning, and for annual reporting to parents and the community.

The school-based assessment module will form the nexus between external and internal assessments and has the potential to see the consistency of teacher judgements and hence the significance placed on school-based assessments, greatly enhanced.

**Survey module**

SMART will soon have a fully functional module for accessing the Department’s surveys and questionnaires, designing custom surveys and analysing and presenting these results. This important initiative makes explicit the connection between academic, social and affective outcomes. This part of the toolkit will facilitate the collection of data from students, teachers, parents and the community. It is planned for release by the end of the 2005 school year.

**Assessment Item Data Bank**

From test items created by the Educational Measurement and School Accountability Directorate, we are constructing a databank of test items from those not required for current testing programs. At this stage, it is simply going under the title of ‘Assessment Item Data Bank’.

As a classroom teacher, using released and aligned test items from our State’s Assessment Item Data Bank, you will be able to select test items to assess how well your students are meeting syllabus outcomes. Once you select the assessment items, you will then be able to print out a test and answer key.

Now that you know how well your students have mastered the syllabus outcomes, you can then visit the linked teaching strategies site to identify best practices in education to teach and or re-teach specific outcomes.

NSW DET has a wealth of material and expertise to construct a test item databank. From our extensive testing activities, we have a huge store of test items from which to construct an Assessment Item Databank. We estimate that we hold some 20,000 items if we include both published items and items that have been trialled but not published.

In the construction of the Assessment Item Databank, we recognised three essential requirements. Firstly, the number and type of items authentically reflect the nature and emphases of the syllabus outcome to be measured. Secondly, the items meet accepted standards of content validity and psychometric quality. Thirdly, the item bank is easy to use and maintain. It is vital that classroom teachers can easily manage the test item database and build tests to their specifications.

**Conclusion**

NSW schools are taking more responsibility for their own performance, are subject to closer public scrutiny and are finding new ways of improving student outcomes in a world of ever-more demanding standards. In the context of the NSW Framework for School Development and Accountability, an effective school will be one that is constantly striving to enhance its educational provision through a process of self-evaluation, reporting, review and development within the resources available to it. A fundamental premise underlying the framework is that neither accountability nor school improvement efforts, on their own, will be sufficient to produce improved student outcomes.

NSW public schools are being presented with quantitative data...
Figure 2  Structure and functions of the SMART package
comparing school performance with state-wide achievement levels, value-added measures generated from external tests and examinations, tools for the collection of both quantitative and qualitative data from within the school and its community, and highly flexible, diagnostic tools for the management, analysis and presentation of outcomes information. The availability of very senior staff in regions assisting each school to undertake self evaluation and planning in which the community plays a part, and which incorporates analysis of the statistics and the setting of targets for school development completes the framework.

The SMART toolkit is cutting edge technology for schools. Nowhere else nationally and perhaps internationally do schools have access to such a sophisticated analysis package that enables the manipulation and investigation of student performance. NSW schools are uniquely positioned through their access to the SMART package to consider detailed information to support specific and tailored intervention strategies for improving student learning outcomes.

References


* The opinions expressed in this paper are those of the author and not necessarily those of the NSW Department of Education and Training.

† I wish to acknowledge the very significant contributions to this paper made by the Director and my colleagues in the Department’s Educational Measurement and School Accountability Directorate.
Data-driven school improvement through the VCE Data Service

Abstract

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 their 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.

Through VCEDS, senior management teams in each school can easily generate charts and tables addressing a range of questions including the following:

- How were our school’s overall results this year? Were they better or worse than in previous years? How do they compare with schools like ours?
- How did our students perform, study by study in terms of completions, Study Scores, examinations and school assessment grades?

Glenn Rowley
Victorian Curriculum and Assessment Authority

Glenn Rowley has been General Manager for Policy, Measurement and Research at the Victorian Curriculum and Assessment Authority since February 2002. He began his career as a secondary teacher in Victorian schools before undertaking graduate studies in educational measurement and evaluation at the University of Toronto, where he completed a Masters degree in 1972 and a PhD in 1975.

Following lecturing appointments at the University of Toronto and La Trobe University, he joined the staff of the Faculty of Education at Monash University in 1983, lecturing in research methodology and school assessment. He was appointed Associate Professor in 1990, Associate Dean (Research) in 1991 and Associate Dean (Staff) in 2001. He has been a member of the Scaling Committee of the Victorian Tertiary Admissions Centre since 1994, and a member of the ACER Council and Board of Directors.

Since joining the VCAA, Glenn has had major involvement with the delivery of the AIM testing program, the changed arrangements for the publication of VCE data and the development and implementation of the VCE Data Service. He is currently working on the development of a new ‘Like Schools’ measure.

Peter Congdon
Victorian Curriculum and Assessment Authority

Peter joined the Victorian Curriculum and Assessment Authority in 2002 as the Manager of Educational Measurement. Prior to this appointment he was the Head of Assessment Services Psychometric Support Team at the Australian Council of Educational Research, where he worked for 11 years. Peter’s main focus of work has been in large-scale testing, involving data analysis, equating and reporting of educational outcomes at individual and group levels.

Peter is a member of the National Measurement Advisory Group of the Australian Government. He has participated in educational standard setting exercises for the Malaysian Government. He has studied psychometrics at the University of Chicago along with various statistical analysis and educational measurement courses at The University of Melbourne. Peter specialises in data analysis techniques including Rasch measurement, multi-faceted analyses, test equating and differential item functioning.

Peter has produced a number of book chapters and journal articles in educational measurement along with numerous presentations at national and international conferences.

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Peter has produced a number of book chapters and journal articles in educational measurement along with numerous presentations at national and international conferences.
• How did our school's results compare to reasonable expectations? Did our students perform as well as students of comparable ability in other schools?
• Is our student cohort changing over time, in ability and/or achievement?
• How can we develop better understandings of the patterns of group performance by identifying how individuals contribute to those patterns?

This paper provides an account of the first two and a half years of the VCE Data Service, outlining the user feedback and the VCAA response to it, and the growth in usage over the period. It concludes with lessons learned and plans for the future.

When educators study their schools and classes, they seek an answer to the ageless question: Is it good because we've been doing it for a long time, or is it good because we have tangible evidence of its worth? In many instances one must conclude the former because no evidence exists to support the latter (Johnson, 1997).

Because of its unique role in Victorian education, the Victorian Curriculum and Assessment Authority (VCAA) has an important role to play in assisting schools in their efforts to become more effective. The VCAA is the holder of data on student achievement that span three sectors (government, Catholic, Independent) and four levels (Years 3, 5, 7 and 11–12), and at each level it has a responsibility to provide these data to schools in ways that enable school staff to use them effectively and easily.

Like other jurisdictions, Victoria has had to deal with issues of accountability, privacy and the public's right to know. The issue became particularly acute in 2002, in relation to the publication of data on school performance in the end-of-schooling Victorian Certificate of Education (VCE).

Public reporting of the VCE, 1996–2001

From 1996 until 2001, the Victorian Board of Studies and its successor, the VCAA, had provided information to newspapers to facilitate the publication of tables documenting VCE performance by school. Conscious of differences in school intake, it was decided in 1996 not to publish raw achievement data, but instead to publish an index, in which raw achievement is adjusted according to students' performance on another set of measures, the General Achievement Test (GAT).

The GAT is administered in June of the same year, and its key purpose is to enhance the quality control measures on VCE assessment. It is presented to students as a measure of their 'general knowledge and skills in the areas of written communication; mathematics, science and technology; and humanities, arts and the social sciences.'

The achievement indices were created using a multiplicative model in which the three components of the GAT were included at the level of the student, but school GAT means were not. It had very different properties to a measure of growth that could have been developed had the full multilevel modelling described by Goldstein (1995, 1999) and Goldstein, Huiqi, Rath, & Hill (2000) been used. There are many reasons for this.

It is well known that a student of a given ability is likely to perform better when placed in a class of higher achievers than when placed in a class of lower achievers. In schools in which students are generally of high 'ability', students do perform better than would have been predicted from their ability alone. In schools in which students are generally of lesser 'ability', students do perform less well than would have been predicted from their ability alone.

Hence we should have expected to find higher achievement indices in schools with higher ability students. And, year after year, that is what was found.

The six-year adventure with achievement indices came to an end in 2002. The VCAA took a view similar to that of Goldstein, who had observed, in relation to the value-added measures that he had pioneered, that:

> their use as public accountability measures, e.g. in the form of performance tables or 'value added league tables' is inappropriate and would destroy their credibility and usefulness. If they were ever to become 'high stakes' pieces of information like the current DfEE league tables of examination results, then they would inevitably become distorted and no longer reflect any underlying reality of school performance (Goldstein, 1999).

In arriving at this position, 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 VCE Data Service.

Public reporting of the VCE since 2002

From 2002, the achievement indices were discontinued. Instead, a wide
range of information is published, including information about:

- school programs (enrolments in VCE and VCAL, range of VCE and VET studies offered)
- student achievements (satisfactory completions in VCE, VCAL and VET units, median study scores, percentage of high achievers)
- student pathways (percentage applying for and achieving tertiary selection and various employment options).

The information that is made public is the information that the public can use to make decisions about schools. Further, more detailed information is, of course, available from school web sites.

The introduction of the VCE Data Service

The detailed information needed by schools in their planning for school improvement is now made available through a new online service known as the VCE Data Service (VCEDS). This service was launched in November 2002, following several years in which a limited form of 'value-added' VCE reporting had been successfully trialled in a sample of schools. The reports available to schools through VCEDS include, but are not limited to, the ability adjusted measures pioneered in the VCE Data Project.

As in the trial that preceded it, VCEDS provides ability-adjusted estimates in which adjustment is made in each study for:

- each of the three component GAT scores (Written Communication, Mathematics/Science/Technology and Arts/Humanities)
- the mean GAT score of all students in the school taking the study, and gender.

But this is only a small part of the information provided. Through VCEDS, senior management teams in every school can easily generate charts and tables addressing questions like the following:

- How were our school’s overall results this year? Were they better or worse than in previous years? How do they compare with schools like ours?
- How did our students perform, study by study? Are there important differences among groups within the school (e.g., gender, class groupings) and between exams and coursework assessments?
- How did our school’s results compare to reasonable expectations? Did our students perform as well as students of comparable ability in other schools?
- Is our student cohort changing over time? Can we detect trends in student ability from year to year, and if so, are these changes matched by changes in student performance over the same period?
- Can we develop better understandings of the patterns of group performance by identifying how individuals contribute to those patterns? Have the results of particular students or groups of students distorted overall patterns of achievement?

School staff are also able to design their own analyses by entering data fields unique to the school and so introducing comparisons tailored to their specific needs. For example, one school might like to see results broken down by campus, another by language background, and another by residential location. An inventive use by one school has been to monitor the long-term effectiveness of an innovative middle school program by comparing VCE performance several years later.

Comparisons between the performance of males and females are, of course, routinely provided, along with those between class groupings and student...
year levels. Schools can use VCEDS to monitor the performance of Year 11 students taking accelerated VCE programs, and use their findings to assess the wisdom of the advice that students are receiving as they approach their VCE studies.

For each report, VCEDS provides users with a choice of a graph, a table, or both. These reports may be sent directly to the printer; or pasted into another application, such as a Word document. In this way, schools can use VCEDS to report publicly to parents, or confidentially to department heads or individual teachers. With the information provided through VCEDS, schools are able to examine all aspects of their students’ achievements in a more detailed way than ever before, and to use the knowledge they gain to identify problems and build upon their strengths.

Schools’ experience with the VCE Data Service

The VCE Data Service is now in its third year of operation. After the first full year, evaluation largely focused on the question ‘How can we make this better?’ During 2004, feedback was systematically sought, and the key improvements sought included:

- the capacity to generate detailed reports on assessment grades and scaled (VTAC ENTER Subject Scores as well as Study Scores in each study;
- access to student results by Home School and/or by Assessing School (for schools that share teaching programs);
- capacity to trace GAT scores over time and their relationship with achievement scores
- more intuitive reporting of adjusted estimates, and
- capacity to study the performance of individuals and their contribution to reports on overall performance.

These and a number of other enhancements were included in a major enhancement of the system in time for the 2004 data upload.

User response to these improvements has been monitored in the course of 27 group professional development sessions attended by 617 senior school staff and 102 individual school consultations in 2005, and has been overwhelmingly positive.

Total usage has grown steadily since the release of the 2004 data in the first week of February 2005. Figure 1 shows the cumulative hits recorded on the first days of February and each month until June. The most heavily-accessed report to this date has been Report 17 (Student Results by Study), which shows a scatterplot of achieved versus predicted Study Scores for each study, with 1692 hits in the four-month period. Another seven reports have exceeded 1000 hits in this period.

In summary, users have drawn most heavily on the following report types, listed in the logical sequence that users might have approached them, rather than their frequency of usage, which is documented in Table 1 (over the page):

- All VCE Studies (overall Study Score distribution)
- Study score distributions, showing multiple studies
- Study score and assessment grade distributions (breakdowns within a single study)
- Study score distributions, plotted over time
- Adjusted score distributions, showing multiple studies
- Adjusted score distributions (breakdowns within a single study)
- Adjusted score distributions, plotted over time
- Scatterplots of achieved versus expected study scores
- Results for individual students, across studies.

![Figure 1 Total VCEDS usage Feb–June 2005](image-url)
Lessons learned from the VCE Data Service

The VCE Data Service is built on a philosophy of empowerment. It challenges its users, and those who rise to the challenge are excited by the capacity that they gain by using it. Feedback from users has been consistently positive, and schools are constantly finding new ways of using the information that they now have the power to access.

But empowerment can be resource-intensive. Over 2004 and 2005, VCAA staff have conducted 50 Professional Development seminars in all areas of Victoria, with attendance totalling 1600 senior school staff. In addition, they have held 236 individual consultations with staff from 161 different schools. Over time, the need for this level of support may decline, but with an influx of new users each year, it is unlikely to go away.

Beyond the existing support program, the capacity of VCAA staff to support schools to provide individual support is limited. Many schools are comfortably self-sufficient already, and others can quickly become so with minimal support. Schools may wish to spend part of their limited professional development funds on buying in the expertise that will enable them to become self-sufficient, and in our view this would be money well spent, particularly if it leads to self-reliance and not to continuing dependence on assistance from outside the school.

There are a number of issues that the VCAA needs to address. Some of these are relatively minor; such as how many years of data the system should retain for everyday access. User feedback is telling us that the current seven years is more than sufficient, and that when the 2005 results are uploaded, one or more years could be dropped.

A vital issue for the VCAA to resolve is the uneasy compromise between the desire for ease of access and the need to maintain the confidentiality of the

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**Table I** Cumulative VCEDS usage by report type: Feb-June 2005

<table>
<thead>
<tr>
<th>Report type</th>
<th>Mar</th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All VCE Studies (Study Score distributions)</td>
<td>296</td>
<td>740</td>
<td>876</td>
<td>1080</td>
</tr>
<tr>
<td>2. Assessment Grades (frequencies of each)</td>
<td>188</td>
<td>482</td>
<td>584</td>
<td>722</td>
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<tr>
<td>3. Study Score frequencies</td>
<td>104</td>
<td>265</td>
<td>330</td>
<td>418</td>
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<tr>
<td>4. Completions (Units 3 &amp; 4 &amp; qualifying for a Study Score)</td>
<td>65</td>
<td>160</td>
<td>200</td>
<td>268</td>
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<tr>
<td>5. Study Scores of 40 and above, over time if required</td>
<td>149</td>
<td>374</td>
<td>522</td>
<td>660</td>
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<tr>
<td>6. Location of school within Like Schools Grouping</td>
<td>70</td>
<td>186</td>
<td>233</td>
<td>325</td>
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<tr>
<td>7. Multiple VCE Studies (Study Scores)</td>
<td>284</td>
<td>804</td>
<td>949</td>
<td>1167</td>
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<tr>
<td>8. Single VCE Study (Study Scores and Graded Assessments)</td>
<td>242</td>
<td>769</td>
<td>922</td>
<td>1198</td>
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<tr>
<td>9. Single VCE Study (Study Scores over time)</td>
<td>246</td>
<td>728</td>
<td>895</td>
<td>1152</td>
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<td>10. Multiple VCE Studies (adjusted scores)</td>
<td>250</td>
<td>678</td>
<td>802</td>
<td>1016</td>
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<tr>
<td>11. Single VCE Study (adjusted scores)</td>
<td>170</td>
<td>514</td>
<td>601</td>
<td>752</td>
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<td>12. Single VCE Study (adjusted scores by time)</td>
<td>233</td>
<td>717</td>
<td>866</td>
<td>1087</td>
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<td>13. Single Study adjusted scores (subgroup comparisons))</td>
<td>179</td>
<td>521</td>
<td>611</td>
<td>796</td>
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<td>14. Single Study (achieved versus predicted scores)</td>
<td>218</td>
<td>602</td>
<td>723</td>
<td>949</td>
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<td>15. GAT and Study Score distributions (single studies)</td>
<td>178</td>
<td>511</td>
<td>613</td>
<td>795</td>
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<td>16. GAT and Study Score distributions over time</td>
<td>155</td>
<td>395</td>
<td>494</td>
<td>699</td>
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<td>17. Student results by Study (scatterplots of achieved versus predicted)</td>
<td>338</td>
<td>1101</td>
<td>1307</td>
<td>1692</td>
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<td>18. Individual student results across Studies</td>
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Using Data to Support Learning

data. To protect confidentiality, access has been restricted to the Principal of each school, the VASS coordinator, and other users as nominated by the Principal. This may be over-restrictive, particularly in schools where the Principal is not aware of the service or nervous about security issues. The VCAA is planning consultations with user-Principals about the possibility of setting up different categories of users with access to different reports within the service. For example, we could have the category ‘Super User,’ with access to everything; a ‘Department Head’ category, with access to reports for a defined set of Studies (such as a Key Learning Area), and a ‘Subject Teacher’ category, with access to one Study only.

These and a number of other issues will be resolved by consultation with users and implemented in time for the upload of the 2005 results in January 2006.

References


APPENDIX

Sample reports from the VCE Data Service

Using Data to Support Learning
### Report 3

**Study Score Frequencies All VCE Studies**
(expressed as a percentage of all assessed studies)

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<thead>
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### Report 4

**Completions**
2004 Test College Home School Data

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Report 17
Mathematical Methods: Student Results by Study
Confidential Report
2004 Test College Home School Data
Abstract

The Getting it Right - Literacy and Numeracy Strategy is a targeted and coordinated program of additional support for government primary schools in Western Australia. The program provides additional specialist teaching personnel, professional development and support to schools across the government school system. The key purposes of the strategy are to improve literacy and numeracy outcomes across government schools, and to achieve greater parity of outcomes across all groups of students. The model for teachers’ professional learning incorporates many features of effective professional development identified in current research findings. Central to that professional learning has been how to select, collect and analyse credible diagnostic and summative student performance data to inform the teaching and learning cycle, whole-school planning and resource allocation.

A trend that is evident in all levels of planning undertaken in recent years by the Department of Education and Training in Western Australia has been careful and deliberate analysis of performance data to inform resource allocation, actions and adjustments to actions. Through a series of complementary teaching and learning professional learning initiatives being implemented in all WA government schools at present, every principal and most teachers within the system regularly hear about the virtues of formative assessment and ‘evidence-based planning’ as key features of outcomes focused education. An increasing number of teachers and principals have embraced these virtues; prominent among the teachers and principals that have gone down this path are those involved in the Getting it Right Literacy and Numeracy Strategy.

Getting it Right was a $27 million pre-election commitment of Western Australia’s Gallop Labour government which came to power in March 2001. The commitment included the training and deployment of 200 specialist teachers to work in government schools to improve levels of literacy and numeracy among high needs students with a particular focus on Aboriginal students and other groups who lagged behind the general population. The initial 4-year commitment expired in July this year, but the strategy has proven so successful that maintenance of current staffing and support has been assured into the foreseeable future.

Planning

The pre-election commitment set down certain parameters for planning (including the number of specialist teachers to be involved by 2005, broad outcomes, focus cohorts and budget) but it left open details about the model for implementation. In a nutshell, key implementation details that were subsequently determined are as follows:

- Specialist Teachers work in high needs schools. Not every school will get a turn. Relative needs are determined through a combination of systemic quantitative data and more localised qualitative data: Western Australian Literacy and Numeracy Assessment (WALNA) data is factored against teacher numbers to allocate full-time equivalent (FTE) teacher time to districts, then District Directors use school performance data (WALNA plus other school data) to allocate the district FTE to high needs schools.
There is now a total of 300 Specialist Teachers of literacy or numeracy working in 300 schools across WA, occupying (in either a full-time or a part-time capacity) the overall commitment of 200 FTE by 2005.

Specialist Teacher allocations are made for 2-year periods. After an initial 2-year allocation, schools remain eligible, on the basis of demonstrated need, for subsequent 2-year allocations.

Schools get a literacy or a numeracy Specialist Teacher. The rationale here is that participating schools are often challenging settings, and there would be a risk of overstretching resources, energy and goodwill if teachers in participating schools were expected to make significant gains in literacy and numeracy at the same time. Rather, they are encouraged to focus wholeheartedly on improving one thing at a time.

Resources and attention are divided equally between literacy and numeracy. Historically, literacy and numeracy initiatives in WA have unfolded as initiatives that focus on literacy … and numeracy if you’ve still got time. The ‘fifty-fifty’ split within Getting it Right was a strategic decision to redress this imbalance, further influenced by the fact that First Steps in Mathematics research and resource development was completed in 2002.

Specialist Teachers (STs) work shoulder-to-shoulder in classrooms with colleagues, assisting with the collection and analysis of student performance data, using that data to inform planning, modelling lessons and team-teaching. The methodology modelled by STs is outcomes focused and reflects the principles and values of the Curriculum Framework. Specialist Teachers do not routinely withdraw groups of students from a class, and the classroom teacher maintains responsibility for the progress of all students in the class. In collaboration with the principal and other staff, the Specialist Teacher also facilitates implementation of a whole school approach to literacy or numeracy and the systematic collection and analysis of student performance data.

Principals of participating schools are required to set a 2-year school improvement target for literacy or numeracy, then to track and report (through normal quality assurance processes) their school’s progress towards that improvement target.

Principals of participating schools attend a 2-day induction workshop before the strategy commences in their schools and Specialist Teachers participate in seven 3-day training workshops spaced across the two years, the first of which occurs before they begin in the role. Between workshops, a member of the Central Team provides ongoing support and site visits to Specialist Teachers and principals.

### Professional learning and support

The basic premise of the Getting it Right Literacy and Numeracy Strategy is that teachers make the difference. Further, that teachers are best equipped to make the biggest difference when they have:

- A deep and thorough understanding of the outcomes students are required to learn. In particular, that they know what the WA Curriculum Framework and the government school system’s Outcomes and Standards Framework says about outcomes within the English and Mathematics learning areas because those documents capture the version of literacy and numeracy that WA government school teachers are required to pursue. This point is significant in the context of evidence-based planning and teaching because what counts for credible and useful data is significantly coloured by what version of literacy and numeracy you are seeking to teach.
- A deep and thorough sense of ‘where their students are at’ in relation to progress towards those outcomes — what they already know and can do, and what they have yet to learn.
- A broad repertoire of teaching practices from which to select so they can properly match student learning experiences to student needs.

Clearly, the above three domains of professional knowledge are necessarily linked in a cyclic process of assessment, teaching and learning. Accordingly, the professional learning and support provided through the Getting it Right strategy gave balanced attention to each. Given the theme of this conference, however, the focus to be taken from here on with this paper will be how Getting it Right was designed to help teachers and principals to make more effective use of data about their students’ achievement using a range of sources, including the Literacy Net, Numeracy Net, diagnostic First Steps tools and WALNA data.

### The focus on data

From the first workshop that principals and Specialist Teachers attend, they are
told very clearly that the Getting it Right strategy is a data-driven initiative and that they will be required to make systematic use of data in their own schools and classes to inform decisions. There are two significant data-driven tasks for principals which are outlined during their 2-day induction workshop and are constantly revisited through subsequent school site visits by members of the Central Team: target setting and the allocation of Specialist Teacher time within the school. The focus on data in classrooms is manifest as systematic monitoring of student learning to inform planning. This is a large part of the support and advice provided by Specialist Teachers when working with classroom colleagues.

**Target-setting**

The only extra reporting requirement placed on schools involved in Getting it Right is that they have to set a challenging yet realistic school improvement target for literacy or numeracy, and to track and report progress towards that target. To ensure that school improvement targets are genuinely challenging yet realistic, principals are required to gain endorsement for the target from his/her District Director. Progress towards school improvement targets is then reported through normal quality assurance processes with District Directors.

The spectre of target-setting is generally greeted by principals with some horror. To start with, if you are going to set a target for a point in the future, you first need to know a fair bit about the platform from which you are working, and many principals know that the data they have about their school’s current performance is, at best, rather thin. When they start digging, many also find that a lot of the data that is collected by their teachers does not tell them much about progress in relation to our Outcomes and Standards Framework.

Target-setting is often where the ‘rubber hits the road’ for schools involved in Getting it Right. Most schools spend the first term looking back into their WALNA data in greater detail to detect trends and gaps, and then turn to supplementary assessment tools to gain a more fine-grained and diagnostic picture of current performance and priority needs. The professional learning workshops conducted for principals and Specialist Teachers anticipate this need by the inclusion of sessions about analysing WALNA data, using the Literacy Net, Numeracy Net and ESL Bandscales, and getting to know developmental phases, teaching emphases and diagnostic uses of First Steps English and Mathematics resources.

Several important benefits have emerged from the way target-setting has applied in the Getting it Right strategy. Firstly, the need to set targets in relation to the outcomes of the English and mathematics learning areas has forced principals and teachers to make sure they know what those outcomes are about. It is felt that a significant factor giving rise to this benefit is that schools were not told what their target would be, nor what measure they had to use. Rather, they looked at the strengths and limitations of various assessment instruments, determined the extent to which those instruments yielded information in relation to our outcomes, and made an informed decision. Secondly, schools have a strong sense of ownership relating to the targets they have set, so have a much clearer sense of purpose with their planning in relation to those targets. It is not the case that an external body has told them to do something about ‘issue A’ while they believe a more pressing problem is ‘issue B’. Thirdly, targets have become a rallying-point for schools, giving them a tangible and collective focus. All staff know that their school’s target is informed by good decisions about good data, so they can see the logic in directing resources, time and energy towards the priority areas captured in their target.

**Allocation of Specialist Teacher time within the school**

To achieve a balance between impact and coverage and to avoid spreading Specialist Teachers so thinly that they become ineffective, it is recommended that Specialist Teachers work about 1 day per fortnight or half a day per week with each classroom colleague he/she is asked to support. It follows that if a school received 0.8 FTE, the Specialist Teacher could be expected to work with about 8 classroom colleagues – more if they were highly experienced, less if they were inexperienced or had very challenging classes. It also follows that some classroom colleagues will not receive direct support from a Specialist Teacher so principals need to decide who will get the support and who will not. To inform these decisions, principals are directed back to the performance data of students in various classes, plus consideration of qualitative data regarding teacher strengths and other forms of support available in the school.

**Systematic monitoring of individual student and class needs**

As the focus shifts from whole-school to class and on to individual students, the imperative to use data to inform planning continues. In classrooms, it is
necessary to supplement the quantitative evidence of class trends and individual needs with more fine-grained assessments of progress towards the outcomes. To this end, Specialist Teachers are trained to help their colleagues to use the First Steps diagnostic maps and the Literacy Net, the ESL Bandscales and the Numeracy Net to monitor progress. Collectively, these fine-grained qualitative assessment tools help teachers determine the nature of any difficulties that students are experiencing so they can be more focused and systematic in their planning and teaching.

An early assumption made by some of the teachers with whom Specialist Teachers worked was that the Specialist Teacher would ‘do’ the assessment or ‘do’ the planning – or better still, take the more difficult students away – so the classroom teacher could get on with the real business of teaching. Not so. Rather, Specialist Teachers worked alongside their classroom colleagues to jointly determine student learning and future needs, then to work out appropriate instructional foci and to plan accordingly. The mismatch between early assumptions and the actual support Specialist Teachers were primed to provide needed to be carefully managed by principals. In time, however, classroom colleagues have found that the time spent analysing work samples and probing students’ thinking through insightful tasks and questions is a good investment because it enables them to be far more efficient and effective teachers.

A breakthrough achieved in Getting it Right schools is that principals and teachers are inclined to view data as a ‘friend’ they can use to support their work rather than as something that is used primarily by others to ‘check’ on them. While they are under no illusions about the accountability agenda and how systemic data contributes to that agenda, they also understand how WALNA data and other qualitative sources of data can be blended to provide a rich picture of progress and needs and are essential tools to support and inform school, class and individual improvements.

**What the data tell us so far**

Three layers of data collection have been established to monitor the extent to which Getting it Right is proving effective in meeting its intended outcomes and to inform adjustments that may be warranted: school target setting, systemic WALNA data and an external evaluation being conducted by the ACER.

**School target-setting**

The requirement for schools to negotiate with District Directors realistic yet challenging improvement targets and to report progress in relation to those targets was outlined earlier. There is clear qualitative evidence that target-setting has been pivotal to getting schools to make constructive use of assessment information. Further, that positioning target-setting as being primarily about improvement rather than accountability has given principals the confidence to be open about what worked, what didn’t work and what adjustments they intend to make in the future.

The vast majority of participating schools have reported that they either met or exceeded their school improvement targets. This could be taken to be a very positive result. On the other hand, the degree of rigour exercised by District Directors in reviewing school targets is unknown, so it would not be prudent to claim success on the basis of this finding alone.

**Systemic WALNA data**

To guard against freedom of information requests for school-by-school WALNA data which could reveal individual student performance in small schools, WALNA data is not centrally collated school-by-school so rates of improvement in ‘Getting it Right schools’ are not easily compared with those of non-Getting it Right schools. Individual schools who have been participating in the strategy for more than two years, however, provided WALNA data to Central Office for analysis at the end of 2004. When compared with 2001 data, the 2004 literacy or numeracy data from these schools indicated an overall improvement. Given that students in many participating schools are highly transient, these gains are significant: students who have benefited from the strategy may have moved prior to the test, only to be replaced by other students who are struggling and have not been at the school long enough to benefit.

It is noteworthy that gains were less evident in difficult-to-staff locations in which teacher turnover is high. This is to be expected in a strategy which seeks to effect student improvements by building the capacity of teachers – if the teachers with increased capacity are constantly moving, their improved teaching practice will benefit students in the school they move to, not those in the school they leave. This finding signals the need to consider supplementary ways to support such schools, many of which are in the country and receive a large proportion of graduate teachers.
Over time, it is expected that the very gradual improvements evident in WALNA data over the past decade will accelerate, and that these gains will be most prominent at the tail. It is too early, however, to detect such trends. Further, when they do become evident, it will not be possible to attribute them entirely to Getting it Right because this is one of several improvement initiatives supporting WA government schools at present.

**ACER evaluation**

An independent, external evaluation has been commissioned by the Australian Council for Educational Research (ACER) to monitor teacher development goals of Getting it Right, in particular, the extent to which Specialist Teachers, their classroom colleagues and their principals:

a. Develop improved understandings, confidence and teaching skills in relation to literacy and numeracy;

b. Understand Curriculum Framework outcomes relating to literacy and numeracy, especially those set out in the English and Mathematics learning areas;

c. Collect and analyse credible diagnostic and summative student performance data to inform the planning and teaching cycle;

d. Participate in cohesive, data-driven, whole-school planning for literacy and numeracy; and

e. Participate in and engender two-way home—school collaboration and communication in support of literacy and numeracy development.

The ACER has recently submitted a final report from this evaluation and its findings will be made public in due course.

**Concluding comments**

Among the principals and staff at schools participating in Getting it Right, there is almost universal agreement that this strategy is making a significant difference in their schools. While the calibre of Specialist Teachers, the leadership provided by the principals of participating schools and the quality and depth of expertise provided by the central Getting it Right team are pivotal ‘people’ factors contributing to the strategy’s success, a number of structural factors that are particular to the model adopted have also contributed to its success. Central among these is the systematic and deliberate use of high quality data that tells us something important about the things that matter at every stage and every level of Getting it Right as it unfolds.
‘Getting it Right’ Symposium – Paper 2
Getting professional development right

Rosemary Cahill, in her paper in these conference proceedings, has described the Getting it Right (GiR) strategy for improving levels of literacy and numeracy among high needs students. This paper examines the Western Australian Getting it Right reform as a strategy for professional learning and compares it with research on the characteristics of effective PD.

The Getting it Right Strategy is clearly a comprehensive and well-resourced reform strategy with its main emphasis on building professional capacity among teachers and principals. The data we gathered as part of the evaluation, through school and classroom observations, interviews and surveys, left us in no doubt that the strategy was highly regarded by teachers and principals and was having a significant impact on practice. This paper will focus mainly on GiR work focused on improving numeracy teaching.

Most teachers we observed and interviewed were readily able to give specific examples of how the GiR strategy had transformed their teaching. This comment from a teacher is typical:

I don’t set limits to my expectations, or their expectations, for what they can learn any more ... because I know they can get there. Because of the diagnostic tools, I’m listening much more to their thought processes, to how they work it out. I’m getting them to reflect more, orally, to find out what thought processes they are using. So I can tell much better whether they really understand or not – pen and paper tests don’t tell you that.

The success of the Getting it Right Strategy in linking State Government policy to significant change in teachers’ beliefs and practice, suggests it would be worthwhile examining its main components in relation to research on professional learning for teachers.

Linking policy to practice

The challenge of building strong links between reform policy and implementation is a perennial one in education. A common refrain in evaluation reports of educational reform efforts is the lack of fit between ambitious goals for school improvement and the resources necessary to bring about significant change in practice. Policy makers can also have quite naive expectations about how easy it is to bring about educational change, not understanding that the kinds of change that really matter in education are not structural changes but those that build teacher capacity and professional culture. There are no short cuts to educational improvement.

Peterson, McArthy and Elmore’s (1996) research, for example, cast doubt on the capacity of ‘restructuring’ reforms in the United States to benefit classroom practice. This was because:

Changing practice is primarily a problem of teacher learning, not a problem of organisation ... School structures can provide opportunities for the learning of new teaching practices and new strategies for student learning, but structures, by themselves do not cause learning to occur ... School structure follows from good practice, not vice versa. (Peterson, McArthy & Elmore, 1996, p. 149)

This is a lesson we understand well in Australia, since the disappointments of school management reforms in the 1990s. There was no logic to these...
reforms linking changes in school management to teacher learning and new practices. Over the past decade, increasing numbers of researchers have identified the existence of an active, accountable professional community within and across schools as important for effective teacher development and high quality teaching (Little & McLaughlin, 1993; Louis, Kruse & Marks, 1996).

Richard Elmore from Harvard has spent many years studying the problem of ‘scaling up’ good educational practices. In a recent comment on the US ‘No Child Left Behind Act’, and the unrelenting pressure to improve schools without corresponding improvement in teachers’ skills, he states, ‘In its least desirable face, educational reform can become a kind of conspiracy of ignorance: policymakers mandating results they do not themselves know how to achieve, and educators pretending they do know what to do but revealing through their actions that they don’t.’

A feature of the WA Getting it Right Literacy and Numeracy Strategy is the depth of understanding it reveals of what it takes for reform policies to penetrate to the level of everyday practice. The Strategy is primarily about enhancing the capacity of existing teachers to meet the needs of children at risk. Rosemary Cahill has revealed that this is a targeted and coordinated program that directs serious money at highly regarded teachers to meet the needs of children at risk. Rosemary Cahill has revealed that this is a targeted and coordinated program that directs serious money at highly regarded teachers to meet the needs of children at risk.

The Specialist Teacher is released from classroom duties to work ‘shoulder to shoulder’ with a number of colleagues, for about half a day each week for each teacher; for two years.

Central training: Specialist Teachers receive extensive and intensive training and support from a central GiR team in using the First Steps in Mathematics materials and in research related to learning the mathematics. The training and support takes place over two years – 21 days spread over seven three-day training sessions run by Central GiR staff.

Working ‘shoulder –to –shoulder’: Initially, Specialist Teachers work alongside colleagues, helping them in the collection and analysis of student performance data, using that data to inform planning, modelling lessons, and team teaching. The classroom teacher retains responsibility for the mathematics learning of the children in his or her class.

In a typical week Specialist Teachers spend half an hour or so planning the next week’s session/s and an hour or so teaching with that teacher using the activities they had planned together. From time to time, the Specialist Teacher might assist the teacher to run a diagnostic test to monitor progress in understanding and identify difficulties students might be experiencing. The Specialist Teacher is not to act as a support teacher or routinely teach groups of students withdrawn from a class. The Strategy places heavy reliance on the professional judgement of the teacher and on informing that judgement.

Preparation of school principals:
Special sessions are held for principals in target setting and in identifying specific actions they can take to support the work of the Specialist Teacher.
Whole school approach: While the Specialist Teachers work mainly in the early grades, they also work towards lifting awareness about the GiR Strategy among all staff and implementing a whole-school approach to improving numeracy outcomes.

Comparing the GiR Strategy with research on effective professional learning

There are many lists of characteristics of effective professional development activities. Few are grounded in rigorous research based on examining the effects of professional learning programs on student learning outcomes. This should not be surprising as the methodological problems in tracing the links between PD and improved student learning are considerable. There is, however, an emerging synthesis of findings from these studies about the conditions that foster professional learning that relates to improved student learning outcomes, particularly in the core areas of literacy and numeracy.

Hawley and Valli (1999) summarise this research in a list of nine principles for the design of effective professional learning (Table 1). The GiR Strategy will be discussed in relation to each of these principles.

1. Hawley and Valli’s first principle for the design of effective professional learning states that:

   The content of professional development (PD) focuses on what students are to learn and how to address the different problems students may have in learning the material.

   The content of professional development is critically important to its effectiveness. While the content varies with the goals of the school, the content of PD should deal directly with what students are expected to learn and the instructional strategies that research and experience have shown are effective.

   This characteristic of effective professional learning emphasises the overriding importance of what teachers learn, as opposed to how they learn it. As Kennedy (1999) puts it, the form of professional learning turns out to be less important than the what, the substance or content. This finding challenges the strong emphasis that has been placed for many years on the processes or structures used in professional development activities, such as whether they are planned

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<td>1. The content of professional development (PD) focuses on what students are to learn and how to address the different problems students may have in learning the material.</td>
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<td>2. Professional development should be based on analyses of the differences between (a) actual student performance and (b) goals and standards for student learning.</td>
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<tr>
<td>3. Professional development should involve teachers in the identification of what they need to learn and in the development of the learning experiences in which they will be involved.</td>
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<tr>
<td>4. Professional development should be primarily school-based and built into the day-to-day work of teaching.</td>
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<td>5. Professional development should be organized around collaborative problem solving.</td>
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<tr>
<td>6. Professional development should be continuous and on-going, involving follow-up and support for further learning-including support from sources external to the school that can provide necessary resources and new perspectives.</td>
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<tr>
<td>7. Professional development should incorporate evaluation of multiple sources of information on (a) outcomes for students and (b) the instruction and other processes that are involved in implementing the lessons learned through professional development.</td>
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<tr>
<td>8. Professional development should provide opportunities to gain an understanding of the theory underlying the knowledge and skills being learned.</td>
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<td>9. Professional development should be connected to a comprehensive change process focused on improving student learning.</td>
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collaboratively or whether they are one-off or long term. It turns out that knowledge is the key when it comes to generative professional learning, particularly when it leads to deeper understanding of the content that students are to learn, the research on how students learn that content and the nature of the problems different students have in learning that content.

The Getting it Right Strategy is firmly based on this kind of content focus. The ‘what’ that occupies most of the GiR professional learning is knowledge about mathematics, research about how students learn that content and the stages in their developing understanding. Training sessions for Specialist Teachers are rich with opportunities to deepen understanding about mathematics concepts, and to become more perceptive about the nature of learning difficulties. Recent research articles are available. Back in schools, the Specialist Teacher works with teachers to find out what the children know and what they need to learn next, then they plan how they will work together to bring about that learning. These meetings focus on selecting appropriate learning activities for children that will progress specific understandings in mathematics. The focus is on strengthening, not supplanting, the professional judgement of the teacher.

2. Hawley and Valli’s second principle of effective professional learning states that:

   Professional development should be based on analyses of the differences between actual student performance and goals and standards for student learning.

   Professional development that is based on analysis of student learning helps teachers close the gap between actual student performance and goals for student learning. Goals for student learning also provide a basis for defining what teachers need to learn and a yardstick for improving PD.

   This principle emphasises the importance of focusing professional learning on data and feedback from one’s own students, especially data about where those students are in relation to where they could be, or should be, in their development.

   Contrary perhaps to initial concerns about standards for student learning expressed some years ago, research-based standards have proved to be an important lever for fostering productive dialogue about the purposes of education and have given teachers something to be collegial about. Some of the most effective professional learning now comes through activities that help teachers to ‘moderate’ or compare their own students’ work and development with that of other teachers’ students. These activities provide a valuable means of ‘deprivatising’ teachers’ practices and opening up more avenues for feedback and professional accountability.

   This principle is at the very heart of the GiR strategy. At almost every meeting between a Specialist Teacher and a classroom teacher, they will be examining the work that students did the previous week in response to the learning activities they chose. They will interpret this work, making use of Diagnostic Maps, student outcomes levels and Key Understandings. They use this work to sort students into groups according to the difficulties they are having and their phase of development with respect to the mathematical concepts in question. They will then plan appropriate learning activities for the following week to help the children to overcome those difficulties. Though there is not enough space to document it here, extensive research underpins the diagnoses of student learning and the learning activities to promote better understanding.

   As an aside, it was common to hear teachers in GiR schools express considerable surprise about the expertise and confidence they had accumulated in analysing student performance when they met with teachers from non-GiR schools at ‘making consistent judgements’ meetings.

3. Hawley and Valli’s third principle links to the previous two principles.

   Professional development should involve teachers in the identification of what they need to learn and in the development of the learning experiences in which they will be involved.

   Adherence to this principle ensures that PD is relevant. When teachers help design their own learning, they are likely to feel a greater sense of involvement in the PD experience. Teachers are most likely to use what they learn when PD development is focused on solving problems in their particular contexts.

   Together these first three principles stress the importance of making practice, and evidence about practice, the site for professional learning.

   Practice-based professional learning represents a major shift from traditional views of professional learning based on participation in ‘courses’. This is not to imply that courses and other activities such as workshops, conferences and seminars do not have an important role in supporting professional learning. But
these kinds of activities are only the ‘front end’ of the change process. We have known for a long time that the ‘back end’, the implementation stage of the change process, is where the hard work has to be – supporting teachers as they test new approaches in their own classrooms (Fullan, 1982). Very few PD strategies put the level of resources into the implementation and continuation stages that GiR does.

The third principle runs counter to conventional wisdom about professional development in some respects. Getting it Right identifies what teachers need to know and be able to do to teach mathematics more effectively rather than what they might want to know. But what they need to know in the GiR Strategy has a strong foundation in research and proven practice. Spending more time on mathematics may not be the highest priority for some teachers. In fact they may avoid PD courses in mathematics and, as some teachers we interviewed admitted, they may cover the mathematics part of the curriculum in a less than enthusiastic manner. With GiR, the Specialist Teachers take the knowledge and the professional learning to the teacher where they work and where they can test it out.

Many teachers we interviewed in the course of the evaluation made comments along the lines that the GiR numeracy strategy made them feel more like a ‘professional’. When pressed to explain what they meant, they would say they felt more like ‘experts’. They now had knowledge that gave them a stronger basis for interpreting student learning outcomes and deciding what students needed next. The GiR strategy deliberately avoids telling teachers how to teach, but it does aim to provide teachers with deeper knowledge about (and interest in) the mathematics they are expected to teach and the means to be more discerning about their students’ learning of that content. As one would expect, teachers varied in their openness to First Steps, but the benefits reported by other teachers and the availability of the Specialist Teacher as an extra resource in planning and teaching usually proved too difficult to resist.

We asked teachers how they saw the Specialist Teacher, and this response is typical:

As someone who is a bit more knowledgeable, but one of us. It’s easy to go to her. We know she is there to change the way we teach mathematics.

4. Hawley and Valli’s fourth principle states that:

Professional development should be primarily school-based and built into the day-to-day work of teaching.

Teachers learn from their work. Learning how to teach more effectively on the basis of experience requires that such learning be planned for and evaluated. Learning needs arise and should be met in real contexts. Curriculum development, assessment, and decision-making processes are all occasions for learning. When built into these routine practices, PD powerfully addresses real needs.

This principle has been promoted for many years. Over thirty years ago, people were promoting ‘school-based in-service education’, or ‘school-focused professional development’. It can mean little, as in simply transferring passive course modes of PD into the school on curriculum days. The difficulty is in building opportunities for teachers to be actively engaged as professional learners in the context of their day-to-day work.

The Getting it Right Strategy achieves this penetration to the level of practice almost painlessly. However, the availability and the training of the Specialist Teachers are crucial – and the fact that the Specialist Teacher is usually another teacher from the same school. The ‘shoulder to shoulder’ notion captures the notion of partnership well – that we are going to work together. Despite our initial scepticism about the possibility of such a relationship, we did not come across any teachers who did not value highly the opportunity to work with the Specialist Teacher in their school.

5. Hawley and Valli’s fifth principle relates closely to the fourth:

Professional development should be organized around collaborative problem solving.

Without collaborative problem solving, individual change is possible, but school change is not. Collaborative problem-solving activities allow educators to work together to identify both problems and solutions. Activities may include interdisciplinary teaming, curriculum development and critique, collaborative action research, and study groups.

The GiR Strategy builds on long experience that effective professional learning opportunities arise from collaborative work on authentic teaching tasks and problems. Motivation to engage in this kind of learning
increases with evidence of improved student understanding and enjoyment. The fact that there is a brief time span in GiR between a planning meeting, teaching together and meeting again to examine student work and review the learning activities greatly helps. There is a direct connection between learning, application and feedback.

What becomes possible with the resources that the GiR Strategy makes available is a movement toward the notion of the school as a professional organisation. Professional organisations, as described by Weick and McDaniel (1989), recognise that professional work is not just ‘up front’ work. Professional work requires the ‘back room’ work of interpretation to inform decision-making. Work structures in professional organisations recognise that effective teaching requires time during the working day to bring values and expertise to bear on the non-routine problems involved in meeting the learning needs of all students. This principle, like the others, requires strong leadership at the school level to ensure collaborative work is actively supported and that the Specialist Teacher are able to say ‘no’ to other demands on their time.

6. Hawley and Valli’s sixth research-based principle states that:

   Professional development should be continuous and ongoing, involving follow-up and support for further learning including support from sources external to the school that can provide necessary resources and new perspectives.

   Adoption and implementation of effective practices requires continued learning. Therefore the design of professional development must provide time to apply new ideas and, sometimes, must draw on additional outside expertise. Such follow-up and support ensures that professional development contributes to real change and continuous improvement.

This component of professional learning design is probably one of the major strengths of the GiR Strategy for improving learning opportunities for disadvantaged students. Perhaps the greatest weakness of professional learning for teachers is the lack of funding for follow-up and support when teachers come to implement the innovation in their own classrooms. This is when the need for support is at its highest if professional learning is to translate into practice.

First Steps in Mathematics is a complex package of resources for diagnosing students’ developing understanding of mathematics and planning and implementing teaching programs to improve student learning. Left at the school door, or even explained at some central professional development event, it is very unlikely that teachers would use these resources. At first reading, the GiR material is vast and rather impenetrable. Working ‘shoulder –to- shoulder’ with the Specialist Teacher turns the learning process into many small achievable steps.

The GiR strategy has an ambitious vision for mathematics classes. Students will be actively engaged in constructing their own mathematical knowledge. Teachers will know how to tap into this thinking. Teachers will be adept at promoting mathematical thinking and maintaining high quality discussion of mathematical ideas. The need for props like worksheets and textbooks will fade away. This kind of pedagogy will not happen without a deep understanding of the mathematics and how children learn the mathematics. Neither will it happen without the other key ingredients in acquiring new skills; modelling of the theory and opportunities to practice the ideas yourself and receive feedback. The Specialist Teacher brings these opportunities into the classroom.

Research has indicated it may take two to three years for the kind of significant changes in pedagogy that GiR calls for to take hold (Hodges, 1996). Under the GiR Strategy, schools were funded for at least two years, and the support for a Specialist Teacher often continued into a third year. Schools often put additional funding of their own to extend the number of teachers that Specialist Teachers could work with.

7. Hawley and Valli’s seventh research-based principle states that:

   Professional development should incorporate evaluation of multiple sources of information on (a) outcomes for students and (b) the instruction and other processes that are involved in implementing the lessons learned through professional development.

   When done right, evaluation of professional development yields important lessons for refining professional development. Without such evaluation, future opportunities for teachers to learn may not be productive. Multiple sources of information should be used, including teacher portfolios, observations of teachers, peer evaluations, and student performance. Lessons become most clear when evaluators collect data during different stages of the change process.

A valuable aspect of the GiR strategy was the realisation that evaluation should be built into the strategy early on. ACER was contracted to conduct
the evaluation in mid 2003 over the next two years when new cohorts of Specialist Teachers were still being trained. Funding for Specialist Teachers often continued into the third year. This made it possible to track changes over time and for the evaluation team to feed information back to the GiR team.

The key questions for the evaluation concerned the impact of the GiR Strategy on teachers’ knowledge and practice, though not student outcomes. The GiR team made a policy decision early in the evaluation not to use Western Australia Literacy and Numeracy Assessment (WALNA) data for assessing student outcomes. Funding for the evaluation enabled several sources of data about the impact of the GiR strategy to be gathered.

These sources included visits to schools to conduct structured classroom observations and interviews with teachers, Specialist Teachers and principals. The ACER team visited twenty schools on three occasions in an attempt to trace changes that could be attributed to the GiR Strategy. Surveys of teachers, Specialist Teachers and principals were also conducted on two occasions – late in 2003 and late in 2004. The surveys included innovative methods for gathering information about the impact of the Strategy on teachers’ knowledge and practice. Teachers were presented with scenarios that called for them to apply what they had learned from the GiR Strategy, for example, about diagnosing student understanding and selecting learning activities to promote key understandings. Later in the evaluation, it was common for Specialist Teachers and principals to show the evaluation team evidence of improved outcomes in numeracy that they attributed to the GiR Strategy.

8. Hawley and Valli’s eighth research-based principle states that:

Professional development should provide opportunities to gain an understanding of the theory underlying the knowledge and skills being learned.

Because beliefs filter knowledge and guide behaviour, professional development must address teachers’ beliefs, experiences, and habits. Furthermore, specific knowledge and skills that work in one setting, sometimes do not work in others. When teachers have a good understanding of the theory behind particular practices and programs, they can adapt the strategy they learned about to the circumstances in which the teacher is trying to use it.

This principle relates closely to Principle 1 and the central importance of the content that is learned in professional development. Change in practice is more likely to be pervasive when it is informed by theory in which the educator involved has confidence.

Reforms such as First Steps set ambitious goals for teachers and students, especially that mathematics lessons will be characterised by lively discussion of significant mathematical ideas. More teachers will help students test their own mathematical constructions, and think critically about mathematical procedures. For some teachers, this involves a transformation in their knowledge, beliefs and practices that goes to the heart of their identity as a teacher. It was common for teachers to state in interviews that, ‘I’ll never teach maths the same way again’, as a result of their work with the Specialist Teacher.

Earlier research, on which First Steps in Mathematics draws (e.g. Carpenter et al., 1993; Fennema, et al., 1996) showed the futility of PD that focused on teaching techniques, as opposed to deepening teachers’ understanding of research about the development of children’s mathematical thinking within particular content domains. Expansion and elaboration of the professional knowledge base leads to what they called ‘generative’ or sustained change (Franke et al., 1998). This understanding was a necessary condition for significant shifts in teachers’ beliefs and practices. Effective pedagogy depends on knowledge of subject matter and how students learn it.

In the GiR Strategy, Specialist Teachers have 21 days of PD over two years focused on this kind of knowledge. The experience of gaining this knowledge led several Specialist Teachers to say spontaneously that, ‘I’m feeling like a professional for the first time’. Specialist Teachers draw on this knowledge back in their schools in working with classroom teachers. Their weekly meetings, where they examine student work from the previous week, identify types of misunderstanding and select learning activities appropriate to those students, provide an authentic context in which to link the research to practice. This real work context brings teachers’ current beliefs, experiences, and habits to the fore – a necessary condition for change to happen.

Working ‘shoulder to shoulder’ means the Specialist Teacher can bring useful knowledge to the core work of planning and teaching. Practice is deprivatised. In the best situations, Specialist Teachers model new practices frequently and teachers receive plenty of informal feedback as they try the practices out for themselves. This protected environment enables teachers to take risks and experience...
different types of learning themselves. Teachers see the benefits of what they are learning in their students' enjoyment of the activities.

Hawley and Valli's ninth research-based principle states that:

*Professional development should be integrated with a comprehensive change process focused on improving student learning.*

Improving teacher capabilities without changing the conditions that influence the opportunities to use these capabilities is often counter-productive. These conditions include time and opportunities to try new practices, adequate funding, technical assistance, and sustained central office follow through. Thus, unless professional development is designed as part of a larger change process, it is not likely to be effective.

The fact that GiR PD is part of a broader reform strategy is clearly a strength of the GiR Strategy. The main components of this strategy were listed earlier. Data about student learning outcomes has been used to identify an undeniable need. The strategy has been planned on several levels, from the centre to the Region, the school and the classroom – and over an extended time period. It has strong political and financial backing from the Minister. The focus on building professional capacity as the means of improving learning outcomes in disadvantaged areas is clear. First Steps in Mathematics is a well-researched and comprehensive curriculum development resource. Funding for each school is substantial and typically equivalent to an extra staff member's salary. There is a strong central team to provide training for the Specialist Teachers over an extended period of time. Principals have customised training in the kind of support they can provide to enable Specialist Teachers to work effectively. Clear guidelines are provided about what the Specialist Teacher's role entails – and what it does not. Time for Specialist Teachers and classroom teachers to plan and teach together is built into the timetable.

**Concluding comment**

The GiR Strategy is consistent with research about the characteristics of effective designs for professional learning. It illustrates how far we have come over the last thirty years or so since professional development was equated mainly with one-off workshops. In these final remarks, I would like to draw attention to one interesting aspect of the GiR Strategy that take us beyond Hawley and Valli's list of principles.

**Freeing up expertise: The role of the Specialist Teacher in the GiR design**

The role of a well-trained Specialist Teacher is pivotal to the success of GiR. Without the Specialist Teacher, it is hard to see how any of the Hawley and Valli principles could be implemented, yet, they make no mention of such a role in their list of conditions that appear to nurture effective professional development.

The Specialist Teacher concept points to a new teacher leadership role that is worth considering as a more permanent component of school staffing. Specialist teachers do what formally appointed school leaders ought to do, but rarely actually do. They make the concept of an accountable professional community a reality. In being free to work alongside colleagues, individually and in groups, the Specialist Teacher makes it more possible for the school to review in depth how well students are being served. The Specialist Teachers act as a bridge between research and the 'dailiness' of teaching. They help to break down isolation and the persistence of privacy in teaching. While we found variation from school to school in the way the role was implemented, the role itself was greatly valued in every case. We were surprised how most specialist teachers, who came from within the ranks of the staff, were accepted and valued in their new role. When asked how she saw the Specialist Teacher in her school, one teacher expressed the views of many teachers we spoke with: 'She's a bit more knowledgeable, but she is still one of us. It is easy to go to her. We know she is there to change the way we teach maths, but that's OK'.

One way to think about the Specialist Teacher role is as a means of 'freeing up expertise' in the school and making it more available. When you see a Specialist Teacher at work with individual teachers and with year level teams of teachers, assisting with the diagnostic maps, with the Numeracy Net, the rotation of classroom activities and so on, you wonder why this role and this type of leadership has not been a normal part of school staffing before. Teachers think that the most important source of useful ideas for their teaching is other teachers, yet school organisation often makes that expertise inaccessible as teachers are locked away in the isolation of their own classrooms. One thing that young teachers value highly is the chance to see expert teachers at work and to get helpful feedback from them about their own teaching. Greater opportunities for
modelling and feedback are key features of the GiR strategy.

The GiR Strategy puts resources where they are most likely to have an impact on student opportunities to learn. The English have been looking at ‘remodelling’ teaching (Collarbone, 2004). Part of the motivation for this arose from studies of teacher workload and stress. Remodelling includes stripping non-teaching clerical and administrative tasks that limit the time and energy that teachers have for teaching. It has also included a very large investment in new teaching assistant roles in schools. The WA GiR strategy raises the question about whether a more effective approach might be to place extra resources, if they are available, into freeing up expert teachers from time to time to work shoulder to shoulder in the way that the GiR developers have insisted. GiR legitimates the deprivatisation of teaching. Some teachers found this uncomfortable at first, but by the second year, when it had become obvious that colleagues were gaining a great deal from the partnership, they usually came on board. Most teachers and principals in WA GiR schools were in no doubt that the GiR Strategy was giving them a greater opportunity to improve student learning outcomes than any other strategy they had experienced.

References


Abstract

This paper and the paper by Dr. Lawrence Ingvarson are companion pieces to Rosemary Cahill’s account of the intentions of the Getting it Right Literacy and Numeracy Strategy, and the model of professional development on which the strategy is based. In these papers, we present some findings from the ACER evaluation of Getting it Right. We provide detailed results from the surveys of principals undertaken in 2003 and 2004, including findings of the use of data to improve planning. These results provide evidence of the impact of the initiative, and evidence of an increase of the impact of the strategy over time. We identify key features of the model of professional learning that underpin the strategy, and link this to other research findings on effective professional development.

The main purpose of the Australian Council for Educational Research’s evaluation was to provide the Western Australian Department of Education and Training with information about the effectiveness of the Getting it Right Literacy and Numeracy Strategy (GiR-LNS) in developing expertise relating to the teaching of literacy and numeracy. The evaluation was focused on the impact of the GiR-LNS professional development, on changes in school practices and on changes in classroom teaching practices.

Principals, Specialist Teachers and their classroom teacher colleagues were surveyed in Term 4 2003 and again in Term 4 2004. Other important evaluation information was collected from visits to a selected number of schools, and from observations of the training sessions for the Specialist Teachers. A review of the data collected from principals presents a positive account of an initiative that provides ongoing expert help to teachers in the school, as they work ‘shoulder to shoulder’ in planning, and in classrooms.

Principals’ perspectives

School principals were well positioned to provide information about the impact of the work of the Getting it Right Specialist Teachers in their school. We interviewed school principals on three occasions in twenty schools, and gained a very positive picture of the responses to Getting it Right. In one school, during the evaluation team’s first visit, the principal noted that teachers’ confidence was ‘going through the roof’, and he reported that the value of having a Specialist Teacher had been mentioned during performance management reviews. The Specialist Teachers’ skills and knowledge, the practicality of her advice and her ‘street credibility’ had impacted on the school. The Specialist Teacher’s role of providing in-class support was non-negotiable in the school. He noted that finding time for collaborative planning had been difficult, particularly because of the number of teachers working in tandem pairs.

Several months later, in a second interview the same principal described the consolidation of the strategies initiated in connection with Getting it Right in the previous year:

The English policy is giving direction to the whole school … GiR is focusing on writing as a starting point … the Literacy Net is being taken up … We’re not trying to cover too much …
without GiR we wouldn’t have been able to implement the policy…. Our Specialist teacher works in class, providing ongoing, accessible support.

The two surveys of principals, conducted with a twelve 12-month interval, provided a range of detailed range of evidence about the impact of Getting it Right over time. The descriptive results of the evaluation questionnaires completed by principals in 2003 and 2004 show that the initiative was rated highly, and on some dimensions, rated more highly in the second survey.

**School context**

Principals were asked to identify the extent to which the Getting it Right strategy was connected to other funded school programs. Getting it Right is intended to bring about improved learning opportunities for students, and coherency with other school improvement programs is desirable. Table 1 shows the responses to this question. Overall, the responses indicate that the getting it Right strategy was closely connected with the programs listed. There were strong links, for example, between Getting it Right and the Curriculum Improvement Program, increasing over the course of a year.

In the 2003 survey, principals were asked: ‘What were the most important criteria used in selecting which classroom teachers would work with the Getting it Right Specialist Teacher?’ The collaborative working relationship between the Specialist Teacher and classroom teachers appears to be a critical factor in the effectiveness of Getting it Right, and it was interesting to investigate the reasons that principals gave for selecting teachers to work with the Specialist Teacher. We found that a range of reasons was cited, and constructed a set of categories from an examination of the responses. Space was provided on the survey to list three criteria, although many principals chose only to list one or two. Table 2 shows the categories and frequencies for each category, sorted according to the aspect listed first, second and third.

The most frequently cited reason for selecting classroom teachers to work with the Specialist Teachers was the year level at which the teachers taught. The needs of students was the next most frequently listed criterion. The willingness of teachers to work with the Specialist Teacher was identified by a small number of respondents. This question was not asked in the 2004 survey.

We were interested in the extent of practical support schools provided to the Specialist Teachers, and so asked principals about resources provided by the school to support the work of the Specialist Teacher. The frequencies shown in Table 3 show the levels of provision of resources. A suitable workspace was provided in almost all cases, but phone, computer and email access were provided less frequently. In both surveys, the majority of principals reported that they had made timetabling arrangements to allow for collaborative planning. In view of the importance of collaborative planning in the GiR strategy, it is interesting to note that 77% in 2003 and 83% of schools in

### Table 1 Connections between GiR and other programs in 2003 and 2004

<table>
<thead>
<tr>
<th>To what extent is Getting it Right connected to the following programs</th>
<th>Not at all %</th>
<th>To a minor extent %</th>
<th>To a moderate extent %</th>
<th>To a major extent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) the <em>Curriculum Improvement Program</em>?</td>
<td>1</td>
<td>5</td>
<td>26</td>
<td>68</td>
</tr>
<tr>
<td>n = 142/141</td>
<td>0</td>
<td>4</td>
<td>16</td>
<td>81</td>
</tr>
<tr>
<td>b) the <em>Students at Educational Risk</em> strategy?</td>
<td>0</td>
<td>7</td>
<td>8</td>
<td>85</td>
</tr>
<tr>
<td>n = 143/140</td>
<td>0</td>
<td>2</td>
<td>21</td>
<td>77</td>
</tr>
<tr>
<td>c) the <em>Commonwealth Literacy and Numeracy Program</em>?</td>
<td>11</td>
<td>7</td>
<td>24</td>
<td>59</td>
</tr>
<tr>
<td>n = 123/116</td>
<td>10</td>
<td>5</td>
<td>22</td>
<td>64</td>
</tr>
<tr>
<td>d) the <em>Aboriginal Educational Operational Plan</em>?</td>
<td>9</td>
<td>26</td>
<td>33</td>
<td>31</td>
</tr>
<tr>
<td>n = 132/131</td>
<td>9</td>
<td>1</td>
<td>31</td>
<td>42</td>
</tr>
<tr>
<td>e) other programs? (please specify)</td>
<td>6</td>
<td>6</td>
<td>17</td>
<td>71</td>
</tr>
<tr>
<td>n = 109/108</td>
<td>6</td>
<td>3</td>
<td>12</td>
<td>79</td>
</tr>
</tbody>
</table>
2004 provided time in addition to duties other than teaching (DOTT) for collaborative planning. The results indicate that schools were providing slightly more practical support for the Specialist Teachers in 2004 than in 2003.

### Setting targets

The second section of the questionnaire was designed to collect information about setting targets for improving literacy and numeracy outcomes within the school. Principals had a key role in this process, supporting and working with the Specialist Teacher in the development of realistic and challenging targets, and negotiating these targets with the District Director.

### Table 2 Criteria for selecting classroom colleagues in 2003

<table>
<thead>
<tr>
<th>Selection criteria for teachers to work with Specialist Teachers</th>
<th>First criteria listed % n = 139</th>
<th>Second criteria listed % n = 103</th>
<th>Third criteria listed % n = 61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year level/s</td>
<td>45</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Teachers’ willingness to work with ST (choice)</td>
<td>7</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Teachers’ capacity for collaboration</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Needs of students in classes</td>
<td>11</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>Teachers requesting to be involved</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Attitude to the concept of GiR</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Teachers’ interest in change in pedagogy</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Availability of common meeting time</td>
<td>1</td>
<td>Nil</td>
<td>3</td>
</tr>
<tr>
<td>Level of teachers’ needs</td>
<td>2</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Small school, all involved</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Misread question, described selection criteria for STs</td>
<td>24</td>
<td>31</td>
<td>39</td>
</tr>
</tbody>
</table>

### Table 3 Resources provided by the school in 2003 and 2004

<table>
<thead>
<tr>
<th>What resources has the school provided to support the work of the Specialist Teacher?</th>
<th>No %</th>
<th>Yes %</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 144/141</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) A suitable workspace for the Specialist Teacher</td>
<td>6</td>
<td>94</td>
</tr>
<tr>
<td>b) Phone, computer, and email access for the Specialist Teacher</td>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>c) Timetabling and staffing arrangements to allow for the collaborative planning time needed by the Specialist Teacher and teacher colleagues</td>
<td>21</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>87</td>
</tr>
<tr>
<td>d) Time, in addition to duties other than teaching time (DOTT), for collaborative planning</td>
<td>8</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>96</td>
</tr>
<tr>
<td>e) A budget for the Specialist Teacher to purchase resources for literacy/numeracy teaching</td>
<td>23</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>92</td>
</tr>
</tbody>
</table>
Using Data to Support Learning

Table 4 shows that in both 2003 and 2004 almost all of the schools involved the Specialist Teacher in target setting. In almost half of the respondents’ schools all members of the school leadership team or the whole staff were involved. District Office staff and parents were rarely involved.

The use of data to set targets to improve learning is a key aspect of Getting it Right, and so principals were asked about the data that had been used in setting targets. The descriptive results indicate that all the data sources suggested in the survey question had been used to a considerable extent. Western Australia Literacy and Numeracy Assessment (WALNA) data was used to a moderate or major extent in 74% of schools in 2003 and in 86% of schools in 2004. Eighty-one per cent of schools used Curriculum Framework Outcomes to a moderate or major extent in both years. The most frequently used sources of information were ‘other quality student achievement data’ (95% to a moderate or major extent in 2003, and 96% in 2004) and the needs of students (94% (2003) and 94% (2004) to a moderate or major extent). The 2004 data confirmed the 2003 data, indicating that schools were drawing on a variety of information in setting targets.

Principals were also asked about the extent to which schools modified the targets once they had been set, and the sources of information and advice leading to modification.

Sixty-three per cent of respondents reported that the targets had been modified during 2003, and 66% reported that they had been modified during 2004. Thirty-seven per cent reported that in 2003 the targets had not been modified, and 34% reported that the targets had not been modified in 2004. Table 6 shows the frequencies of responses to suggested reasons for modification.

The most common reasons for modifying the targets in both 2003 and 2004 were the availability of further information about student performance and further review of the data. Advice from GiR team members prompted modification in 42% of schools and 43% in 2004. Advice from District Office staff was almost never involved in either year.

The impact of Getting it Right

The third section of the questionnaire for principals included a series of questions designed to gather information about the principals’ impressions of the impact of the Getting it Right strategy in the school. These responses provided insights into the initial impact of the strategy, as they refer to the end of the first or second year of operation of the strategy in the schools, and to the impact after another year had passed. The 2004 responses provided information about the longer-term impact of Getting it Right.

The first question in this section of the survey focused on a variety of outcomes in the school that had resulted from the Getting it Right strategy. These results are shown in Table 7. The greatest impact reported was in relation to teachers and teaching practices. Over 90% of respondents in both the 2003 and 2004 surveys reported that the Getting it Right strategy was, to a moderate or major extent, leading to more effective literacy/numeracy teaching practices, benefits to teachers, teachers being

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### Table 4 Involvement in target setting

<table>
<thead>
<tr>
<th>Who was involved in setting targets? (tick as many boxes as apply)</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The Specialist Teacher</td>
<td>4</td>
<td>96</td>
</tr>
<tr>
<td>b) You, the principal, alone</td>
<td>83</td>
<td>17</td>
</tr>
<tr>
<td>c) All members of the school leadership team</td>
<td>49</td>
<td>51</td>
</tr>
<tr>
<td>d) A literacy or numeracy working party</td>
<td>69</td>
<td>31</td>
</tr>
<tr>
<td>e) The whole staff</td>
<td>54</td>
<td>46</td>
</tr>
<tr>
<td>f) District Office staff</td>
<td>95</td>
<td>5</td>
</tr>
<tr>
<td>g) Parents</td>
<td>89</td>
<td>11</td>
</tr>
<tr>
<td>h) District Director</td>
<td>95</td>
<td>5</td>
</tr>
</tbody>
</table>

n = 144/141
more confident about teaching literacy or numeracy, and teachers being better at diagnosing students’ learning needs.

It is interesting to note the increase in the extent to which principals reported that Getting it Right had impacted on several outcomes between 2003 and 2004. These results are indicative of the longer-term impact of the initiative.

In 2004, 87% (to a moderate extent and to a major extent) of respondents reported that a coherent whole school literacy or numeracy plan had been implemented, compared with 73% in the previous year.

Principals also reported an increase in the consistent use of the Literacy Net, from 68% (to a moderate or major extent) in 2003 to 82% (to a moderate or major extent) in 2004. The principals reported teachers’ increased understanding of the English or

Mathematics student outcomes of the Curriculum Framework also increased: 73%, 2003, to 92%, 2004 (to a moderate or major extent).

The effective use of student performance data to improve planning had also increased from 84% in 2003 to 91% in 2004 (to a moderate or major extent). There was also an increase between 2003 and 2004 in the extent to which it was reported that more reflective use

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**Table 5** Data used in setting targets in 2003 and 2004

<table>
<thead>
<tr>
<th>To what extent was each of the following important in setting targets?</th>
<th>Not at all %</th>
<th>To a minor extent %</th>
<th>To a moderate extent %</th>
<th>To a major extent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) WALNA data</td>
<td>9</td>
<td>17</td>
<td>25</td>
<td>49</td>
</tr>
<tr>
<td>n = 139/137</td>
<td>4</td>
<td>10</td>
<td>20</td>
<td>66</td>
</tr>
<tr>
<td>b) other quality student achievement data</td>
<td>2</td>
<td>3</td>
<td>25</td>
<td>70</td>
</tr>
<tr>
<td>n = 131/129</td>
<td>2</td>
<td>2</td>
<td>25</td>
<td>71</td>
</tr>
<tr>
<td>c) Curriculum Framework learning outcomes for English or mathematics</td>
<td>2</td>
<td>18</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>n = 131/133</td>
<td>5</td>
<td>14</td>
<td>33</td>
<td>47</td>
</tr>
<tr>
<td>d) the needs, experiences and interests of those students most in need of help with literacy or numeracy</td>
<td>1</td>
<td>6</td>
<td>25</td>
<td>69</td>
</tr>
<tr>
<td>n = 137/135</td>
<td>2</td>
<td>5</td>
<td>22</td>
<td>72</td>
</tr>
</tbody>
</table>

**Table 6** Modifying targets 2003 and 2004

<table>
<thead>
<tr>
<th>What led to targets being modified?</th>
<th>No %</th>
<th>Yes %</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) More information about student performance became available</td>
<td>48</td>
<td>52</td>
</tr>
<tr>
<td>n = 144/141</td>
<td>52</td>
<td>48</td>
</tr>
<tr>
<td>b) Advice was provided by Getting it Right team members</td>
<td>58</td>
<td>42</td>
</tr>
<tr>
<td>n = 144/141</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>c) Advice was provided by District Office staff</td>
<td>95</td>
<td>5</td>
</tr>
<tr>
<td>n = 144/141</td>
<td>94</td>
<td>6</td>
</tr>
<tr>
<td>d) Further review of student achievement data, such as the WALNA data, or information gained from the Literacy / Numeracy Net</td>
<td>58</td>
<td>41</td>
</tr>
<tr>
<td>n = 144/141</td>
<td>45</td>
<td>55</td>
</tr>
</tbody>
</table>
Using Data to Support Learning

---

**Table 7** Getting it Right has led to these outcomes in 2003 and 2004

<table>
<thead>
<tr>
<th>To what extent has the Getting it Right strategy led to the outcomes listed below?</th>
<th>Not at all %</th>
<th>To a minor extent %</th>
<th>To a moderate extent %</th>
<th>To a major extent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) more effective literacy/numeracy teaching practices n = 144/139</td>
<td>0</td>
<td>6</td>
<td>39</td>
<td>55</td>
</tr>
<tr>
<td>b) The implementation of a coherent literacy/numeracy plan for the whole school n = 142/138</td>
<td>0</td>
<td>7</td>
<td>33</td>
<td>60</td>
</tr>
<tr>
<td>c) Consistent use of the Literacy/Numeracy Net across the school n = 141/139</td>
<td>14</td>
<td>19</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td>d) improved learning outcomes for students at risk n = 143/139</td>
<td>0</td>
<td>12</td>
<td>40</td>
<td>48</td>
</tr>
<tr>
<td>e) improved learning outcomes for all students n = 142/139</td>
<td>2</td>
<td>15</td>
<td>49</td>
<td>35</td>
</tr>
<tr>
<td>f) more effective use of student performance data to plan teaching and learning activities n = 143/138</td>
<td>0</td>
<td>16</td>
<td>43</td>
<td>41</td>
</tr>
<tr>
<td>g) Improved school results in WALNA testing n = 124/128</td>
<td>16</td>
<td>31</td>
<td>36</td>
<td>17</td>
</tr>
<tr>
<td>h) more effective reporting to parents on students’ improvement in literacy/numeracy skills n = 141/139</td>
<td>11</td>
<td>38</td>
<td>39</td>
<td>12</td>
</tr>
<tr>
<td>i) Teachers have a clearer understanding of the English or Mathematics student outcomes of the Curriculum Framework n = 143/139</td>
<td>4</td>
<td>23</td>
<td>52</td>
<td>21</td>
</tr>
<tr>
<td>j) the teachers have benefited from working with the Getting it Right Specialist Teacher n = 143/139</td>
<td>0</td>
<td>3</td>
<td>22</td>
<td>75</td>
</tr>
<tr>
<td>k) teachers are more confident about teaching literacy or numeracy n = 142/139</td>
<td>0</td>
<td>4</td>
<td>18</td>
<td>81</td>
</tr>
<tr>
<td>l) teachers are better at diagnosing students’ learning needs n = 142/139</td>
<td>1</td>
<td>11</td>
<td>48</td>
<td>40</td>
</tr>
<tr>
<td>m) more reflective use of performance data to improve planning at the whole school level n = 143/137</td>
<td>3</td>
<td>19</td>
<td>46</td>
<td>32</td>
</tr>
</tbody>
</table>

was being made of performance data to improve planning at the whole school level: 78% in 2003, to 92% in 2004, (to a moderate or major extent).

In 2004 72% (to a moderate or major extent) of principals reported that their schools results in WALNA testing had improved across the school, compared to 53% (to a moderate or major extent) in 2003.

Overall, these results indicate the principals’ impressions that Getting it Right has led to a range of outcomes in their schools.

Principals were asked about the impact of Getting it Right on their own understanding of literacy and numeracy curriculum and pedagogy, and how to link performance data to students’ needs. The results are shown in Table 8. Almost none of the principals responded using the ‘not at all’ option. Responses to the other three options (to a minor; moderate or major extent) were spread across the options. These...
results indicate that principals were reporting some level of impact on their knowledge and understanding, and that this had increased by the time of the second survey.

A question was designed to produce a general estimate of principals’ viewpoints on the impact of the Getting it Right strategy on teachers’ professional learning. Principals were asked to compare the impact of all the professional development activities in which teachers at their school had participated over the past three years with the impact of their teachers’ work with the Getting it Right Specialist Teacher. The results shown in Table 9 indicate a very strong trend to rating involvement in Getting it Right as having more impact (42%, 2003, 34%, 2004) and much more impact (54%, 2003, 61%, 2004). That is, more than half of the respondents indicated in 2003 that involvement in Getting it Right has much more impact than other professional development activities, and this had increased to 61% in 2004.

The surveys included a number of open-ended questions, so that principals could provide their own reasons and explanations to further questions about the impact of the Getting it Right strategy. These responses were examined and categorised into common responses. All responses were read by trained assessors, and scored according the described categories.
Principals were asked whether or not the Getting it Right strategy was meeting important needs in their school. As the results in Table 10 indicate, in both surveys almost all (98%) agreed that this was the case. If the principals responded in the affirmative, they were then asked to list how Getting it Right had helped to meet these needs. Table 11 captures the reasons they listed. Space was provided for three reasons to be listed. Respondents listed a varying number of needs, accounting for the different numbers of responses.

The responses shown in Table 11 indicate that, in 2003 and 2004, two school needs were most commonly reported as having been met by the Getting it Right strategy. The first of these was the need to identify, diagnose, monitor and assist students at risk. The second need was related to...

<table>
<thead>
<tr>
<th>GiR meeting school needs</th>
<th>First need listed n = 139/133</th>
<th>Second need listed n = 123/120</th>
<th>Third need listed n = 88/86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying, diagnosing, monitoring and assisting students at risk</td>
<td>18 %</td>
<td>15 %</td>
<td>13 %</td>
</tr>
<tr>
<td>Improving pedagogy in literacy/numeracy</td>
<td>26 %</td>
<td>15 %</td>
<td>15 %</td>
</tr>
<tr>
<td>Increasing teachers’ awareness of strategies to improve learning</td>
<td>4 %</td>
<td>15 %</td>
<td>6 %</td>
</tr>
<tr>
<td>Improving teachers’ content knowledge</td>
<td>11 %</td>
<td>13 %</td>
<td>7 %</td>
</tr>
<tr>
<td>Enhancing literacy/numeracy learning</td>
<td>6 %</td>
<td>6 %</td>
<td>3 %</td>
</tr>
<tr>
<td>Improving assessment practices</td>
<td>2 %</td>
<td>5 %</td>
<td>5 %</td>
</tr>
<tr>
<td>Catering better for a range of student needs</td>
<td>4 %</td>
<td>6 %</td>
<td>3 %</td>
</tr>
<tr>
<td>Other</td>
<td>3 %</td>
<td>6 %</td>
<td>7 %</td>
</tr>
<tr>
<td>Whole-school planning for lit/num development</td>
<td>3 %</td>
<td>6 %</td>
<td>11 %</td>
</tr>
<tr>
<td>Improving data gathering and analysis</td>
<td>3 %</td>
<td>2 %</td>
<td>5 %</td>
</tr>
<tr>
<td>Focused use of school budget</td>
<td>1 %</td>
<td>1 %</td>
<td>1 %</td>
</tr>
<tr>
<td>Helping focus teacher learning (professional development)</td>
<td>8 %</td>
<td>4 %</td>
<td>6 %</td>
</tr>
<tr>
<td>Availability of ‘on-hand’ expert support; modelling of lit/num strategies</td>
<td>13 %</td>
<td>8 %</td>
<td>5 %</td>
</tr>
<tr>
<td>Teachers’ engagement in collaborative planning and sharing expertise</td>
<td>11 %</td>
<td>7 %</td>
<td>8 %</td>
</tr>
<tr>
<td>Improving home-school links</td>
<td>0 %</td>
<td>3 %</td>
<td>1 %</td>
</tr>
</tbody>
</table>
the improvement of pedagogy in literacy or numeracy teaching. Other needs that were identified as being met included increasing teachers’ awareness of strategies to improve learning and the need for teachers to engage in collaborative planning and sharing of expertise.

Principals were asked if they thought that there were better ways of meeting their school’s needs than the Getting it Right strategy. Most replied ‘no’ to this question (88%, n = 135) suggesting that their impressions of the value of the strategy were positive. A small number responded ‘yes’ – there were better ways. The results in 2004 were very similar, with 84% (n = 135) replying ‘No’. The responses of the small number who answered this question negatively were categorised, and the results are shown in Table 12.

From the small number of respondents, more opportunities for staff professional learning and more time for the Specialist Teacher were mentioned as better ways of meeting school needs. Principals were given the opportunity to note the factors that had facilitated or hindered the Getting it Right strategy in their school.

The range of facilitating factors shown in Table 13 is of interest. They relate to the school context, the effectiveness of the Specialist Teacher, and to aspects of educational change, such as teachers’ receptiveness to change. The pattern of responses is similar for 2003 and 2004. While the frequencies for many categories are small, the range of factors identified by principals provides useful insight into the operation of Getting it Right. The most frequently listed facilitating factor was the general effectiveness of the particular Specialist Teacher in that school. The next most frequently listed factor was the support and cooperation of the whole school staff. Support from the school administration, and school organisational support were mentioned more than other factors.

Although reference to the Getting it Right training program for teachers was limited, the emphasis on the effectiveness of the Specialist Teachers implies the effectiveness of the training received by the Specialist Teachers, as well as the strength of their interpersonal skills and knowledge of literacy and numeracy content and pedagogy.

A number of factors were identified by the principals as having hindered the implementation of the Getting it Right strategy in their schools. The descriptive results are seen in Table 14, and are similar for 2003 and 2004. Two factors were mentioned more often than the others identified. Of all factors listed for the first time, 28% related to lack of time for collaboration. Staff resistance to working with the Specialist Teacher,

<table>
<thead>
<tr>
<th>Yes. Better ways of meeting school needs than GiR?</th>
<th>First way listed n = 27/23 %</th>
<th>Second way listed n = 12/5 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>More opportunity for additional professional learning for all staff</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>Need both GiR Literacy and Numeracy STs</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>More FTE</td>
<td>22</td>
<td>17</td>
</tr>
<tr>
<td>More differentiated resourcing</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>Even more support for GiR additional assistance to schools</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Linking to other agency support</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 12 Better ways of meeting school needs 2003 and 2004
or to the Getting it Right approach to providing additional assistance accounted for 11% of factors listed for the first time in 2003, and this increased to 26% in 2004.

### Sustaining changes to teaching practice brought about by the Getting it Right strategy

Finally, principals were asked about plans that schools had made to sustain changes that may have brought about by the Getting it Right strategy. The range of plans reported was categorised. The descriptive results for the first and second plans listed are shown in Table 15. The most interesting result is the increase in reports between 2003 and 2004 that collaborative planning and in-class support will be continue: from 9% in 2003 to 24% in 2004. This suggests increasing recognition of the value of this key aspect of the Getting it Right strategy, affirming one of the strengths of the model of professional learning that underpins Getting it Right.

### A positive view

Overall, the descriptive results of the responses to the questionnaires completed by principals in 2003 and 2004 present a positive view of the Getting it Right strategy. The results provide insights into many features of the strategy that principals connect to improved outcomes in their schools.

### Table 13  Factors that facilitated Getting it Right in the school in 2003 and 2004

<table>
<thead>
<tr>
<th>What has facilitated GiR in school?</th>
<th>First factor listed n = 131/134</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team approach (involving, for example, ST, SAER coord., Admin.)</td>
<td>2 5</td>
</tr>
<tr>
<td>Support and cooperation from whole staff</td>
<td>1 8</td>
</tr>
<tr>
<td>Support by school Admin.</td>
<td>8 10</td>
</tr>
<tr>
<td>School organisational support, including time for collaboration</td>
<td>5 13</td>
</tr>
<tr>
<td>System-level support for GiR</td>
<td>3 5</td>
</tr>
<tr>
<td>Additional time provided by school for work of GiR ST</td>
<td>2 4</td>
</tr>
<tr>
<td>General effectiveness of the GiR ST</td>
<td>39 22</td>
</tr>
<tr>
<td>Other</td>
<td>3 2</td>
</tr>
<tr>
<td>Use of GiR to focus whole school on improving student outcomes</td>
<td>2 2</td>
</tr>
<tr>
<td>Collaborative planning and review</td>
<td>6 7</td>
</tr>
<tr>
<td>GiR supports local needs &amp; meets system requirements</td>
<td>1 4</td>
</tr>
<tr>
<td>GiR provides resource at point of teaching in the classroom</td>
<td>1 1</td>
</tr>
<tr>
<td>The GiR training for STs</td>
<td>4 2</td>
</tr>
<tr>
<td>Teachers receptiveness to change</td>
<td>2 1</td>
</tr>
<tr>
<td>Teachers’ willingness to ask for help</td>
<td>0 1</td>
</tr>
<tr>
<td>Data-based incentive from need for school to improve student outcomes</td>
<td>8 10</td>
</tr>
<tr>
<td>Coherence with other school initiatives</td>
<td>1 0</td>
</tr>
<tr>
<td>Observed effectiveness of strategies promoted by GiR</td>
<td>2 0</td>
</tr>
<tr>
<td>ST from within school</td>
<td>1 1</td>
</tr>
</tbody>
</table>
Table 14: Factors that hindered Getting it Right in the school

<table>
<thead>
<tr>
<th>What has hindered GiR?</th>
<th>First factor listed n = 131/122 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of direction, poor administration of GiR (at system level)</td>
<td>2 (0)</td>
</tr>
<tr>
<td>Insufficient funds</td>
<td>7 (4)</td>
</tr>
<tr>
<td>Lack of time (eg, for collaboration)</td>
<td>28 (25)</td>
</tr>
<tr>
<td>Short timeline (only 2 years)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Timetabling constraints</td>
<td>2 (0)</td>
</tr>
<tr>
<td>Staff turnover</td>
<td>6 (11)</td>
</tr>
<tr>
<td>Change of ST</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Other</td>
<td>14 (19)</td>
</tr>
<tr>
<td>Sharing GiR ST with another school</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Inappropriate ST</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Staff resistance</td>
<td>11 (26)</td>
</tr>
<tr>
<td>Difficult to change some teachers’ practice</td>
<td>5 (3)</td>
</tr>
<tr>
<td>Staff not focused on students’ learning needs</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Principal needed more briefing at commencement</td>
<td>3 (0)</td>
</tr>
<tr>
<td>Negative effects of GiR program title</td>
<td>10 (0)</td>
</tr>
<tr>
<td>Staff misunderstanding of GiR ST role</td>
<td>8 (1)</td>
</tr>
<tr>
<td>Student transience</td>
<td>5 (1)</td>
</tr>
<tr>
<td>Unwillingness to use DOTT for GiR</td>
<td>0 (1)</td>
</tr>
<tr>
<td>Not whole school (K-7) in focus</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Plans for sustaining GiR changes?</td>
<td>First plan listed</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td>n = 137/136 %</td>
</tr>
<tr>
<td>Maintain ST role through other funding (eg, CLNP, or further GiR funding)</td>
<td>7</td>
</tr>
<tr>
<td>Providing school resources/funding</td>
<td>7</td>
</tr>
<tr>
<td>School will continue to fund ST position</td>
<td>5</td>
</tr>
<tr>
<td>Developing whole school literacy/numeracy plan</td>
<td>15</td>
</tr>
<tr>
<td>Continue to treat GiR as integral part of teachers’ learning</td>
<td>4</td>
</tr>
<tr>
<td>Ongoing direct monitoring of student outcomes in all classes</td>
<td>1</td>
</tr>
<tr>
<td>Continue collaborative planning and in-class support</td>
<td>24</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
</tr>
<tr>
<td>Extend collaborative planning to whole school</td>
<td>4</td>
</tr>
<tr>
<td>Embed GiR changes in school teaching and/or assessment practices</td>
<td>20</td>
</tr>
<tr>
<td>Increase the number of teachers involved</td>
<td>1</td>
</tr>
<tr>
<td>Implement GiR as designed at system level</td>
<td>4</td>
</tr>
<tr>
<td>Introduce timetable changes</td>
<td>2</td>
</tr>
<tr>
<td>Provide more PD for teachers</td>
<td>9</td>
</tr>
<tr>
<td>Share good practice within the school (eg staff meetings, visiting other teachers’ classrooms)</td>
<td>6</td>
</tr>
</tbody>
</table>
Wayne Craig
Department of Education and Training, Victoria

Wayne Craig was appointed as Regional Director of Education for Melbourne’s Northern Metropolitan Region early in 2005.

Prior to this appointment Wayne was principal at Box Hill Senior Secondary College. Under Wayne’s leadership Box Hill Senior developed a significant reputation as an innovative school providing diverse programs and pathways.

Box Hill Senior played a leading role in the integration of vocational education in senior schooling and established unique sporting programs in basketball, football and tennis.

In 2005, Box Hill Senior established the Middle Years Tennis School to cater for 150 students seeking to combine middle years education with a strong sporting program.

Box Hill also developed innovative approaches to the use of ICT as both a teaching and management tool.

Wayne commenced his working life as a research officer for a major retail company and later taught mathematics and science at a number of technical schools in Melbourne’s east and south east.

Over the past decade, Victorian government schools have become accustomed to the use of data as a means of evaluating school performance and identifying potential areas for improvement.

In many instances however, the data has been relatively unsophisticated and the data has not been readily available to or usable by teachers, and students rarely had access to this information.

The Victorian Education Department’s Accountability and Improvement framework, underpinned by a three-year school charter, required schools to monitor, evaluate and report on performance data across a range of areas. Data sets include:

- Like School Group – a measure of the socioeconomic status of the school population
- AIM* results
- VCE** Results against ‘Like Schools’
- Vocational provision and achievement
- Real Retention
- Student Absence
- Parent Opinion
- Staff Opinion

The Framework was more a compliance mechanism than an improvement tool. The data underpinning the Framework assisted in identifying issues, but was relatively unsophisticated and is not readily usable in schools as the basis for improving student achievement.

In 2003 Victorian Education Minister Lynne Kosky launched a Blueprint for Government Schools with a moral purpose to improve student achievement regardless of background or location. The Blueprint emphasises the need for an accountability and improvement focus that is responsive to school needs and focuses on improving student outcomes and now the charter process is evolving into a four-year strategic planning process.

Another of the Blueprint Flagship Strategies is the implementation of a performance and development culture across all schools. The core of this performance and development culture is the provision of multiple sources of feedback to teachers so that teachers can constantly monitor and improve their performance.

In an attempt to drive improved outcomes, schools such as Box Hill Senior Secondary College have developed their own data gathering processes to inform both teachers and students about performance.

Box Hill Senior Secondary College – a Years 10 to 12 school of 600 students – is unusual in the Victorian context. As one of two ‘stand-alone’ senior colleges, it has no feeder schools and relies on ‘word of mouth’ recommendations to secure its enrolment. A third of Box Hill students travel three to four hours per day to and from school and the school has developed an enviable reputation for innovative programs across a broad range of programs.

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*AIM – Achievement Improvement Monitor: a statewide literacy and numeracy test administered at Years 3, 5 and 7.

**VCE – The Victorian Certificate of Education
Box Hill Senior uses a broad range of electronic tools to gather information on student attitudes, aspirations, expectations and achievement. Some of this information is fed back to students as part of a mentoring process and some goes to teachers to assist in improving their performance.

There are several crucial preconditions for the implementation of the Box Hill approach:

- Clarity and unity of purpose
  - Unless the school has a strong sense of direction, data is more likely to confuse than clarify or assist.
- A strong emphasis on use of data
  - Using data that is potentially confronting for teachers is a gradual process.
- The use of ICT for collection and analysis of data
  - ICT is essential to collect, analyse and distribute data.
- High levels of trust
  - Teachers and students must be confident that data will be used appropriately.

In its work with students the school uses a well-developed mentoring program that assists students to take responsibility for their performance. This program supports students in reflecting the match between achievement levels and aspirations and expectations. Much of the data at the heart of the mentoring process is also used to support improved teaching.

**Data collection and use**

To get a picture of student ability levels all students sit ACER Literacy and Numeracy tests on entry to the school. Students also complete a number of tasks on Websurvey (web-based software developed by the school) which include:

- A learning styles test that is intended to raise student awareness and reinforces the need for teachers to consider different learning styles as they plan teaching programs;
- A self-assessment of approaches to learning. This includes questions like ‘How do you rate yourself on commitment to study? Very committed? Committed! Not committed? How much time do you expect to spend on homework each day?’;
- Questions related to future employment such as, ‘Being highly paid is … Very important? Important? Not important?’;
- Questions on achievement expectations in each subject;
- Questions related to involvement in part-time work, sport and the arts (outside school); and
- Questions related to the student’s access to ICT at home.

Box Hill Senior has also developed a web-based attendance and progress reporting system that monitors student attendance by the half-hour and provides a monthly progress report in each subject. This progress report also includes a grade point average on student performance.

Individual student mentoring sessions are conducted with a teacher several times per year. The student is encouraged to reflect on levels of achievement compared to expectations and aspirations and what strategies might be used to lift achievement.

At the end of each semester, students complete their own report on progress using scanning technology. Students evaluate their approaches to learning, indicate whether they have achieved at the level they expected, factors contributing to their success and steps they can take to lift their performance. The reports are a key component of the Student Progress Conferences that are held with parents and students. Success factors and improvement options are also forwarded to each of the student’s teachers.

Teachers at Box Hill have electronic access to all the data regarding students and are encouraged to reflect on this information as part of the school’s performance management process.

Two other significant data sets are also used to assist staff to improve the quality of their teaching.

The first is an analysis of individual student performance at Year 12 in the VCE. The analysis takes into account three key factors:

- Ability as measured by the General Achievement Test that is administered by the Assessment Authority during Year 12;
- Gender, as girls generally outperform boys; and
- Year level, as students taking one Year 12 subject at Year 11 generally outperform Year 12 students taking five subjects.

Other variables such as attendance, age and student family occupation can also be included in the analysis.

Teachers have information on the performance of each student in their classes and are able to look at how those students performed in other classes. The data indicates whether students performed at, above or below what would have been expected on
The data lays a rich foundation for discussion in performance management sessions, in learning area meetings and between groups of teachers. These discussions have encouraged teachers to modify their teaching practice and have led to changes in class organisation in some instances.

Another key data set for Box Hill teachers is student opinion on the quality of teaching. Using scanning technology, all staff members are expected to survey classes during the year. Students are asked to respond to questions such as:

• My teacher is an expert in this subject.
• My teacher is well prepared.
• My teacher checks understanding.
• In this class, students are treated as adults.
• In this class, high standards of work are expected.

Implementing this approach required a significant leap of faith on the part of teachers. There was some concern, particularly from experienced teachers, as to whether students would actually assess teacher performance fairly. At the same time, some students expressed doubt as to whether teachers would respond to teacher opinion.

There were four clear outcomes from the student opinion surveys.

Firstly, students treated the surveys seriously.

Secondly, teachers were highly regarded by students and this had a significant impact on morale. Most teachers had never received any formal feedback from students in their classes. During performance review many teachers spoke about how they always knew when they had a really bad lesson or really good lesson but the surveys provided detailed information across a range of performance areas.

Thirdly, student opinion gave teachers an insight on aspects of their performance that could be improved. Most teachers looked at the survey results and identified two or three indicators that were lower than others. These aspects became the improvement focus for the next twelve months.

Finally, the survey data added another layer of rich discussion to the schools performance management process and assisted the school administration to identify professional development needs for the staff as a whole.

The strategic use of data at Box Hill Senior Secondary College supports improved student achievement and a similar, but broader, approach is now being developed to serve government schools in Melbourne’s Northern Metropolitan Region. A regional data service is being developed to provide teachers and students with a range of information on student achievement, ability, aspirations and expectations.

The data service will support a range of other school improvement initiatives to be rolled out over the next two years.
Using the evidence of student achievement for improvements at individual, class and school level

Reg Allen
Tasmania Qualifications Authority

Dr Reg Allen is the Chief Executive Officer of the Tasmanian Qualifications Authority. He has 30 years of experience as a teacher and subject master, board member and teacher representative, consultant, deputy director and director, in the diverse education contexts of Australia, England, and the USA. He has acted as expert education advisor in Australia and America, including being a leading member of the Framework Research Advisory Group for Queensland’s New Basics in 2001-2004.

His principal previous role has been as Deputy Director of the Queensland Board of Senior Secondary School Studies where he played a key role in the design and implementation of Queensland’s Student Education Profile for senior school students, including the integration of vocational education in post-compulsory school education. He has produced over 40 publications across diverse education specialities, including national studies and the development of policies for the Australasian Curriculum Assessment and Certification Authorities (ACACA).

Abstract

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.

For a teacher, the central purpose of analysing data is to improve the learning of one or more particular students. That is, the individual teacher and the school take the students who come to them and seek to improve the learning of those students. This purpose is different from that of the sociologist seeking to understand patterns of participation, or that of the policy analyst seeking to understand the impact, if any, of policy settings. The possibly powerful generalisations about a handful of key variables produced by nomothetic analyses of large data sets often provide little guidance to the individual teacher, who must be concerned with the complex particularity of individual students and groups of students.

Of course, these statements about teachers and students rest on assumed archetypes of:

- learning as including (but not restricted to) broad and deep understanding
- the teacher as professional, inquiring and reflecting on practice to achieve more learning by more students
- the student as a whole person, living in and across a time and place and embedded in cultures.

Such archetypes push into the background those data techniques that are more suited to the notions of teacher as technician, following codified instructions in the use of some test scores to focus coaching effort for gains in terms of a uni-dimensional latent trait. The techniques explored in this paper can help teachers to identify teacher and student repertoires of practice. Luke et al. (2005) describe the hypothesis that effective teaching involves ‘weaving’ – shifting kinds and levels of knowledge as needed. In these terms, teachers draw on repertoires of practice as they work with students, weaving these together. Students draw on repertoires of practice, some of which they bring with them from outside the school and others which are learned, developed or modified through their experience of school.

1See Gutierrez and Rogoff (2003).

2‘Repertoires of practice’ is a helpful term from cultural sociology now being increasingly used in discussions of pedagogy. Its broader meaning refers to the idea that regularities in our performances or actions (language, gestures, rituals, routines, rhetorics) can be understood in terms of ‘toolkits’, set of models, from which we select and combine (more-or-less unreflectively)(Sheffy, 1997).
Indeed, learning itself can usefully be seen as the development by the student of particular repertoires of practice.

The teacher’s concern with improving the learning of particular students means some distinctive characteristics for data gathering and analysis.

First, the methods and results of what Ragin (1997) calls the variable-oriented researcher are not useful – there are too few students, too many facets to consider and the students interact with each other, with the teacher and with their wider socio-cultural contexts. Teachers often seem intuitively aware that some fundamental assumptions required by statistical studies seeking to understand patterns of complex causality in small-n populations, they present significant technical and operational challenges to the teacher seeking to understand and improve what is happening in a particular classroom.

Thirdly, students bring their complete selves with them when they interact with school – a ‘dunno’ can be laconic, resentful, defensive, uninterested, diversionary or intentionally misleading rather than a simple attestation of a deficit of not knowing (not remembering, never encountered, didn’t realise) easily remedied by an instruction session. Cooper and Dunne (1999) have shown from UK data the importance of understanding what students bring with them and their knowledge, understanding and acceptance of ‘doing school’ – Bourdieu’s habitus and Bernstein’s recontextualisation – their ‘feel for the game’ (Cooper & Dunne, 1998), for making sense of students’ responses to various types of mathematics assessments.

Data about what actually happens in school can be relatively direct or indirect. Direct data includes student work – potentially the most valuable outer sign of internal activity – and structured classroom observations. More indirect data includes the evidence from student and teacher reflections (through conversations and surveys) and test results. Student and teacher comments and reflections are more indirect in that they are statements about what people think is happening as mediated through their ways of seeing the world

1Especially so when we seek learning that is powerful, transferable and oriented towards meeting a future of unpredictable demands and opportunities.

2See http://smalln.spru.ucl.ac.be/. Ragin (1987) uses the term Qualitative Comparative Analysis (QCA). The methods in QCA have, however, a quantitative aspect in the inclusion of Boolean minimisation algorithms originally developed in digital electronics.

3Katz et al. (2005) present an interesting comparison of the results of fuzzy set QCA (Cronqvist, 2003) and regression analysis in an analysis of causality in economic development in Spanish America.

4The term ‘enacted curriculum’ is helpful, but can be misleading. Studies of the ‘enacted curriculum’ seem to focus more on what teachers say about what they do, more than on what happens or how students experience it. See for example http://www.secsupport.org/overview.htm for materials and Porter (2004) for a discussion of differences between the intended (standards), enacted (teacher priorities) and assessed (tests) curriculum.

5In this context, ‘direct’ and ‘indirect’ are similar but not identical to the distinction historians draw between ‘primary’ and ‘secondary’ sources.

6Student work’ is used here in the most general sense, not restricted to culminating performances, formal assessment or testing.

7See, for example, the coding scheme used in the Queensland School Reform Longitudinal Study (Education Queensland, 2001). The need for trained observers and multiple observations over time (a single lesson does not sample the complexity of practices that could be part of a teacher’s repertoire) make this type of evidence less accessible on a regular basis.

8Student comments can be very helpful, nonetheless. See Cooper and Dunne (1999) for examples of the insights that are only readily apparent with the use of student comments – students who gave the ‘wrong’ answer to ‘realistic’ problems sometimes did so because they took the ‘realistic’ setting of a task at face value. Student comments can also remind us of the gap between our intentions and their interpretations. The author once sought feedback about the Queensland Year 12 Writing Task from a small group of students selected from the highest achievers – a group that included students who write for pleasure and profit. The Writing Task was designed to provide students with opportunities to do their very best writing, to showcase their writing skills in their preferred genre whatever that might be. They told us, however; that this was ‘school’ and that school doesn’t want your best writing, only the writing that fits its expectations.
by their intentions and their feelings about what ought to be happening.

Tests provide teachers with indirect evidence about what is happening – an estimate of the ability (and propensity) considered to underpin particular knowledge and skills – an indirect indication about aspects of what has happened. Tests are, of course, coloured by their sample nature and by the varying ways students choose (or don’t choose) to respond to them. It may seem so obvious and simple that tests can provide diagnostic evidence – so that a teacher knows what needs to be done for the student to learn more. Practice is more complex. For example, as part of the reform of its lycées, France had developed in the 1990s a national program of testing specifically designed to be diagnostic, for teachers to adapt their pedagogy to meet the needs of their students (see, for example, http://artic.ac-besancon.fr/espagnol/pages/evalsec.htm). In mathematics, for example, the teacher codes student responses, and tables in the teacher’s guide suggest that various combinations of successes and failures are associated with different needs and proposed remediations. Not surprisingly, teachers (for example, http://www.ac-versailles.fr/pedagog/anglais/joinin/miseenplaceremediation2nde.htm ) find it not so simple – there’s a lot of work scoring and then coding responses, there are students with widely varying backgrounds, widely varying responses to the test situation and other familiar problems.

In summary, for teachers seeking to improve student learning, as a data source, student work is more easily accessible than structured classroom observations, it provides more direct, visible and complete evidence of both student and teacher repertoires of practice than do test scores and it supports the types of analysis needed by the classroom and school situation of small numbers and complex causality.

There is growing interest in the use of student work to improve learning – see, for example, www.lasw.org, Cushman (1996), Little et al. (2003). Critical elements include the need: • for expert facilitation and carefully designed protocols – teachers can find the task of looking at the work itself both difficult – they want to (re-)mark it – and troublingly – there are notions of territory, of privacy and perhaps worries about being judged and found wanting • to avoid ‘deficit’ models – the students and/or the teacher ‘didn’t get it’ (Little et al., 2003) – but to look for the attitudes, values, priorities and ways of doing things that are evidenced in the work (and the presence or absence of teacher comments and other signs)

• to identify and see through and beyond what is being taken for granted by the teacher and the student.

In the late 1990s, the author led the development and piloting of a resource for Queensland senior secondary schools seeking to review their practices (Allen & Bell, 1999). This involved a skilled facilitator using a structured process centred on student work. As well as the critical elements listed above, a particular characteristic of the process was that it took a student-centred focus rather than subject focus. That is, it sought to use a set of collections of the work of individual students as the direct evidence for asking questions about the enacted values, priorities and practices in the set of subjects experienced by a student. To make the task as straightforward as possible, the sets of student work were, for the first stage of review, chosen to be those of students who were generally successful – the students who were not ‘resistant’ to the enacted culture of the school, who knew how to ‘play the game’. The techniques encouraged by the facilitator and the protocols could be seen, roughly, in terms of the ‘hermeneutic circle’ or, in simpler terms, as the sorts of interpretations that historians and anthropologists practise when documents are the only evidence they have for understanding some social practices. An initial focus on the surface, obvious features of the evidence, including any evidence of teacher comments, codes and signs, was followed with closer examination of

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1 Gutierrez and Rogoff (2003) emphasise the importance of a focus on activities rather than individual traits.

2 Queensland had a system of externally moderated school-based assessment for high-stakes subjects. Students typically took six subjects each studied for two years. The moderation process required compilation of a folio (collection) of a student’s work providing the evidence that supported the final decision about a level of achievement (criteria and standards based) in a subject. Thus, a collection of a single student’s work for this project was a set of five or six folios each containing a variety of tasks.

3 A reading of the texts in the light of pre-judgements is subjected to critical examination in the light of the texts.

4 There are cuneiform texts from Sumerian schoolrooms that give us some (limited) picture of their enacted values, priorities and practices. See Sylvan (2004) for an account of methodological issues involved in using these sorts of perspectives.
what activities seemed to be emphasised and what de-emphasised in practice – using the assumption that the students whose work was being looked at would seek to maximise their return for effort and thus enacted attitudes, values and priorities could be inferred from the evidence.

Taking a student focus rather than a subject focus was often a particular challenge for participating teachers, as was seeing the implicit, enacted priorities rather than the intended or designed.

At the end of the process, teachers’ findings included that:

• some generally desired behaviours (for example, clear and accurate written expression, clear mathematical argument) were in practice rewarded/encouraged/required in only one subject – with consequences that the behaviour was exhibited within but not outside that classification; the knowledge and skills did not transfer from one situation to another

• in some schools, there appeared to be greater reward for effort for careful presentation than for serious intellectual rigour – these schools often started the process because of concerns that their students performed relatively less well in higher order thinking tasks than they expected

• what was declared to be the official intention of an assessment task was not necessarily what was rewarded/favoured in practice15

• a school’s view that there was effective use of technology across the curriculum was not supported by sets of student work that showed, for example, that computers were being used mostly as electronic typewriters

• across one school’s curriculum, the enacted variety and complexity of ‘problem-solving’ was less than individual subject areas believed it to be – the sort of result that only comes readily through teachers taking a whole student rather than an individual subject perspective

• across the curriculum of individual students there was a narrower range of extended writing than they expected

• with the ideas from this sort of review they could draw useful interpretations of the patterns in the QCS16 test score data they had.

These findings are probably not surprising, of course. They illustrate, however, the potential of this sort of technique for developing teachers’ understanding of the impact of practices rather than intentions and of the importance of seeking to understand school from a student perspective. Once teachers were familiar with the practice and techniques of this sort of study, there was real additional value in a successful follow-up review using the work of students who did not experience success – a more challenging task (less evidence, more possible interpretations) but potentially very fruitful, as demonstrated by Cooper & Dunne’s (1999) exploration of the varied reasons students had for giving ‘incorrect’ responses to mathematics test items.

This technique looks at all the evidence in the artefacts (the student work), including teacher and student marginalia, the ‘unofficial’ as well as the official. There’s much potential value in taking as complete a view as possible. A look at the marginalia of students’ responses to some items on a Queensland Core Skills Test showed, for example, that there were many students who have in effect learned that anything that looks at all ‘mathematical’ is not for them; regardless of how carefully an item has been constructed to provide a friendly and easy entry to the task. A study of Queensland Year 10 Mathematics folios included a wonderful example centred on the problematic nature of so-called ‘problems’ but illustrating the recontextualising, the demands on knowledge, skills, attitudes and values of ‘doing school’. Here was a ‘problem’ (actually not a problem – the answer was obvious on inspection). The full text (student response and teacher marginalia) strongly suggested the following scenario: the student wrote down the obvious answer, remembered that ‘working’ had to be shown and constructed some semblance of it (it didn’t work); the teacher attempted to follow the working, couldn’t, gave up and then marked the response as correct, giving full credit.

These approaches are, especially in the shorter term, essentially ameliorative

15 In audiences in different countries, the author has found general recognition that a university assignment that is declared as ‘wanting your own opinion’ should not be taken simply at face value.

16 Schools were provided with comprehensive and detailed score analyses of their year 12 students performances in the Queensland Core Skills Test – a test of generic skills, using multiple choice, short response and extended writing formats to assess students’ achievements in terms of common curriculum elements, such as reading, writing, evaluating, synthesising, judging, inferring, deducing.
rather than fundamentally reconstitutive. Teachers need data gathering and analysis techniques that work in the here-and-now, providing some ways to improve matters for their students. Avoiding not only deficit models but also both an emphasis on intentions and too restrictive a focus\(^1\), the use of student work provides a practicable basis for identifying key aspects of what is and what might be, at an individual, class and school level. Starting at the school level builds the skills to look at what is rather than what is intended and the consensus building involved in working at this level supports the individual teacher in looking at student repertoires of practice at the class and the individual level. At the same time, teachers develop their understanding of the range of teacher repertoires of practice\(^2\).

One of the practical challenges of using student work noted by Little et al. (2003) is the tendency for teachers to select culminating, ‘show’ pieces. It can be salutary to collect the full set of student work completed by a student across all classes for, say, a four-week period – the author has observed cases where there was little if any artefactual evidence of any worthwhile activity by students and involvement by teachers. Some will say, of course, that the really important learning is necessarily not\(^3\) evidenced by anything anyone can produce – the classroom is a private space.

Such claims are not refuted by dismissing them as defensive ness, an unwillingness to be accountable – there’s a scholarly tradition that the silences, the gaps, the interstices speak louder than the text. To improve student learning, however, the direct and comprehensive evidence of achievement in the point-at-able form in which it appears in student work provides a data source that can be used to generate rich analyses.

**References**


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\(^1\)Strong classifications serve as a constraint on teachers, of course, as well as students.

\(^2\)Including the filters through which they see and understand student responses – there’s a lot of taken-for-granted understanding of what it is to ‘do school’, there can be wide differences between what we say and what students hear.

\(^3\)This is the strong version of this claim – a weaker version is ‘not necessarily’.

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**Using Data to Support Learning**

Using HSC data to give principals leverage

John DeCourcy
St Andrews College, New South Wales

Dr John DeCourcy is College Principal of St Andrews College, a Catholic dual-campus secondary school of 1200 students in Western Sydney. His academic background is in theoretical structural chemistry, educational measurement and developmental psychology. Five years ago, seeking a better way of understanding and using achievement data from his own school, he began the project with the Catholic Education Commission (NSW) providing a multilevel analysis of HSC data described in this paper, and has gone on to provide this analysis to all Catholic secondary schools in the State. John is also currently president of the Australian College of Educators in his part of Sydney.

Without data, I’m just another person with an opinion
(Barry McGaw, ACER Research Conference 2002)

What makes the difference in student achievement? What elements among ‘what makes the difference’ can a school principal influence? How does the principal influence these for the better? How do teachers best take account of the pedagogical information available in data? How can we use the data available to address these questions?

The topic of this conference is ‘Using data to improve student learning’. Data will act to improve student learning broadly across a school only if the data become the principal’s agenda, and the data will become the principal’s agenda only if s/he sees the data as a useful lever to achieve worthwhile outcomes. So the question becomes: ‘How do you get data to a form where it will provide the principal with leverage s/he can use and trust?’ This paper draws on a five-year project involving over 120 secondary schools in New South Wales to outline what has been learned about the most effective ways to engage principals and teachers with a particular set of achievement data. The learnings from this project may well have applicability in other settings.

Principals and teachers can be reluctant to engage with data because their professional intuition leads them to be defensive about data analysis which purports to attribute large differences in achievement to schools or teachers, where the difference actually lies in factors beyond their control (O’Day, 2002). What is needed is a form of analysis that separates out the factors that do lie within the control of teachers, and gives a valid and easily interpreted analysis of these factors.

Visscher and Coe (2002) develop a heuristic for the interpretation of School Performance Feedback Systems (SPFS) which looks at the system in terms of its:

- design process
- features (the validity of the input information, the accessibility of the data, whether the output is standard or tailored to the school, the extent of support for use of the system, etc.)
- implementation process (the use of tailored user training, promotion of user participation, the monitoring of implementation, etc.)
- within-school organisational features (the school’s and teachers’ capacity to deal with innovation, the extent to which the system requires resources, the extent to which new skills must be developed, etc.).

Each of these four aspects of the system bear upon the fifth and critical aspect: the usage of the SPFS (whether it will be for instrumental, conceptual, symbolic, or strategic use). The choice of dominant usage pattern then affects the sixth characteristic of the system, its intended and unintended effects.

There are many examples of SPFS where failure to take adequate notice of the features, implementation, or organisational characteristics of the system leads to utterly inappropriate usage of the system, and undesirable unintended effects (Amrein & Berliner, 2003; Braun and Mislevy, 2005). The intention of the project described in this paper is to produce a usage pattern that is instrumental: the data becomes an instrument in the principal’s and teachers’ hands to monitor and improve pedagogy and students’ performance.

As an instrument, the data is presented in a way that gives the principal
leverage to support and effect innovation that has a positive effect on student achievement.

Context

For each of the last five years, the project has been a cooperative agreement, conducted under the auspices of the Catholic Education Commission (CECNSW) between the (now) 125 Catholic secondary schools of New South Wales to pool the results of their 14,000+ students in the Higher School Certificate (HSC) examinations to enable a multilevel analysis (Goldstein, 1995; Goldstein, Rasbash, Plewis, Draper, Browne, Yang, Woodhouse, & Healy, 1998) to be conducted across both the aggregate results and each of the 80,000+ results in individual subjects. The statistical methodology of the analysis is described in the Appendix to this paper.

The central concept of the project is 'comparative learning gain': what is the comparison in the performance of the students in this subject in this school with that of similar students in other schools, where 'similar' is taken as students of equivalent prior achievement two years earlier in the School Certificate, of the same gender and of the same socioeconomic status (SES). For the teacher in the HSC course, each of prior achievement, gender and SES is a given, each is liable to have a bearing on achievement, and each must be discounted if pedagogical effects are to be inferred.

A second important aspect of the analysis has been the inclusion of confidence intervals (uncertainties) in the graphical presentation of results. An apparent improvement of 2% in average achievement is not significant if the confidence intervals of the measurement are +/- 9%.

The product of the project as supplied to schools is an electronic file, consisting of five parts:

- The Primary Analysis of each subject, showing a comparative learning gain (with confidence intervals) of the mean result achieved in the subject with that achieved by similar students in other schools
- The Secondary Analysis of each subject, showing a comparison of the mean result achieved in this subject with firstly state average and secondly the average obtained in all of their other subjects by the students in this subject
- The Trends Analysis for each subject, showing the three measures from the primary and secondary analyses over the last six years, and showing any second-order effects for each year
- The School Database containing both the input data and the results of the analysis for each student in each subject, along with aggregations at the student, subject and school level. The database in particular allows for further investigation of the student- and class-level information
- The Report (DeCourcy, 2005b) to CECNSW on the performance of Catholic schools generally in the HSC, any issues arising from the analysis and a series of statistical appendices.

The process for delivery of the analysis to schools is centred on supporting the principal in his/her work with staff. Students and schools receive the results of the HSC in mid-December each year; the analysis of these results from the project is available for downloading before the start of the following school year; and the report on the overall HSC is available from June each year. The project is supported by a web site (http://stage.cecnsw.catholic.edu.au/hsc/) which has both a secure section where schools and systems can obtain their own data, and an open section containing the Manual (DeCourcy, 2005a) for the project, and a series of annotated PowerPoint files which can be used by principals and others in professional development activities with staff. Each year, a number of seminars on the use of the analysis are conducted under the auspices of CECNSW for those whose role it is to introduce the analysis to staff.

Initially, most principals met this project with a healthy degree of scepticism and suspicion; over the five years of the project, this has changed for most to insight and enthusiasm as they have seen the connection between the presentation of the data and their knowledge of their schools.

What we’ve learned

We’ve learned (Rowe, 2000, 2001, 2004) that it’s teachers who make the difference; whole-school effects are small compared to the effect of individual teachers. Multilevel analysis with all variables converted to normal-equivalent deviates as described in the appendix partitions the variance sources for student aggregate Tertiary Entrance Score (TES); a similar process can be undertaken for a subject such as Drama.

The contrast between the school effect in these two analyses is not surprising. For a TES, students will have experienced at least five different teachers, and usually...
Putting it simply, the data point to a consistent mix of teaching and pedagogy experienced by students. The point of leverage for principals is to see those subjects and teachers where the comparative learning gain is high and to build on these strengths; similarly, to see those where it is low and target appropriate interventions.

We’ve learned that most practitioners are engaged with the data not through a consideration of the analytic techniques as summarised in the Appendix, but through the use of a valid graphical presentation of the results of that analysis. For each subject in a school, the Primary Analysis is simply presented as a comparison of ‘Achieved’ with ‘Expected’, building on the unpacking of assumptions describing above, showing confidence intervals.

Learning to interpret a graph such as this is the focus of the seminar program and the manual. The diagonal line where achieved equals typical is the line of average comparative learning gain in this subject. The centre of the ellipse is the value that this subject in this school achieves as an average achieved standard score, against the average typical standard score as outlined in equation (13) in the Appendix. The axes of the ellipse are determined by the confidence intervals of the means, derived as outlined in the Appendix. When the ellipse is completely above the diagonal as in this case, the achieved result is above what students of the same prior achievement, gender and SES have achieved elsewhere. When the ellipse intersects the diagonal, it is ‘in the range of expectation’. When it is completely below, it is ‘below expectation’. In the case illustrated above, the principal and the teacher can indeed be confident that ‘we have done well’ even though the results may have been below state average.
We've learned that gender and SES do make a difference in results, but they are not variables which schools can change. The approach therefore has been to account for the variable, discount it (by factoring it into the typical or expected score as shown in equation (13)), and look at the pedagogy.

Gender is related to 10–14% of the variance in TES, favouring girls. The issues relating to appropriately differentiated pedagogy, enabling both boys and girls to engage with the curriculum at their point of need and learning style are considerable. In 2004, 31 subjects showed significant gender effects, with 30 of these favouring females. The size of the significant effects ranged from 2.3% (Mathematics) to 16.7% (Food Technology). The longitudinal data from the project give principals a basis for seeing whether the curriculum and pedagogical interventions they apply are having an effect.

We've learned that SES is related to only a tiny proportion of the variance in aggregate results (as shown in Fig. 1), but it may be a bit larger in some individual subjects. There has been criticism (Marks, Rowe & Beavis, 2003; Rowe, 2004) of some analyses of achievement data which purport to show large SES effects but are in fact statistically invalid. The 2004 analysis in this project shows 1.1% of the TES variance related to variance in the school-level Farish index (Farish, 2004) and 1.9% related to variance in the postcode-average for the individual student (Australian Bureau of Statistics, 2004).

We've learned that the real test of the validity and utility of a data analysis for a principal lies in his/her ability to recognise in the graphical representation of the subject what s/he knows of what has happened within the school. For the first three years of the analysis, there was simply a single-year snapshot of data. When the data was summarised over time in a trends graph, principals began in a large way to engage with the data. Fig. 5 shows on particular school's trend on the primary (comparative learning gain) measure.

When the principal saw this, he immediately identified the reasons for the drop in 2001 from what he knew of what had happened in that subject in the school, and was convinced of the validity of the data analysis process.

We've learned that engagement with data is like peeling the layers of an onion: different audiences begin and end their engagement at different levels of the data. For district, diocesan or system officers, the beginning level of interest is...
whole-state, leading down to system, then to individual schools and often stopping at that level. For a teacher, the initial point of interest is the department within the school, leading down to subject, then to class then to individual student. Teachers do not become engaged if they do not have student-level data, with each student identified by name. Hence the database that is provided as part of the package has the facility for schools to convert student ID numbers to names, and or any user to begin and end their consideration of the data at their points of interest.

We've learned that principals and teachers can be overwhelmed by a large dataset, but that you do need to provide the large dataset to enable each to follow his or her particular point of enquiry or interest. Hence, we have developed ‘roadmaps’ through the analysis package to give at least an initial way of logically engaging with the data. A typical roadmap for a principal takes him/her from the manual (DeCourcy, 2005a), to the trend graph ‘Overall School Result’, to Numeric Report 4, the ‘school summary’ from the database. This summary unpacks the overall school result to see the effect of each different subject, which can then be further investigated from the trends graph in that subject. If the second-order effect in the subject is significant, this is noted on the trends graph and can have (see below) significant utility in developing pedagogy. Roadmaps have been developed for the use of a number of other audiences for the analysis.

We've learned that a school performance feedback system like this has to be responsive to the needs of the users, as strongly stated by Visscher and Coe (2002). Many of the elements of the analysis, including the web site, the available PowerPoint files, the manual and the database have been provided following the expressed needs of those using the analysis.

We've learned that a school performance feedback system like this has to be responsive to the needs of the users, as strongly stated by Visscher and Coe (2002). Many of the elements of the analysis, including the web site, the available PowerPoint files, the manual and the database have been provided following the expressed needs of those using the analysis.

We've learned that once the principal is engaged with the analysis, s/he will begin to use it as a lever to move the pedagogy and curriculum of the school.

The idea of leverage

The analysis gives principals and teachers an external point of reference for discussion about pedagogy and for attempts to improve both pedagogy and thereby student achievement. In Amrein and Berliner’s (2003) terms, we aim for a low-stakes analysis so that teachers engage; if the analysis becomes a high-stakes accountability exercise, then the focus shifts to dealing with the analysis, rather than using the analysis to deal with the pedagogy. There are many methods of engagement between principals and teachers: some are outlined below as the levers a principal might use. The manual (DeCourcy, 2005a) gives more detail on most.

Lever 1 for the principal is to ask for the production of a brief report on each subject, addressing just four questions:

- What have you been doing, and why?
- How is it going?
- How do you know?
- What do you plan to do next?

The third question demands that the teacher engage with the analysis in order to substantiate their answer to the second question. The fourth question becomes the answer, the following year, to the first question. There is not room in this sort of analysis for blame-the-students responses, unless the teacher can...
hypothesise a distinctive characteristic of the particular group of students. If s/he can, then dealing with it becomes the answer to the fourth question.

Lever 2 is the Overall School Result report, which uses the layout of Fig. 5 above to plot over time the aggregate comparative learning gain for all students in the school. The single aim of an increasing comparative learning gain on this is a valid and stringent target for all in the school.

Lever 3 is the School Summary provided as part of the database, which ranks each subject from the highest to the lowest comparative learning gain. There is potential for misuse here if the idea behind confidence limits in measurement is not understood. The fact that the differences between the comparative learning gain in different subjects are small, particularly when compared to the uncertainties is illustrated by the relatively large size of the ellipses in the primary analysis (Fig. 3). Hence the School Summary lists subjects simply with a statement of whether the subject is above, within or below expectation. Its advantage is that one can easily see those subjects which are close to the boundary between these categories.

Lever 4 is to engage with teachers in terms of comparative learning gain. The focus of future planning is always around ways in which the comparative learning gain might be improved, as this is the most reliable way of improving outcomes. For this reason, subject trend graphs such as that shown in Fig. 5 are the focus of attention. The aim is to keep the graph going up. In dealing with these, the most powerful leverage comes from the simple questions. ‘Can you just explain to me why this graph looks like this?’

Lever 5 is to engage teachers with second-order effects in the data. The comparative learning gain shown in Fig. 3 is a representation of the mean learning gain for the whole class, a first-order effect. Equation (3) in the appendix has a second-order statistic $u_{ij}$ which represents the school-level residual of the slope of the line of best fit for each of the individual students within that subject within that school. Obviously, the line of best fit for one school may be parallel to, steeper than, or shallower than the typical line of best fit through the students in all schools. Where it is significantly steeper, the comparative learning gain of the students in the higher end of the distribution has been relatively better; a statistic summarised by a simple ‘$+H$’. Where it is significantly shallower, the comparative learning gain of the students in the lower end of the distribution has been relatively better; ‘$+L$’. For the principal and teachers, these second-order effects are recorded in the School Summary report, the Trends Analysis, and individual subject reports. A subject where the focus is on supporting struggling students and allowing the capable to fend for themselves will be identified by a string of ‘$+L$’ results. A subject where the focus is on the achievement of the best students and the remainder are allowed to find their own level will gain ‘$+H$’ results. For the discussion between principal and teacher, it is a valid aim if you have achieved a ‘$+H$’ one year to strive to keep those gains and attempt a ‘$+L$’ the following year; all the while keeping the first-order effect positive and increasing. Similarly, a ‘$+L$’ one year can lead to an aim for a ‘$+H$’ the following year. The pedagogical direction is towards differentiated instruction.

Lever 6 is in ‘further factor’ analysis. Explanations of why a particular result has been achieved in the primary analysis of comparative learning gain often come back to hypotheses at the individual-student level. For example, prior study of the subject in earlier years, class size, frequency with which some students arrived on the late bus and the differing effectiveness of different teachers in multi-class subjects might be hypothesised. A crude test of any of these can be simply performed, using the data supplied to the school. The database supplied to the school for each student in each subject includes a calculation (using equation (14) from the Appendix) of the Achieved and Typical results for that student in the subject. The mean of each of these gives the coordinates of the centre of the ellipse in the primary analysis. For a categorical hypothesis, such as the students who had previously studied the subject, it is straightforward to gain the means of the sub-groups, and then compare how they plot.

Lever 7 is in monitoring participation in different subjects, particularly in those which are most challenging. There is a temptation for able students experiencing their first taste of really having to struggle with a subject to drop to lower levels of the subject. Marsh (1991), Marsh, Chessor, Craven and Roche (1995), Marsh and Rowe (1996), Marsh, Hau and Craven (2003) and the data from this project show that the key to outstanding results in higher-level subjects lies in the combination of high participation by students, positive challenge from teachers, and appropriate pedagogy. We should be ensuring that more students take on challenging subjects, rather than seeking to advise students out of the subject.
Which lever or combination of levers a principal or teacher chooses to use is dependent on the school and the students. Together, they form a powerful set of tools to address pedagogical change.

Conclusion

The international research and the data from this project show that using data as an accountability mechanism, producing league tables which amplify tiny and statistically non-significant variations between schools into large differences in rank, is not effective in improving student performance. What is effective is valid analysis of data, presenting the results of the analysis in an engaging way, targeting professional development to support use of the analysis and then engaging teachers in professional development to support changes in pedagogy.

It is the teachers who make the difference.

Appendix: statistical methodology for the multilevel analysis

For the total sample, the School Certificate results in English-literacy, Mathematics, Science, Australian Geography and History were converted to standard scores \( x_e \), based on the whole-of-state means and standard deviations in each test.

For each subject \( k \) in the Higher School Certificate, the \( x \) values from two years earlier were obtained for all students taking the subject \( k \). Within the Higher School Certificate, each student is awarded a scaled exam mark and a (school-based) assessment mark that is moderated for each school against the examination mark. The mean of these two marks for each student is his/her ‘HSC mark’ in the subject. HSC marks for each subject were re-scaled to the mean and standard deviation of the \( x \) values, to give \( y_k \) values for each student.

Within each subject \( k \) the values of the mean for each school \( j \) of \( x \) and \( y_k \) were obtained. Since both \( x \) and \( y_k \) lie on the same scale, the comparison of the means \( \bar{y}_k \) and \( \bar{x}_k \) is then a crude comparison of achieved result with what might be expected from students of a similar level of performance two years earlier.

The standard error of the independent variable can be estimated in the usual way as \( \sigma_y \sqrt{\frac{1}{n}} \), where \( n \) is the group size for school \( j \) in subject \( k \). However, Goldstein (1995, p. 3) notes that such a method is likely to underestimate the standard error of the dependent variable, since it assumes a random sampling from the population and in this study we are specifically assessing non-random (school) effects on the groupings of the dependent variable.

To estimate the standard error in the dependent variable and to investigate any gender or SES effects, a model is fitted to the data using MLwiN multilevel modelling software (Goldstein et al., 1998) for each subject. This gives the value of for student \( i \) within school \( j \) studying subject \( k \) as:

\[
y_{jk} = \beta_0 + \beta_1 x_{ij} + \beta_2 g_{ij} + \beta_3 s_{ij} + \beta_4 r_{ijk} + e_{ijk}
\]

where \( g_{ij} \) is the gender of student \( i \) in school \( j \), \( s_{ij} \) is the school-level measure of socioeconomic status (Farish, 2005), and \( r_{ijk} \) is the student-level measure of socioeconomic status, taken as the postcode-average of the fourth SEIFA index (Australian Bureau of Statistics, 2004). In this equation, following Goldstein et al. (1998):

\[
\beta_{0j} = \beta_0 + u_{0j} + e_{0ij}
\]

and

\[
\beta_{1j} = \beta_1 + u_{1ij}
\]

Allowing for variation of \( \beta \), at the second level detects school effects where the extent of the impact of prior performance varies from school to school, and reveals second-order effects as described. Allowing for gender and SES effects detects that part of the variance in the HSC mark which can be attributed directly to gender or SES, and is not part of the school effect.

This allows an estimation of the expected mean result in school \( j \) in subject \( k \) to be given as:

\[
\hat{y}_{jk} = \bar{y}_0 + \bar{y}_1 x_{ij} + \bar{y}_2 g_{ij} + \bar{y}_3 s_{ij} + \bar{y}_4 r_{ijk}
\]

and attributes school effects as being:

\[
\text{SchoolEffect} = u_{0j} + u_{1ij} x_{ij}
\]

There is often more than one class of a given subject in a school. It would be ideal to construct a three-level model for each subject, with students nested within classes within schools. However, the data as supplied do not include class designation, so this is not possible. Lever 6, described above and in the manual (DeCourcy, 2005a), gives a way in which this separation may be achieved by individual schools.

A second analysis is then performed with each set of data, using the separate SC results, giving models structured thus:
\[ y_{jk} = \beta_{0j} + \beta_{1j}x_{Ej} + \beta_{2j}x_{Mj} + \beta_{3j}x_{Gj} + \beta_{4j}x_{Xij} + \beta_{5j}x_{Sij} + \beta_{6j}x_{Hij} + u_{ij} + e_{ij} \]  

where

\[ \beta_{0j} = \beta_0 + u_{0j} + e_{0j} \]  
\[ \beta_{1j} = \beta_1 + u_{1j} \]  
\[ \beta_{2j} = \beta_2 + u_{2j} \]  
\[ \beta_{3j} = \beta_3 + u_{3j} \]  
\[ \beta_{4j} = \beta_4 + u_{4j} \]  
\[ \beta_{5j} = \beta_5 + u_{5j} \]  
\[ \beta_{6j} = \beta_6 + u_{6j} \]  

\[ \hat{y}_{jk} = \hat{\beta}_0 + \hat{\beta}_1x_{Ej} + \hat{\beta}_2x_{Mj} + \hat{\beta}_3x_{Gj} + \hat{\beta}_4x_{Xij} + \hat{\beta}_5x_{Sij} + \hat{\beta}_6x_{Hij} + \hat{\beta}_7j + \hat{\beta}_8s_i + \hat{\beta}_9s_j \]  

\[ \hat{y}_{jk} = \hat{\beta}_0 + \hat{\beta}_1x_{Ej} + \hat{\beta}_2x_{Mj} + \hat{\beta}_3x_{Gj} + \hat{\beta}_4x_{Xij} + \hat{\beta}_5x_{Sij} + \hat{\beta}_6x_{Hij} + \hat{\beta}_7j + \hat{\beta}_8s_i + \hat{\beta}_9s_j \]  

Finally, the process of equations (6) – (13) is repeated with all variables converted to normal equivalent deviates in order to obtain overall relationships between the variances in the dependent and independent variables.

**Derivation of the second-order effect**

In equation (3) above, the residual \( u_{ij} \) is significant in educational terms for schools. If the value is positive and significantly above \( \hat{\beta}_1 \) (MLwiN provides both the value and standard error of the residual) then the school has provided significantly greater learning gain for the higher-achieving end of the student distribution than is found in other schools in this subject. Such a result is depicted with the designation ‘+H’ in the school report of the subject.

If the value is negative and significantly below \( \hat{\beta}_1 \) then the school has provided significantly greater learning gain for the lower-achieving end of the student distribution than is found in other schools in this subject. This is depicted with the designation ‘+L’ in the school report.

In both cases, the effect inferred is relative. A ‘+H’ is necessarily a ‘–L’, and vice versa. Neither a ‘+H’ nor a ‘+L’ an inference of a deficiency in the teaching and learning; it is simply an observation of an effect.

**Conversion to the Tertiary Entrance Score scale**

The process of producing the University Admission Index (‘UAI’, Cooney, 2000) derives a measure of the student’s performance compared with a whole-of-age group cohort. (A index similar to the UAI is produced in each state in Australia, the Equivalent National Tertiary Entrance Rank (ENTER).) In NSW the UAI is produced from a Tertiary Entrance Score (TES). The TES is a mark out of 500, consisting of the aggregate of the best 10 units of the student’s re-scaled scores, including a minimum of 2 units of English. (Most subjects are 2-unit in value, giving a mark out of 100.)

The process compares subject with subject within the HSC using students common to pairs of subjects to derive a mapping of the Board of Studies (BOS) marks to a new ‘UAImark’ for each student in each subject. From these a ‘UAI mean’ for each HSC subject is derived and published (Cooney, 2005). These UAI mean then vary over a wide range, representing the relative performance of the cohort taking the particular subjects. (For example, Mathematics Extension 2 has a UAI mean of approx 44/50; at the other end of the scale, Construction has a mean of approx 16/50.)

Schools in NSW are given no information about individual student’s UAI or TES. However, it is possible to take the individual student marks as provided by the BOS and to map them to gain reasonably accurate TES values using the published data of the Universities Admission Centre (Cooney, 2005). This is done by a simple linear mapping such that a value \( t_s \) is gained as the TES equivalent of the BOS mark \( y_k \) where \( y_k \) lies between the mapping points \( b \) and \( b_y \) where these points map to the UAI/TES scale \( u_c \) and \( u_d \) thus:

\[ t_s = \left( \frac{y_k - b_y}{b_d - b_y} \right) (u_d - u_c) + u_c \]  

**Comparison with State average**

As a part of the feedback to schools, one of the six presentations of the data that is provided is the comparison of school and state mean in the subject. To place the differences between school and state means in all subjects on the same scale, the difference that is reported (\( \Delta_{\text{UAI}} \)) is the difference on the TES one-unit scale.
Comparison between this subject and all others in the school

Comparisons of the different means of subjects within the school carry little information when the subjects are on the BOS scale. Even when the marks are re-scaled as described above to the TES scale, the fact that different subjects attract candidates of varying ability means that little can be gained by direct comparison of means.

However, if one uses the NSW DET method (Smith, 1999) a clear-cut comparison between subjects within the school can be obtained. Because the TES process places all marks on a common scale, the comparison of each student’s mark in a subject $t_k$ with the mean value of that student’s results in each of his/her other subjects $t_m$, gives a measure of the extent to which the individual student’s performance in the subject is ahead of or behind other subjects. The mean of these individual values for all students in the subject $t_{jm}$ then gives a reliable comparison of subjects within the school.

$$t_{jm} = \frac{t_k - t_m}{n}$$  \hspace{1cm} (16)

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An evidence-based approach to teaching and learning

Michele Bruniges
Department of Education and Training, Australian Capital Territory

Michele Bruniges (Dip T., Grad Dip Ed. Studies., M.Ed. Ph.D.) has experience teaching in both primary and secondary schools. She has also held the positions of Senior Curriculum Adviser, Assessment and Reporting, Chief Education Officer; Mathematics and Assistant Director of School Assessment and Reporting for the NSW Department of Education and Training.

During 1999, Michele received an award for excellent service to public education and training in NSW. The following year, Michele was appointed Director of Strategic Information and Planning with responsibility for leading and directing systems performance, information systems and corporate and strategic planning. In the same year, she was awarded a Churchill Fellowship to study the analysis, monitoring and reporting of student achievement in education systems and research studies in the United States and the Netherlands.

Michele was appointed Assistant Director-General, School Education Services NSW in 2003 with a strong interest in educational measurement issues, school culture and the process of managing change. In early 2004, Michele was appointed Regional Director; Western Sydney with priorities including a renewed focus on supporting frontline teachers and school staff and the provision of quality responses to local issues. In January 2005, Michele took up the position of Chief Executive of the ACT Department of Education and Training.

A Greek philosopher might suggest that evidence is what is observed, rational and logical; a Fundamentalist – what you know is true; a Post Modernist – what you experience; a Lawyer – material which tends to prove or disprove the existence of a fact and that is admissible in court; a Clinical Scientist – information obtained from observations and/or experiments; and a teacher – what they see and hear.

The past decade has seen a high level of engagement and commitment by Australian schools to the collection, analysis and interpretation of information about students to inform teaching and learning. Rapid changes in society, economics and technology, the increased demand for accountability, and the need to prepare all students to be citizens in an increasingly globalised world, has cultivated the increased requirement to inform and improve education through various evidence-based approaches.

However, while evidence is one way to support the core business of schools – maximising student learning and outcomes – evidence in and of itself is not sufficient to maximise student outcomes. If we are serious about developing and maintaining an evidence-based culture of improvement in teaching and learning, the unique and specialised knowledge, skills, experience and professional capacity of teachers must be valued as fundamental components of any evidence process. That is, the way in which evidence is obtained, collated, interpreted and results strategically utilised, must be interlinked with, and influenced by, the profession.

What is evidence?

Evidence is obtained through various forms of assessment – which may include teacher observation, tests, peer assessment and practical performance – and constitutes the information and data that is used to gauge the educational attainment and progress of individuals; groups; and cohorts; and increasingly, the effectiveness of programs and performance of educational systems.

Information and assessment data are increasingly used for multiple purposes, including national and international comparisons of standards of learning and educational attainment (Timmins, 2004). Increased pressures at a local level to meet accountability requirements, and to deliver improved results across the cohort have ‘put data to an increasing array of use’ (Timmins, 2004, p. 2) in schools.

Why is an evidenced-based approach to teaching and learning important?

As realised by many educationalists, an evidence-based approach to teaching and learning is crucial to maximising student outcomes. We need to ‘know’ – to have evidence about the performance of our students in order to support them to achieve high quality educational outcomes.

There are four major ways in which we can use the information we gain from assessment (our evidence) to maximise student learning and outcomes. These include using evidence to:

- improve the focus of our teaching (a diagnostic capacity)
- focus students’ attention on their strengths and weaknesses (a motivation capacity)
- improve programming and planning (a means of program assessment)
• report on an assessment (a means of communicating student achievement)

In order to most effectively support students to achieve quality educational outcomes, the process of evidence to inform teaching and learning must be an explicit and accountable one, which is equitable, representative, valid, and reliable.

**Sharing the secret**

The increased use of information and assessment data to inform teaching and learning brings a largely recognised increased need for assessment that is an open and accountable process about what really matters; what students should know, and a process that provides the best information to them on how they can improve.

Assessment should not be a covert mission, but rather a process defined by the importance of transparency and information sharing which is directed by positioning the needs of students as paramount. Providing students with minimal and nondescript information about assessment is an antiquated approach, which has the potential to disengage students from an important aspect of their learning experience and limit their capacity for achievement. Being open with students about the once held secrets of assessment, and engaging students in associated questioning and conversation, provides a greater opportunity for all students to achieve high quality educational outcomes.

The development of assessment that makes explicit the standards, criteria and feedback for students has been recognised as a significant development in describing and quantifying student achievement and progress. The adoption of criterion-referenced reporting (in favour of, or in collaboration with, the more traditional norm-referenced assessment) by Australian education systems as the primary means to describe students’ achievements and progress has enabled the use of data to identify particular strengths or weaknesses in curriculum terms at the classroom, school and system levels. One example of this has been the development of assessment rubrics. Rubrics have been powerful in supporting student learning in their simplistic form by providing a list of criteria, or ‘what counts’ in a project or assignment; and in providing a scale describing the characteristics of a range of student work. This tool creates the structure for important conversations about assessment by providing students with informative feedback about their work and detailed evaluations of final products (Department of Education Tasmania).

Criterion-referenced assessment sheds light on many of the previously protected secrets of assessment. In the past, the details of assessment have usually remained teacher-only information. However; increasingly so, teachers and students are engaging in conversations about assessment that involves a common language. These conversations are crucial to provide the learner with an opportunity and impetus to discuss how goals are set, how performance is measured, and how performance can be improved. Significantly, they enable the learner to experience an active role in the assessment process. They also provide important feedback for teachers that can be used to respond to students’ particular needs.

Advances in educational measurement have paved the way for the introduction of progress maps or achievement scales that articulate a continuum of typical development in a specified domain. Once defined, these maps can be used to describe quality student achievement at both a point in time and over time. This development has also provided the means to establish where individual students are in a continuum of learning the essential starting point from which to develop a relevant and appropriate learning pathway.

**Quality teachers make the difference**

We know that quality teachers make a significant difference to the learning outcomes of students. John Hattie’s (2003) recent rigorous and exhaustive research has provided profound and powerful evidence to support this conviction – ‘excellence in teaching is the single most powerful influence on achievement. The design, collection and response to findings are intimately linked to the art of effective teaching and will impact significantly on student educational achievement.’

In many disciplines, field professionals are predominantly identified as having the most astute and profound knowledge, skills, experience and professional capacity to make judgements about the most effective way to obtain, collate, interpret and apply evidence. Professional educators have a unique and specialised capacity to lead and contribute to evidence-based approaches to teaching and learning – because, it is they who know best, the ‘subject’ matter and the individual. Teachers are distinguished from other professions by their deep knowledge of how the learning process occurs. This places teachers in an inimitable position to utilise a range of
profession-specific, as well as locally specific, skills, knowledge and experiences, to improve the educational outcomes of their students.

While it is necessary to value, or at least consider, all sources of evidence, we must not hesitate to recognise that teachers are often in a leading position to identify and act on the best way in which to obtain and assess the worthiness and weight of the diverse range of evidence collected about students. Just as the judgement and authority of a doctor is respected in the assessment he/she makes of a patient, and the medication he/she prescribes to achieve an outcome of health and well-being, so too should the professional expertise of teachers be valued and trusted, in the quest for high-quality educational results.

Teachers are in a unique position to have an extensive and well-developed range of strategies and techniques that can be used to identify and meet the current needs of a diverse range of students – and, moreover, to match the future desired achievements of the students to a plan for action. No, teachers cannot necessarily predict the future! However, they do have a rich capacity to accumulate a broad-ranging repertoire of strategies that enable them to match a strategy to a student’s needs. With this knowledge base, teachers are able to make informed judgements about how best to work towards further developing students, selecting assessment strategies that accurately reflect what it is that our students know; use evidence to support students for further achievement; and prepare students to be active and contributing citizens, now and into the future.

Furthermore, teachers are in a distinctive position to be able to interrogate evidence. The value of evidence does not necessarily lie solely in the description that it provides of student achievement – but rather, the way in which this description is interrogated and understood in order to develop and apply appropriate strategies to improve student learning. It is fair to say that traditionally the role of the teacher in this process has been undervalued. However, if evidence is to be used most effectively, the capacity of the teacher to ask the right questions of evidence, to examine the how and why of evidentiary results, and to respond with the most effective strategies, must be realised as paramount.

While it is critical to realise and support the role of teachers in leading and contributing to evidence-based approaches to teaching and learning, it is also important to consider that teachers have a responsibility to the profession, as well as a broader social responsibility, to account for decisions that are made. In times of increased change, it is necessary that the teaching profession builds strong links with research communities in order to understand the most current developments about learning and development to enhance and sharpen their knowledge. For, if we are to support the notion that the creativity, ingenuity and expertise of teachers be valued and prioritised, the thinking and instruction of teachers must be relevant, perceptive, dynamic and forward looking.

Alan Luke (1999) argues that effective education requires alignment of the three key message systems that exist in education: curriculum, pedagogy and assessment. Luke’s argument is a powerful one, and teachers, enabled by professional autonomy and collaboration, are in a powerful position to direct and sustain this alignment, in order to provide effective education.

In identifying the variables that impact on student learning, Hattie (2003) confirms that within schools, teachers account for about 30% of the variance in student achievements – the major source of ‘within-school’ variance. There is also a ‘growing body of evidence that the use of high-quality, targeted assessment data, in the hands of school staff trained to use it effectively, can improve instruction’ (Protheroe, 2003) and consequently, student outcomes.

Furthermore, Nancy Protheroe suggests that educators who have learned to effectively use assessment data have often ignited change and achieved positive results. This evidence provides a compelling argument of the importance of continuing development of the teaching profession, and that in particular, teachers are supported to play a leading role in evidence-based approaches to teaching and learning. This includes supporting teachers to see and learn from each other’s work and experiences, in order to expand the circle of professional collaboration directed towards student achievement, and developing ways to ensure that the best teachers are retained in the area of greatest impact – the classroom.

**Conclusion**

It is the ‘evidence’ that we are presented with that often informs decisions that are made about student learning and about the health of education. However, evidence alone is not sufficient to maximise student outcomes. Quality teachers are a fundamental part of the recipe for successful evidence-based approaches to teaching and learning. The knowledge, skills, experience and
professional capacity of teachers must be valued as essential ingredients in meeting the goals of the core business of education systems and ensuring that educational attainment across the nation continues to rise.

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Assessment for learning: Using Statewide Literacy & Numeracy tests as diagnostic tools

Assessment of, assessment as, and assessment for learning

The Victorian Government’s Blueprint for Government Schools (Department of Education and Training, 2004a) promised the development of guidelines ‘to assist government schools with school-based decision-making in areas of curriculum development, pedagogy, assessment and reporting’. Subsequent draft assessment advice (Department of Education and Training, 2004b) suggests that assessment for improved student learning and deep understanding requires the range of assessment practices to be used including:

- **Assessment for learning** [which] is undertaken to ascertain students’ prior knowledge, perceptions and misconceptions and to monitor student learning progress … [and] to inform teaching practice and curriculum planning in order to support students’ future learning and understanding. (formative assessment)

- **Assessment as learning** [which] focuses on constructive feedback from the teacher and on developing the student’s capacity to self assess and reflect on their learning – to improve their future learning and understanding. (ongoing assessment)

- **Assessment of learning** [which] makes judgements about what the student has learned in relation to the teaching and learning goals. … [and] should be comprehensive and reflect the learning growth over the period assessed. … (summative assessment)

Assessment for, assessment as, and assessment of learning are certainly not new concepts. For example, Black and Wiliam (1998a, 1998b, 1998c) make little distinction between assessment ‘for’ and ‘as’ learning grouping both under the one title of ‘formative assessment’. They do, however, make a distinction between this formative assessment and summative assessment.

Black and Wiliam (1998c) argue that raising the standards of learning has become an international priority but governments throughout the world have put most of their efforts into summative assessment type initiatives such as ‘National, State, and district standards; target setting enhanced programs for the external testing of students’ performance; surveys such as NAEP (National Assessment of Educational Progress) and TIMSS (Third International Mathematics and Science Study); initiatives to improve school planning and management; and more frequent and thorough inspection’.

However, Black and Wiliam (1998b, 1998c) argue that the impact of all these reforms have amounted to little. They, and others, argue that there is now compelling evidence to show that ‘the important message now confronting the educational community is that assessment, which is explicitly designed to promote learning [formative assessment] is the single most powerful tool we have for both raising standards and empowering lifelong learners’ (Assessment Reform Group, 1999).

The pattern of assessment efforts in Australia certainly mimics that of many other countries such as the United Kingdom and the United States in that each State Government conducts its own version of Literacy and Numeracy summative testing at Years 3, 5 and 7 (and will be extended to Year 9 by 2007) and the expenditure on these policy initiatives greatly overshadows any policy initiatives that promote formative assessment. Reporting of these data is dominated by summative...
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type reports and accountability units
around the country look at these data
in terms of what they say about overall
school performance.

Using Statewide
Literacy & Numeracy
tests as diagnostic tools

Despite this apparent incongruence
between what the research suggests
will have the greatest impact on raising
the standards of learning (formative
assessment) and the actual practice that
most jurisdictions around the world
have implemented (summative
assessment), it is too often overlooked
that summative type tests actually
contain valuable formative (or
diagnostic) information.

For example, in Australia, because each
State bases its tests on its version of
the national curriculum profiles and
because each item on the tests reflects
one or more outcomes from the State’s
curriculum standards, responses to each
item reflect students’ knowledge,
perceptions and misconceptions with
respect to the standard being tested.

Let us look at two items from Victoria’s
English and Mathematics tests to
demonstrate the use of Statewide
Literacy & Numeracy tests as
diagnostic tools.

Look at Table 1. It shows for each student
at the school the response to each item.
If a student answered the item correctly, a
‘tick’ is entered in the body of the table; if
a student answered the item incorrectly,
the incorrect response is entered into the
table. Look at the highlighted item No. 6.
The answer key shows that the correct
answer is option ‘d’ and that the first
three students (David Billsdon, Stephane
Byrne and Anne Conlan) answered this
item correctly. The fourth student
(Rhonda Connor), however, gave the
incorrect response ‘c’. Summary data near
the bottom of the report shows that
thirteen of the twenty-one students (or
62% of the group) answered this
question correctly. Furthermore, the
summary data shows that across the
whole State, 59% of students answered
this item correctly. In other words,
although less than two-thirds of the
students in this group answered the item
correctly, this percentage was very similar
to the percentage of students in the
whole State.

More interesting, however, is to note that
of those students in this group who
answered the item incorrectly, all of
them gave the same incorrect answer ‘c’.
(This can be seen by either running your
eye down the column for item No. 6 or
by computing a tally for each response
as has been done in the last four lines of
the table.) By reviewing the item,
teachers at this school can gain some
very interesting diagnostic information
about this group of students.

Table 1 Student response report for Year 3 Reading
The letter from Paul clearly says ‘Please don’t give me any more homework’. Any student who gave the answer ‘a’ can’t even read for literal interpretations from this text. Most students would probably first approach answering this question by looking at each letter and trying to find a one-to-one match between the question and the text. For most students, matching up ‘Which student wants to some extra work’ with ‘Please don’t give me any more homework’ is a simple task and option ‘a’ would be eliminated easily. Although no one in this school gave ‘a’ as the answer, there were many in the State that did indicating a low level of literal reading skills amongst such students.

The letter from Alice says ‘Please don’t give us any more projects to do’. Matching up ‘Which student wants to some extra work’ with ‘Please don’t give us any more projects to do’ is a slightly harder task because it requires students to have a higher level of vocabulary understanding to be able to equate extra work and more projects. Again, although no one in this school gave ‘b’ as the answer, there were many in the State that did indicating a low level of literal reading skills amongst such students. It should be noted, however, that these students may be reading at a higher level than those students who answered ‘a’ – their problem may be more to do with a limited vocabulary.

The letter from Vlad says ‘Thank you for all the homework you give us’ but makes no mention of whether or not he would like to do some extra work. The letter from Rosa says, ‘I am glad that you don’t give us homework on the weekends’ but does ask, ‘Please can I do a project on the solar system to share with our class?’. Students who answered either ‘c’ or ‘d’ can probably
comprehend the literal interpretation of option 'a' or 'b' and have eliminated them as possible correct answers. This places these students at a higher reading level than those who gave answer 'a' or 'b'. What separates students who gave the correct answer 'd' from those who answered 'c' is the level of inference these students are able to make from the text. Those who answered 'c' are incorrectly making the inference that liking homework ("Thank you for all the homework you give us") with wanting to do even more of it. On the other hand, those who answered 'd' have been able to infer correctly that wanting to do a "project on the solar system" means that Rosa wants to "do some extra work" even with the distracter statement from Rosa that she was 'glad that you don’t give us homework on the weekends'.

The diagnostic information from this item gives the teachers at this school some powerful information. If supported by information from similar items, it would be possible for the teachers to conclude that reading the literal meaning of text is probably a skill already mastered by all students in Year 3 at this school. Therefore, it would probably be a waste of time devoting too many learning and teaching opportunities to this skill. On the other hand, although about two-thirds of students can make correct inferences from text, making inferences from text has not been mastered by all Year 3 students at this school and additional learning and teaching opportunities in this area are warranted.

Table 2 gives a Numeracy example. Again, it shows for each student at the school the response to each item. Look at the highlighted item No. 17. The answer key shows that the correct answer is option 'b'. The summary data near the bottom of the report shows that seven of the eighteen students (or 39% of the group) answered this question correctly. Furthermore, the summary data shows that across the whole State, only 47% of students answered this item correctly. Although less than half the students in the State answered the item correctly, even fewer students in the school answered this item correctly.

More interesting, however, is to note that of those students in this group who answered the item incorrectly, most of them (another 39%) gave the same incorrect answer 'd'. (Again, this can be seen by either running your eye down the column for item No. 17 or by computing a tally for each response as has been done in the last four lines of the table.) Again, by reviewing the item, teachers at this school can gain some very interesting diagnostic information about this group of students.

Table 2  Student response report for Year 3 Mathematics
To answer this question, students need to employ at least two different skills. First, they must be able to match numbers written in word format with the equivalent number written in numerical format. That is, fifteen hundred means 15 lots of 100. Second, they need to have some understanding of place value. That is, 1500 signifies one lot of a thousand (which indicates 10 lots of 100) plus 5 lots of 100 (i.e., 15 lots of 100).

In this school, about 6% of the Year 3 students gave the incorrect answer ‘a’ (150) as their answer. These students show no understanding of either concept. No one gave answer ‘c’ indicating that the ‘15’ in 10,015 fooled no one. However, 39% of the Year 3 students in this school chose the incorrect answer ‘d’ (15,100), suggesting that while these students may be able to match numbers written in word format (“fifteen hundred”) with an equivalent number that somewhat resembles its numerical format (15 100), they do not fully understand the concept of place value. That is, they have incorrectly read ‘15 100’ as meaning 15 lots of 100.

Again, the diagnostic information from this item gives the teachers at this school some powerful information. If supported by information from similar items, it would be possible for these teachers to conclude that place value is a concept not understood well by many students. Therefore, additional learning and teaching opportunities in this area are warranted.

Furthermore, some students, but not many, also have a problem matching numbers written in word format with the equivalent number written in numerical format. These students need to be identified and supported.

Interestingly, this item also appeared on the Year 5 Numeracy test as a link item. At Year 5, 82% of all students in the State answered this item correctly and almost the same number of students in the school answered correctly. However, of the remaining students answering incorrectly, by far the greatest number gave ‘d’ as their answer; indicating that there are still a few students in Year 5 who do not fully understand the concept of place value.

Summary

Assessment of learning dominates assessment efforts around the world, and systems, whether intentionally or unintentionally, typically portray such programs as the best means of raising the standards of learning. At the classroom level, such programs are rarely appreciated and most teachers have little faith in either the reliability or validity of such State-mandated tests. While it is clear that school administrators take the results of such programs very seriously, few classroom teachers give any more than cursory attention to the results for their own class. This is a shame for a number of reasons. First and foremost amongst these reasons is that item-level results from the tests actually contain valuable formative information that could inform teaching practice and curriculum planning in order to support students’ future learning and understanding.

Research suggests that much could be gained (in terms of raising the standards of learning) by supporting classroom teachers to make better use of formative assessment. One place to start should be to support teachers in using Statewide Literacy & Numeracy tests as diagnostic tools.

References


1 A link item is an item placed on two different Year level tests to aide in the establishment of a common performance scale across the different Year levels.
Data-informed research and practice: Evaluating student achievement in secondary schools

Abstract
The advantage of ‘ability-adjusted’ analyses of educational data is their capacity to provide fairer assessments of school and student achievement than reliance on raw scores alone. School performance evaluations based on students’ unadjusted (raw) marks favour schools with higher intakes of bright and advantaged students. The learning gains of middle and lower ability students are overlooked, and the achievements of students and schools in disadvantaged areas are not valued, while the focus is concentrated on those achieving the highest marks. With ‘ability-adjusted’ analyses of school data, any student who achieves higher marks than similar ability peers is acknowledged as having performed well. This paper describes findings from a series of ‘ability-adjusted’ analyses conducted within individual schools, where students’ Victorian Certificate of Education (VCE) results were analysed at student and class levels. Staff members were assisted with verification and interpretation of their data to ensure positive use within their school. This research led to a number of practitioners seeking ‘ability-adjusted’ analyses of their junior and/or middle-secondary students’ achievements, as they recognised the benefits of this data-informed approach. The impact in terms of improving teaching and learning, and the on-going challenges inherent in designing each school’s database, aligned with curriculum and assessment policy, are discussed.

Background and context
Data-driven quality assurance is a popular term used by system bureaucrats and researchers far removed from the heart of education – students and teachers in schools – whereas data-informed evaluation of student achievement and school performance is the term preferred by practitioners. This is not a pedantic wordplay – it highlights a key difference in the attitudes and practices of system personnel compared with those of school staff. At system-level, the focus is on a top-down, reform-driven judgement of schools in terms of their students’ achievements, with teachers typically assumed responsible when underperformance is identified. For school staff, the emphasis is on integrating their external and internal quantitative results with their qualitative data, to more comprehensively inform their monitoring of student achievement and their school’s performance.

But what processes are required to ensure that both educational systems and schools accurately and fairly assess student and school achievement? Simplistic rankings place schools and classes with large numbers of bright students as the top performers, while real achievements in schools and classes with more disadvantaged and lower ability students are ignored. Clearly, as far as possible, all variables that affect student learning ought be taken into account, if genuine ‘value-added’ educational performance is to be recognised. Research in the School Effectiveness and School Improvement (SE&SI) tradition has consistently identified individual student ability and prior attainment as key factors associated with student achievement; and socioeconomic status is the most

Teachers need ability and prior attainment data on each student at the start of the year to monitor student progress effectively, and to provide parents with valid reports on their child’s learning gains each semester. Schools are hampered from achieving these goals for many reasons, one being the negative attitude towards ability measures held by some educators; due in part, to the misuse of ‘intelligence’ tests throughout the last century. The major reason, however, is the lack of an ability measure, and system level failure to supply schools with developmentally appropriate attainment measures, scored on a common metric, longitudinal scale. Currently, school reports do not provide the next year’s teacher with indicators of the standard that students have achieved in terms of clearly delineated skills and knowledge within each subject; nor do they give parents indicators of their child’s achievement in relation to his or her potential. There are divergent views in the educational community about the merits and demerits of schools’ reports that indicate student ability and achievement in relation to school-aged peers. This paper discusses one approach where ability and achievement data were analysed, electronically displayed and comprehensively interpreted to assist school staff in monitoring student and school performance. This work was built on ‘value-added’ analyses from two large-scale research projects, which involved multi-level modelling of VCE results over the past ten years. Key findings included:

- The value of an ability measure, appropriately verified and comprehensively interpreted, for more accurate evaluation of school and student performance.
- The evidence regarding the real gender effect, illustrating the error in the general statement that ‘boys are underperforming in relation to girls’, based on overall patterns in aggregated data.
- The dangers associated with referring to class-level variance, that is, the class residual, as the class/teacher effect, or even more misleading, as the teacher effect.
- The need for each school to develop a ‘within-school’ database to enable ‘ability-adjusted’ monitoring of student and school performance.
- The need for better resourcing to ensure instructional effectiveness within schools, and greater focus on monitoring system-level effectiveness.

The research background 1. ‘Across-schools analyses’

For the seven years, 1994 to 2000, ability and attainment data for all VCE students in every government, Catholic and Independent school, were analysed at student and school levels, in a series of variance components models for each of the 20 largest VCE Studies. The measure of ability for this ‘across-schools’ research was the General Achievement Test (GAT), based on general knowledge and skills in three domains: Written Communication (GAT w); Mathematics, Science and Technology (GAT m); and Humanities, the Arts and Social Sciences (GAT h). Each year, students are informed that they do not have to do any special preparation for the GAT, as the basic writing and reasoning skills being assessed have been developed in their earlier years of schooling, although they are advised to look at sample questions and past papers. The GAT is a component of the statistical moderation process used by the Victorian Curriculum and Assessment Authority (VCAA) in their monitoring of the school assessed work and examinations used to calculate the student’s VCAA Study Score, which was the achievement measure for this research.

The methodology and modelling followed the process initiated by Hill & Turner in 1995 for 10 schools in the pilot version, and further developed by Rowe in 1998 for 50 schools in the trial VCE Data Project (Rowe, 1999). Effect sizes were calculated for the five explanatory variables – three student ability measures, school mean ability in each Study, and student gender, used to generate each student’s expected VCE results. School residuals, representing the difference between the predicted and achieved VCE scores, were plotted for the 20 subjects each year. Consistency in the school’s performance across the 20 Studies each year, and stability in each subject over time, were noted (Richardson, 2000a). The school residuals at this time were interpreted as indicators of the school’s ‘ability-adjusted’ position amongst VCE providers across the State (Rowe, 1999).

Several concerns surfaced when these ‘ability-adjusted’ results were shared with schools. Practitioner-informed explanations for the patterns in their school’s subject residuals were not congruent with interpretations typically made by system-level bureaucrats and academic researchers, who rely too often on statistical analyses alone, and frequently ‘got it wrong’ (Richardson, 2001). In Victoria’s League Tables,

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published from 1996 to 2000, there were blatant examples of schools being incorrectly highlighted by the media as ‘top performers’ or unfairly labelled as ‘failing schools’ based on system level data analyses with ability ‘supposedly’ taken into account. Detailed examination of these data revealed the problems with such gross school rankings, when, regardless of the standard achieved, half the schools in the State had to be below the median, by definition; and one school has to be ‘bottom of the ladder’ each year. This ‘so-called’ accountability rating rarely affected elite schools in wealthy suburbs, and impacted most negatively on schools in poorer areas (Richardson, 2002).

The key difference between the system-level VCE data provision to schools since 1994 and this in-depth research project was the latter’s inclusion of qualitative research undertaken with schools (Richardson, 2000b). Staff feedback and suggestions were integrated into subsequent data analyses each year; and macros and a software package were developed to display the data so as to facilitate data display and interpretation. The more informative, visual presentation of both raw and ability-adjusted data in this project was preferred by school staff to the residual plots provided at system level, because teachers could verify the raw data, and explain some of the patterns in the analysed results. In response to the positive feedback from schools, this doctoral research developed into an independent Data Interpretation Service, now operated by ACER.

The research background 2

‘Within-school analyses’

The comprehensive verification of the data and review of the multi-level analyses indicated that in-depth, ‘within-school’ analyses had to precede ‘across-schools’ analyses, to ensure fair evaluation of school performance. In 2001, the ‘within-school’ analyses were developed and trialled. Over the next three years, 16 schools (2002 VCE data), 90 schools (2003 VCE data), and 105 schools (2004 VCE data) voluntarily participated in this research, that is, they effectively funded it.

One of the problems highlighted in the ‘across-schools’ research involved the use of the VCAA Study Score as the achievement mark, since it is the student’s rank, relative to all other VCE students within each Study. However, this rank is unsuitable for comparisons across an individual student’s VCE Studies, and when comparing class and subject achievement within schools. In recognition of this, the Victorian Tertiary Admissions Centre (VTAC) transforms VCE Study Score ranks to marks for calculation of students’ ENTER (Equivalent National Tertiary Entrance Rank). As students and schools in Victoria are not given students’ final VCE marks, only their Study Score ranks, the Scaling Guide that VTAC publishes to schools each year was used to calculate the student’s VCE marks for this research. The difference between VCAA Study Scores (marks) and VTAC Scaled Scores (ranks) is illustrated and discussed further in the section on class level analyses below.

The second problem identified in the initial research was that year level was a key variable predicting student performance in some Studies, and differentially so in some schools. This factor needed to be included in the modelling. Students typically complete VCE Units 1 and 2 in Year 11, and VCE Units 3 and 4 in Year 12, although some students study one or more VCE Units 3 and 4 in Year 11.

For the two-level (students in classes) variance components modelling for the ‘within-schools’ analyses, the six explanatory variables used to predict the student’s VCE marks were:

- Three student ability (GAT) measures: Written Communication (GAT c), Mathematics/Science/Technology (GAT m) and Arts/Humanities/Social Sciences (GAT h)
- Class mean ability (the mean ability for all students, with student ability calculated as the average (AvGAT), of the three GATs)
- Gender (males = 0, females = 1)
- Year level (Year 12 students = 0, Year 11 students = 1)

Effect sizes, and proportion of variance at student and class levels, were calculated for each school, which included government, Catholic, and Independent schools, small and large schools, single-sex and co-educational schools, and urban, regional, and rural schools. Both student and class residual scores were examined for both typical and atypical patterns, where the residual was the difference between the predicted mark, based on student ability (3 GATs), gender, year level, and class mean ability (AvGAT), and the achieved VCE mark. Raw and ability-adjusted VCE results were summarised in graphs and tables, and provided to each school on a CD. To ensure that the analyses and the interpretations were statistically sound and educationally meaningful, the researcher and practitioners discussed and debated the results in a professional learning seminar. This allowed for the rich contextual knowledge available within the school to be taken into account in evaluating student, class and school performance.
Broad consistency in effect sizes and school patterns were found for the 2002-2004 ‘within-schools’ research and the 1994-2000 ‘across-schools’ population-level research, especially in terms of the average magnitude of variance explained—between 5-15% at the second level (classes for the ‘within-schools’ research; and schools for the ‘across-schools’ research). It is not possible in this paper to discuss all results of these two large-scale projects, however different aspects of the research have been presented in greater detail at seminars and national and international Conferences (Hong Kong, 2000a; Melbourne, 2000; Denmark, 2001; Sydney, 2003; Melbourne, 2003; Sydney, 2004). A series of seminars will be held after the Conference, where more in-depth displays and explanations of the research findings will be presented.

Student ability patterns

Some patterns from one school are outlined below to enable indicative patterns, and the depth of these ‘within-school’ analyses and data interpretations, to be examined. In all graphs, whether at student, class or school levels, individual student ability (AvGAT) was plotted on the X-axis, and achievement (VTAC mark) on the Y-axis. Drop-down menus beside each graph enabled results for particular students, classes or subjects to be highlighted as white circles, against the background of dark diamonds displaying the school’s VCE results for the year. For example, in Figure 1, the diamonds pinpoint the ability and achievement scores for every student completing their VCE in this school in 2004. The white intersecting lines on the graph indicate State means (AvGAT = 20, VTAC Study mark = 30), and the diagonal line crossing the diamonds is the school’s regression line. No student or class has been selected here (the blank space in the legend beside the white circle in the graph’s title).

Noteworthy features are the general pattern of achievement increasing with student ability (higher GAT scores associated with higher VTAC marks, \( r = 0.6435 \)); and the variation between students at each ability point. For example, around the State mean ability level (AvGAT \( \approx \) 20), the range for individual students in this school in 2004 varied from 13 to 43 VTAC marks.

This was the typical range across VCE ability and achievement data both within schools and across schools, except for schools with fee-paying overseas students, where a distinctly different pattern was evident. Further examination of these schools led to the understanding that two separate analyses were needed for such schools, to avoid the distortion that results when ability-adjusted data for overseas students are included in the VCE data analyses.

Figure 1 demonstrates that while ability plays a large part in students’ final academic achievement, the range in marks at every level of ability is considerable, thus ability alone does not determine final achievement. The multi-level modelling revealed that in this school in 2004, individual student ability as measured by performance on the three GATs accounted for 41% of the variation in student marks. Class mean ability, gender and year level explained around 3% of student differences in VCE achievement. Thus, a total of 44% of the variation in student’s scores was explained by the six factors modelled, with differences between classes accounting for 9% of the variance. The remaining 47% of unexplained variance in VCE results in this school was associated with factors not measured in these analyses. This unaccounted-for variation was what the discussions with staff in each school were intended to uncover, and were usually attributed to student effort, motivation and aspirations, teacher skill, school and home resources.

Figure 1 Scatterplot of Students’ Mean GAT Score (Ability), Plotted against Students’VTAC Marks (Achievement).
From this graph of overall school VCE achievement (Figure 1), individual students could be identified using a 'Who is ...?' button. This allowed obvious outliers in the data to be immediately identified, and their ability and achievement data further examined by reference to the tables and graph on the Student page (see Figure 8 below) of the CD. In addition, displays of school gender and year level patterns selected from the following eight options: Year 11 students, Year 12 students, males, females, Year 11 males, Year 11 females, Year 12 males, Year 12 females, could be highlighted on the Figure 1 graph.

**Gender and year level patterns**

Similar patterns were evident in terms of the range for both ability and achievement data when gender and year level were examined in the 'within-school' analyses. The effect size for gender in the variance components modelling for this school’s VCE 2004 scores was 1.2 and the effect size for year level was 1.7. That is, girls averaged just over one mark higher than boys (Figure 2), and Year 11 VCE students averaged almost two marks more than Year 12 VCE students (Figure 3). In these two graphs, the dashed line represents the school mean performance for boys (Figure 2), and the school mean achievement for Year 11 students (Figure 3).

At each ability level (Figure 2), there are boys achieving VCE marks higher (white circles above the regression line) and lower (white circles below the regression line) than the school's average across all Studies. This graph indicates how misleading the gross statement that 'girls are outperforming boys' is, given the range in marks for boys at each level of ability. The typical pattern was that bright boys achieved as well, if not better than bright girls, but more lower-ability boys performed worse than lower-ability girls. The mean gender effect at class and school levels, in both the 'within-schools' and 'across-schools' research, was due to the poor results of some of the lower ability boys, not because all boys are performing worse than all girls.

The educationally more informative questions in terms of gender ought be: 'Which boys are performing better than similar ability boys within the school?' and 'What factors are influencing some low ability boys to perform well, while other low ability boys do poorly?' These two questions can be re-worded for girls, as the same situation applies – at every ability level, there are groups of girls achieving both above and below their predicted score. The relevant focus for teachers and schools is 'which boys' and 'which girls' were under-performing, when evaluating under-performance.

This research has more potential than the Federal government's response to the 'boys' under-performance' problem than male-only scholarships, as it enables positive examples of low ability boys (and girls) who are performing well to be identified, and the factors that contributed to their success can be evaluated and shared with all schools.

The same questions can be asked regarding year level and other variables known to affect student achievement: for example, 'Which Year 11 students, highlighted as white circles in Figure 3, performed better (or worse) than similar ability peers?' Careful examination of this graph, and
discussions with students and teachers to accurately discern the reasons associated with each student’s performance, enabled positive action to be taken where deemed necessary, for these students are the school’s current Year 12’s.

Class-level analyses

When class-level data were first examined in 2001, the need for the ‘ability-adjusted’ analyses to be conducted on the student’s mark (VTAC Scaled Score), not the relative State rank (VCAA Study Score) within each Study, became evident. The following two graphs illustrate this at class level, where its effect is strongest; and were prepared to assist teachers to understand the difference between the VCAA Study Score and the VTAC Scaled Score. This pattern occurred also at individual student level, although to a variable degree, as students’ marks are differentially affected by the impact of VTAC’s scaling of Studies. In Figure 4, class mean GAT scores are plotted against class mean VCAA Study Scores; and in Figure 5, class mean GAT scores are plotted against class mean VTAC Scaled Scores, for the selected school.

The pattern in the data in Figure 4 is of concern, with some low ability classes achieving higher class mean VCAA scores than some high ability classes in this school in 2004. The correlation between these two class level variables was zero, indicating no discernible relationship between class average GAT scores and class average VCAA Study Scores (ranks).

However, in Figure 5, when VCE marks (class mean VTAC Scaled Scores) were plotted against ability (class average GAT scores), the expected pattern for educational data was found \( (r = 0.660) \), with higher ability classes generally achieving higher marks than lower ability classes. In Figure 5, classes (diamonds) above the regression line are interpreted as performing better than expected within this school, while those below the line are not performing as well as predicted, based on the variables adjusted for in the modelling, and on the overall pattern in the school’s data. A range of performance is evident at each ability level. Clearly, there are factors other than ability which influence class achievement, and hence the results for all students in each class were examined, along with the patterns within and across teachers for all VCE classes in the school.

Class and teacher patterns

The following two class graphs (Figures 6 & 7) provide examples of VCE results for two English classes (A and B), taught by the same teacher (Teacher 5) in the same school in the same year.

In teacher 5’s first English class (A), more students were above than below the school’s regression line, while in Class (B), the reverse pattern was
found. Yet in both classes, most students were on or around the school's mean line, that is, they performed as expected given their ability. In class B, however, two students were ten or more marks below the regression line, noticeably dropping below the majority of the school's 2004 VCE cohort (densely clustered diamonds). In particular, Student 429, identified as the third highest in terms of ability (AvGAT = 23.7), with a mark of only 16, strongly affected the mean achievement in Teacher 5's second English class.

Class A (Figure 6) had a positive class residual (1.6) and Class B (Figure 7) a negative class residual (–1.4). This is interpreted as the mean English mark for Class A was 1.6 marks higher than predicted, and Class B's mean was 1.4 marks lower than expected, given the six factors adjusted for in the multi-level modelling. Obvious questions are:

- Who decides if this difference is educationally meaningful?
- What process determines where the line of acceptable ability-adjusted performance is drawn, and how is this authenticated?

Detailed examination and informed discussion of the data were necessary when evaluating the factors believed to influence overall class achievement. More often, the effect of individuals or small groups of students within a class appeared to have a greater effect than an individual teacher on the class mean achievement. Frequently a student who achieved high marks in one class also scored positively in their other Studies, and vice versa.

**Student level analyses**

Note that in Figures 8 & 9, the white circles illustrate an individual student’s performance, set against the results for all students (diamonds). The English mark for each student is shown as a white square to assist with comparison and location of these students in their respective English class graphs (Figures 6 & 7). Data for a high performing student in Class A (Student 258) in Figure 8, and a low performing student in English Class B (Figure 9) are now examined. As can be seen, both students performed in similar fashion in English as they did in their other classes.

Student 258 (AvGAT = 18.3) in English Class A, with a mark of 34, contributed to Class A's positive residual (1.6), and generally achieved at or above expected level in all Studies. Student 429 (Figure 9) generally achieved less than expected, relative to other students of similar ability in this school in 2004, and contributed to the negative residual for his English class. This leads to the question: “To what extent can the English teacher be held responsible for the English marks of these two students?” These data, of themselves, do not and can not tell us whether Teacher 5 was a good, average or poor teacher of English in either class.

School staff generally attribute student effort and interest, or lack thereof, as the main explanatory factors in student performance. Students with positive
residuals were described as those who had high aspirations, gave appropriate time to the subject regularly throughout the year, and took notice of teacher feedback and instructions for improving their work. Students with negative residuals were usually said to have low motivation, lack of home support for learning; and in some cases, illness and trauma were relevant factors.

Results of this research (Richardson, 2004b) indicate that the class residual ought not be referred to as the teacher residual. Even reference to variance at this level as the class/teacher residual, needs caution, given the unit of analysis is merely aggregated student level data, not specifically measured teacher or class variables. In multi-level modelling research, the class residual is simply the difference between the adjusted mean for all students in a class, compared with the adjusted mean for all other classes in the school. Yet in the vast majority of cases in this research, negative class-level residuals were clearly influenced by factors associated with a small group of students.

Principals and senior staff in schools did not automatically associate the class residual with the measure of the teacher’s effectiveness, as academics and system level staff tend to do.

The fact is that few researchers have actually analysed data that could be authentically considered to have included valid measures on which teacher effects could be calculated. Until such measures are defined and gathered, claims of teacher effect sizes, calculated from multi-level models of students in schools, or even students in classes, must be more closely examined.

However, it is important to note that, in schools where such analyses were conducted over several years, teachers whose class residuals were strongly positive year after year were often the ones that colleagues named as ‘high-performing’ teachers. This was substantiated with detailed reference to the individual teacher’s behaviours in terms of curriculum contribution, assessment practice, student feedback, and collaboration within the school. Other characteristics of ‘top teachers’ acknowledged by VCE staff in this research were openness to their own, ongoing learning, and capacity to acknowledge both ‘good’ lessons and ‘difficult’ lessons. These teachers were not paraded as ‘perfect’ teachers or persons, but as genuine educators, who loved learning, had strong discipline knowledge and love of their subject material, and were able to communicate well and sustain positive relationships with students. Note that no evidence was provided in the sense of these qualities being measured as they were merely observations of, and attributions made by, their peers within the school.

As a consequence of these data-informed discussions, many teachers independently selected areas of focus for themselves for their current VCE teaching – more examination practice, greater monitoring of student written work in class throughout the year. Examples of instances where a negative class residual was attributed to a ‘poor’ teacher were rare, but some class patterns did generate concern. Further investigation into their students’ performance in their other Studies was undertaken in discussions with the teacher, as was consideration of
contextual factors that may have accounted for the less-than-expected achievement. In some schools, additional support was given in terms of formal and informal mentoring. Some teachers were encouraged to develop contact with subject networks groups for improved access to curriculum and assessment resources and information.

School level analyses

In Figure 10, all class residuals (dark diamonds) for this school in 2005 are plotted in rank order from lowest to highest, with all English KLA classes (white diamonds) selected. The bounded line around each diamond indicates the 95% Confidence Interval for each class residual. As is the case in all schools, the majority of class residuals in the school are within ±2 marks of their expected achievement on the vertical scale.

Residuals for Teacher 5’s two English classes (Class A’s residual 1.6, and Class B’s residual – 1.4) are highlighted as grey squares (Figure 10). Because their respective confidence intervals do not overlap on this class residual plot, statisticians consider that there is a statistically significant difference between these two classes, and some then refer to this as the ‘teacher effect’. However, detailed examination of individual students’ results in Teacher 5’s two English classes revealed that the difference was largely associated with performance of several students in each class.

The data and discussion associated with Figure 10 provide one example of the misinterpretation that can occur when statistical analyses alone are used to estimate school, subject and teacher performance.

At system-level, and in ‘League Table’ summaries, so-called ‘failing schools’ and ‘top schools’ are identified from such ranked residual plots, without any reference to the multi-variate, multi-level factors influencing these results, let alone acknowledgement of the unmeasured (and possibly unmeasurable) factors. Too often, negative subject or class residuals are misrepresented as the teacher effect, simply because the patterns across students are hidden. Only when lower level (student) data are examined is this problem avoided. A more detailed discussion and interpretation of patterns in residual plots will be presented in a series of seminars to be held at ACER later this year.

Principals and teachers preferred scatterplots (Figures 1–9) to residual plots (Figure 10), when examining their school’s data, as the former better illustrated the meaning of student and class residuals. Within the school, staff could identify instances where the student and class residuals were inaccurate, and make appropriate adjustments in their evaluation of their school’s performance.

Within schools research, years 7-11

Staff in schools who had access to this level of detailed student and class data quickly recognised what they described as ‘the value of a good ability measure’ to provide them with value-added information on their students’ academic performance (Richardson, 2002, 2003a). In some schools, senior staff set about obtaining an independent measure of student ability at the key learning stages – entry to secondary school, and in Year 10 when there was a focus on work experience, careers advice and VCE subject choices.
Concerns were often raised about the relationship between the results students receive on school reports, and their academic performance as measured on external assessments. Figure 11 illustrates the typical pattern found when internal school assessments (in this case, semester report grades) are plotted against external measures (in this case, an intake ability test). White circles represent one school’s Year 8 Mathematics results for Semester 1, 2003, set against all Year 8 students' subject results (diamonds), with teachers' grades converted to marks (A+ = 20, A = 19, A– = 18, B+ = 17, etc.). The diamonds and circles on the Y-axis (vertical line at zero ability score) represent students not assessed on the ability measure on entry to the school, and the missing data on the X-axis indicate students no longer at the school. Note the lack of correlation between ability and teacher grades, highlighting the reality that, when writing reports for students, teachers’ grades are based on both observed behaviours and examined subject material over the semester. Some teachers give positive grades to ‘reward’ students for effort, and to encourage lower ability students. Figure 11 reflects the high variability amongst teachers when assessing student achievement, sometimes found even when moderation procedures are in place in the school.

Many schools are developing processes to support their teachers in monitoring and improving their assessment and reporting practices, and some schools have already begun this venture towards becoming a data-informed school (see poster displays at this Conference for examples). Sally Paterson now outlines the way her school embarked on the task of ‘using data to support learning’.

Research into practice

Urrbrae Agricultural High School (UAHS) is a specialist agricultural school located in suburban Adelaide. The school has 1000 students, all of whom are selected to enter the school. As with many schools, one of our goals is to achieve excellent learning outcomes, in particular, as expressed in our Strategic Plan: ‘To achieve excellent learning outcomes which allow our graduates to be skilled contributors to our community’. This generated debate within our school about an operational definition of excellent learning outcomes. Subsequently, consideration was also given to the second strategic goal: ‘To achieve growth of social capital for a community that is socially and environmentally sustainable’.

Defining excellence in terms of tertiary education entry scores was not appropriate for or relevant to many of our students, and also left us to work with data available only after students had left the school. We wanted the capacity to monitor progress of all students towards the goals as they moved through the school. Debate over the meaning of excellence led to a belief that, for us, it would be for the school to make a positive impact on student achievement. On an individual basis, excellence was defined in relation to the student's starting point. To monitor achievement in each learning area, we needed a measure of student ability. The proposal to collect baseline data was controversial in the school, with some fears raised from past memories or myths of IQ tests. However, staff members recognised that our school not only had goals relating to the quality of academic learning, but also to the development of social capital, as stated above, and gathering a multi-
dimensional student profile would give us the opportunity to monitor all aspects of each student’s development.

A commitment was made to establish a database with a comprehensive array of information gathered for each student, including a measure of ability in four domains – verbal reasoning, numerical reasoning, abstract reasoning and visual spatial reasoning, a measure of students’ thinking style/learning preference, and their self-reported attitudes to learning and to the school’s focus areas. These attitudes were expressed on a school-developed survey. Teachers also collected an example of student writing conducted in class throughout the first semester to provide a baseline against which development in students’ written expression could be mapped.

Research has shown that what the student brings to the learning situation predicts 50% of their achievement. The collection of baseline ability data gave the school the opportunity to identify the starting point for each student.

Some research (Hattie, 2003) described the factors that predict student achievement as being individual ability (50%), the influence of school, home and peers (20%), and the quality of teaching (30%). To allow us to focus on the impact we can have, as school staff, we need to be clear about the factors we cannot influence, such as the student’s ability on entry to the school.

To monitor our progress in achieving excellent outcomes, it was necessary to ensure that teachers were using at least some common assessment tasks, completed individually and under supervision. Teachers were involved in moderating these assessments. In some learning areas, new assessment tasks were devised and in other areas, existing ones fitted the appropriate criteria. In all cases, the assessments were referenced to Level 4 outcomes of the State curriculum framework.

Discussion of the need for, and the structure of, these assessment tasks led to an interesting professional debate. In some situations, teachers raised questions about the increased workload this change in assessment required. In most cases, however, it was not that assessment tasks had to be created and marked which was new, but the requirement for the content and tasks to be common between classes studying the same course material. There was some additional work for the teachers to participate in moderation of the results.

The Design and Technology faculty drew up a task that Year 8 students completed at the end of their semester of study in this area. It was designed to assess all of the desired outcomes of the course and was completed across a number of lessons. This model promoted discussion among the curriculum coordinator group and inspired interest within other learning areas in devising similar tasks. Mathematics and Science already used common tests and these results were correlated against the ability data.

This project is still at a very early stage; however, an examination of Year 8 Mathematics data in Figure 12 (r = 0.656) in this school in 2005...
indicates a pattern closer to the expected relationship between ability and achievement data, than for example that shown in Figure 11 (Mathematics, Year 8, 2003).

Once data from each learning area is correlated against the baseline data, teachers are asked to examine and reflect upon individual and group variations from the ability-predicted results. In some cases, there may be clear, non-school explanations for under- or over-achievement. Most research indicates that the more likely explanation for those variations is a teacher effect. Teachers are being supported to develop the expertise to analyse the data and work towards finding and addressing the possible reasons for the variation in performance, from that expected given their ability.

As an example, some of our teachers see one cause of under-achievement in our senior school as student participation in vocational education programs, which take the students out of their normally scheduled classes. This issue will not be able to be investigated with our new database for some years (until this year’s Year 8 students reach Year 11 and 12); however it is an example of the enquiry that will be possible, as a result of our commitment to developing a longitudinal database.

Another issue of debate has been the reporting of the correlated data (achievement to ability). From the outset, parents were informed that the correlation of their child’s achievement with their child’s ability would be reported to them. The intention was to do this at the end of each semester. There was never any intention of reporting the raw data from the student profile. For the ability section of the profile, we did not want to foster views such as: ‘My child is top (or bottom) of the class’. The discussion we want to have with parents and students is about how well the student is achieving in relation to their own ability-predicted achievement. For the attitudinal data, we have offered to report this to parents in a face-to-face discussion with a staff member to fully flesh out the implications of this information.

The intention was to ensure consistency in achievement reporting across the year level, as well as to build capacity for monitoring each student’s progress throughout their time in the school in ability-adjusted terms, commonly referred to as the value-added contribution of the school to student academic achievement.

We did not meet our goal of reporting to parents at the end of the semester. This was because it became clear that considerable professional discussion still needed to occur for the teaching staff to feel comfortable with their capacity to answer questions from parents and students regarding these data. There are other sensitivities as well. For example, if all results are available to staff, how will performance of individual learning areas be seen by staff of other learning areas? If we continue to send home student grades as well as the correlated ability and achievement data, will parents question results that may appear anomalous? Some teachers are finding the stated expectation that they can influence the quality of students’ learning outcomes to be, at least to some degree, quite confronting.

As we proceed with this project, opportunities and questions continue to arise. Our commitment is to run this project for five years at least. In 2005, it is only our Year 8 students who are involved. As they move through the school, achievement data will continue to be correlated against the intake ability data. There are several questions as yet unanswered: How will we best represent a student’s Year 9 achievement levels against their Year 8 levels? Is there a meaningful way to do that? Will the results of each learning area be correlated against each ability strand separately, or only against the general reasoning or some combination of these?

The point in conducting this research is to lead to our teaching processes being data-informed and as a consequence, more effective. We believe the focus on the student’s own real learning progress will contribute to improved relationships between the teacher, student and parents.

**Conclusion**

Schools have extensive data – as student records and reports, in staff offices, administration areas and archives, and of course, the vital information carried in teachers’ heads. Some secondary schools have intake data or scholarship results, but few schools have gathered the comprehensive data required for effective monitoring of student achievement, as identified in the research discussed above.

A measure of student ability, against which to evaluate student attainment via common tasks and moderated subject assessment for each year level, is essential to provide schools with the capacity for ability-adjusted monitoring of each student’s learning progress, at regular intervals. The explicit purpose for developing a school database is to support learning at all levels within the
school, so that trends over time can be identified, with early detection of issues leading to remediation and extension.

However, managing the school’s academic database so that appropriate information can be readily accessed when needed requires time, skill and financial commitment. Planning is essential to ensure that all data are formatted and integrated, as students, teachers, year level co-ordinators, curriculum and welfare staff, administration and management all require different analyses, report formats, and levels of access. In addition, security, regular updating and archiving of information also require attention.

To begin the task of value-added monitoring of student and school performance, the following steps are recommended:

Step 1. Enter all current educational data available in the school in relevant spreadsheets in the school’s academic database.

Step 2. Arrange for appropriate analyses to be conducted, with output formatted to ensure user-friendly access to, and interpretation of, all tables, graphs and summary information.

Step 3. Use this school database to initiate informed discussion and debate around the following questions:

- Do these data provide us with answers to the questions we have been asking?
- What questions remain unanswered, and what further data are needed to respond to these?
- What new questions have emerged?

The challenge for school staff when reviewing their data is to identify the factors that affect student learning, both positively and negatively then adjust their practice accordingly. This research indicated that school leaders and teachers need considerable time to examine their value-added data. The graphs and tables of data provided on their CD encouraged staff to reflect on the student and class patterns, and to discuss and debate their attributions for the factors impacting student and class scores. The capacity to highlight each student within the school, examine performance in depth at individual student, class and subject levels, as developed in this research, was new to, and positively received by, school leadership teams. It is hoped that this research can be extended in the future to include student feedback, as it would be of interest to record the factors students considered were major influences on their results, and whether they believed they had achieved to their potential.

However, the extensive, multi-level analyses that affect student learning have yet to be definitively identified and modelled. For this to occur, a reallocation of resource provision at system level is needed, so that valid and reliable curriculum measures and assessment protocols are available in all schools. Clearly defined subject knowledge and skills, in appropriate developmental stages with common metric assessment scales, would enable teachers to report valid learning gains for each student.

When contextual information and data-informed interpretation are lacking at the level at which the data were gathered, class and subject residuals are often misrepresented as evidence of teacher performance. Principals and teachers are rightfully concerned about their performance being judged by the type of data analyses and displays of VCE results similar to that displayed in Figure 10, and currently used at system level in Victoria.

Improved collaboration between researchers and practitioners can lead to more truly data-informed analyses, if the voices of all stakeholders are represented, and not dominated by system-level statistical analyses that are not independently verified. It is possible to conduct more equitable evaluation of student and school performance, both across and within schools (Richardson, 2004a). This VCE research found support for Rowe’s (2003) statement that ‘All too frequently systems, schools and teachers (my emphasis) have lacked credible information regarding the magnitude of their relative contributions to performance and effectiveness’. Greater effort needs to be focused on research within schools where it is possible to validly identify the factors influencing students’ achievements for both boys and girls and for low, average and high ability students.

School effectiveness research (SER) and system-level analyses still over-emphasise teacher effectiveness, and fail to take into account the multi-level structure within which teaching and learning operate. Student responsibility for learning (at senior secondary) and system-level accountability need appropriate attention so that resources are diverted to research that has the potential to identify and verify sources of variation at student, class and teacher levels within and across schools.

We do not yet have appropriate measures of the verifiable teacher behaviours explicitly linked to student achievement that can be validly reported in terms of effect size. Claims regarding the proportion of variance
explained at the so-called ‘teacher’ or ‘class/teacher’ level were not supported in this detailed, evidence-based research (Richardson, 2003b, 2004b), where interpretations were validated in discussions with senior staff within schools. This does not mean that teachers and the quality of teaching are not vitally important influences on student achievement, just as we rarely have measures of student motivation and aspiration, time on task and degree of private tutoring, illness and personal trauma, all of which affect student performance, so too, we do not yet have the comprehensive data needed to identify the teacher behaviours and attitudes that positively impact student performance across all ability levels.

For more authentic evaluation of teacher performance, and calculation of genuine teacher effects, valid measures of teaching knowledge, skills and behaviours demonstrated to make a positive difference to student achievement, are needed. While some research quotes ‘characteristics of effective teachers’ (Sammons, 1999) no definitive studies have measured these variables over time. The Hay-McBer (2000) research on teacher effectiveness provides one way of conceptualising a matrix of factors that could be modelled to further our understanding in this area.

Many research reports aggregate one or more student measures to create second-level variables, then discuss this aggregated group variance, be it class/subject or school-level, in terms of the ‘class/teacher effect’, sometimes the ‘teacher effect’. Results from ‘within-school’ analyses in this research indicated that even when student data are aggregated to class level (or subject level) it is misleading to name this as the ‘teacher effect’.

The value added by the school is usually estimated in terms of student and group performance above that of their peers. Yet it is rare for all academic characteristics such as ability, past performance in the subject area, teaching and learning strategies, and contextual variables such as gender and SES at student and school levels to be comprehensively measured. This level of data is just not available yet in Australia. Of all the States in Australia, because of the ability and achievement measures collected for the VCE, Victoria has the greatest potential to take the lead in developing research to identify positive teaching and student learning effects (Richardson, 2004a). One way that this could be achieved is, for example, if the Hay-McBer (2000) Teacher Effectiveness variables were measured and integrated with the type of ‘within-school’ analyses described above. More than 100 Victorian schools have already demonstrated their commitment to ‘using data to improve learning’. It is now time for both the Federal and State Governments to collegially support and extend this research.

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Presentation at the 14th International Congress for School Effectiveness and Improvement (ICSEI): Conference, Copenhagen, January 3-6, 2001.


Using online assessment to inform teaching and learning in primary and secondary classrooms

Abstract

In the 1980’s there was a conscious effort around Australia and in many other countries around the world to shift the focus in assessment from notions of passing and failing to those of monitoring growth; from comparing students against each other to building up an image of what it is that students know and can do at particular stages in their development; and, from collecting marks to summarise performance to providing students and teachers with information from assessment activities that can be used to help diagnose potential weaknesses and strengths and lead to improved learning.

The Australian Council for Educational Research (ACER) has recently developed an online assessment instrument that takes advantage of the latest advances in psychometric theory to provide schools and students with a powerful tool to support learning at school and at home.

The instrument provides

- an online testing program in mathematics and English for the equivalent of Years 3 to 10;
- tests that assess the generic skills that underpin learning in the subject areas of English and mathematics;
- tests that are tailored to the individual needs of children;
- instantaneous feedback using student reports and progress maps to show where a child is located on a continuum of performance that is linked directly to learning in the classroom; and,
- users with the ability to monitor student progress over time.

This presentation will describe instrument and its underlying rationale, show how the feedback can be used to inform teaching and learning, and discuss ways that the instrument and the feedback might be developed further in the future to ensure that the advantages that accrue from information technology are being fully harnessed in an attempt to continually improve learning.
Turning data into information that improves learning: The WA experience

David Axworthy
Department of Education and Training, Western Australia

David Axworthy is Director of Standards and Accountability at the Western Australian Department of Education and Training and is responsible for the policy on school accountability and for the system of educational measurement, reporting and school review. He has extensive experience in all areas of the education system from classroom teacher to senior executive and is known for his systems approach to organisational change and reform. His background is in educational psychology and measurement and he has undertaken work as a consultant to education authorities in England and to the Medical Research Council (MRC) in Scotland.

Introduction

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.

John Hattie’s work has shown that of those variables over which an education system can have some control, it is the behaviour of teachers that has the greatest impact on student learning (Hattie, 2003). It is because of this research finding and its congruence with the intuitive knowledge of those who work in schools that we need to ensure that student performance data reaches teachers in a way that informs their approach to teaching practices.

While Blanchard’s proposition (Blanchard et al., 1999) that people without information cannot make good decisions appears self-evident, we all know from our own experience that the mere presence of performance data does not necessarily lead people to make good decisions. Teachers are no exception to this, despite – or perhaps because – of the fact that they are surrounded by a plethora of data on student behaviour and performance, there is no automatic and universal adjustment to their teaching practice in response. Herein, lies the nub of the issue that we have been working on in Western Australia what needs to happen to performance data to turn it into the kind of information that will cause teachers to modify their teaching practice?

While the classroom teacher is the critical target for this work, we know that teachers engage in their work within a powerful and interrelated socio-political system. There are a number of potential enablers and blockers operating in the system that need to also be considered. For this reason, the resources that we have developed to bring information to teachers has been integrated into a whole of system approach which has implications for the teacher, principal, district director and central executive of the organisation. Locally we refer to the whole paradigm as Assessment literacy or Assessment for learning. This approach has included:

- Policy;
- Resources;
- Professional learning and;
- Consultancy support.

In keeping with the theme of the conference, this paper focuses on the resources component; more specifically the approach that we have taken to data and its use. However, in displaying the resources, the linkage to the other components will become evident. As part of the Assessment literacy approach resources have been and are being developed around student performance data across all learning areas and phases of schooling. We have also been working with ACER on the development of assessments on the social outcomes of schooling both inter- and intra-personal. This paper will limit itself to a discussion of the resources related to the performance data produced by the Western Australian Literacy and Numeracy Assessments (WALNA) in Years 3, 5 and 7 and some comments on Monitoring Standards in Education Year 9 (MSE 9).

The WALNA is a curriculum-based assessment that tests students’ knowledge and skills in numeracy,

reading, spelling and writing. Annual testing commenced in 1998 with the assessment of Year 3 students in reading, writing, and spelling. Over the next two years numeracy was added and the assessment extended to Years 5, and 7. MSE 9 was used to assess Year 9 students in reading, viewing and mathematics in 2004 and is being extended to include writing and science for 2005. Both sets of tests are whole cohort tests for students in public schools in WA and are also used by Catholic and independent schools in WA and some other states and territories.

In looking at the data and its use to support learning this paper will focus on the following issues:

- The validity of the data;
- The way in which the data is presented;
- The knowledge and skills required by teachers to interpret the data;
- The way that data is managed at the school site and the support provided for teachers to work with the data; and
- Teachers’ capacity to transform data into information.

**Underlying properties of the test**

Fundamental to any discussion of the use of data is the quality of the data. To what extent does the test result tell us about the nature of learning that has occurred? The WALNA is developed in accordance with standards of best psychometric practice (Wright & Stone, 1979) in terms of item response and Rasch analysis. The internal reliability for every test instrument is greater than 0.8 and a rigorous regime of horizontal and vertical equating is used to ensure that tests can be placed against a common scale from year to year across each of the year groups, for each of the areas assessed.

It should be recognised that while the psychometric properties of the test are of critical importance to those of us interested in measurement, it cuts little ice with teachers. The things that increase the validity of the tests in the eyes of teachers are:

- The direct and explicit linkage between each test item and a corresponding element of the curriculum (Outcomes and Standards Framework);
- The involvement of classroom teachers in the paneling of items for consideration;
- The trialling of sample items in actual classes; and
- The use of teachers as markers and the associated training that goes with it.

Thus, we have a standardised test with a beautiful set of psychometric numbers that specifically measures important facets of the curriculum outcomes which teachers want their students to achieve, and a growing recognition by teachers that their professional expertise has been incorporated into the test’s design and construction.

When we were starting out it was clearly apparent that those teachers who had been directly involved in the process of test construction were far more open to the more ‘diagnostic’ use of the assessment results than those who saw the test as another off-the-shelf standardised assessment. In fact, the development of the approach that we have adopted is as much the result of a response from teachers for more information, as it is a response to a senior management directive. In other words, the paradigm developed is an example of top-down directive meeting bottom-up demand.

**Presentation of the data**

(This part of the presentation will involve a ‘show and tell’ of the different electronic data displays including hot links that cannot be reproduced in a paper medium.)

Data is presented in different ways to the many different audiences that receive it. Parents, teachers, principals, district directors and the community through the media all receive reports of the results following the annual assessment in August. The general principle that has been applied to these reports is that data is provided in a form that provides the most useful evidence for the role of the audience. In other words, the data is reconstructed into information to support the decision-making and judgements that are the responsibility of the specific group to whom it is supplied. This will be illustrated through examples of the data presented to class teachers, school principals and district directors.

**Class teachers**

To assist the class teacher make appropriate decisions on their teaching programs, the data is constructed so as to give detailed information on each student’s performance on each test item. The electronic worksheet on which the data is presented enables teachers to cross-reference items to the component of the curriculum being assessed and to undertake a miscue analysis to gain further insight into a student’s learning.
Item by item analysis enables the production of learning profiles of individuals or groups of students. These profiles are represented on a set of 'super-profiles' in English (reading) and mathematics (number, measurement, space and chance and data). Each of the five super-profiles have been generated from a Rasch analysis of the elements of the curriculum that have been assessed, not just in this test but throughout the history of testing in WA with MSE and WALNA. Each profile has involved the analysis of over 1,000 test items and 50,000 students. Any one test measures a relatively small sample of the total profile, usually approximately 30 items. However, because Rasch modelling has enabled these elements to be placed in a hierarchy along with many other elements, it is possible to project a student's score from this test onto the profile and predict how that student would have performed on other elements. Similarly, groups of students or a whole class may be profiled in the same way.

A critical feature of the way that the data is provided to teachers is that it encourages them to ask questions of the data and triangulate this information with evidence that they have from classroom observations, assessments and judgements of the same students' learning. In this way, the data that has been gathered from a one-off test is not privileged over that collected by teachers in the course of their teaching. The data from the test suggests to teachers the possibility that some aspects of the curriculum may have been learnt and others not yet learnt. If teachers are able to confirm this from their own observations and classroom assessments, it provides them with clear information about what they need to teach, whether to an individual student, a group or a whole class. The super-profile also provides teachers with some ideas about the components of the curriculum that represent the logical next steps to teach in line with the notion of proximal development (Vygotsky, 1978).

Often teachers observe a pattern in the results of a particular student or a group of students, which indicates that components of the curriculum have or have not been learnt but the teachers are unable to confirm whether or not this is true. In other words, the teachers are unsure how to specifically assess a particular part of the curriculum. To help teachers to assess curriculum outcomes, a set of resource books has been generated that use past test items to explain in detail that part of the curriculum and how distracters have been chosen to exemplify faulty learning. By working with these examples, teachers get a deeper understanding of the curriculum outcomes in question and how to assess whether students have achieved them. Teachers often report that by looking at the assessment resources they gain some insight into how to teach the curriculum outcomes better. These resources may be viewed on the following website: http://www.eddept.wa.edu.au/mse/Assessment.

Principals

While principals are able to access the same data as the class teacher, they also receive the data reconstructed to provide comparative evidence of their school level performance over time and with that of other schools. To assist principals to make judgements about the effectiveness of particular programs or policies on student learning, information is constructed on cohort growth over time (in WA primary schools this is from Year 3 to Year 5 and on to Year 7). Principals are assisted to look at aspects of 'value-adding' by an analysis of the actual performance of a year group compared with that predicted from the socioeconomic status of the students, their earlier performance or both of these factors combined.

As with the data presented to teachers, the data is presented to principals in a way that causes them to ask questions and to triangulate the test data with that from other sources. The data also leads the principals to ask questions about the performance of specific students or groups of students, which requires an analysis of class data by a class teacher. Thus, principals are encouraged to support their teachers in accessing the class level data and in learning how to better understand it.

District Directors

District Directors have the responsibility of determining whether a school is providing a quality education to each of its students. They also operate in collaboration with the school principal to improve the overall performance of each school. To assist the district director, the data is presented in ways that provide the highest level of summarised and analysed data alongside other information on the Department's intranet web site. Data is again presented in ways that cause them to ask questions and triangulate this data on student performance with that coming from other sources. The data presented on the web site focuses on trend and 'value-added' aspects rather than straight descriptive statistics. It leads District Directors to ask questions of principals that require the principal to have engaged in an analysis of their
own data at both the school and class level. In this way, Directors are encouraged to support principals to understand their school's data and to develop the analytic skills within the school to use the data to plan for improvement.

Conclusion

In Western Australia, we do not believe that we have solved the problem of transforming data into information which leads teachers to improve the learning of their students, but we do believe that we are well into the journey and that we have learnt a lot. The following are just some of the things that we have learnt:

- Teachers are willing to look at test data if it gives them some insight into their students’ learning of relevant curriculum outcomes.
- Creating a dichotomy between test results and teacher judgements that privileges one over the other is counterproductive. Assisting teachers to see how test results can refine and sharpen their judgements is very powerful.
- Presenting data in ways that encourage teachers to take on a questioning, problem-solving role (scientist practitioner) with respect to their students’ learning causes changes in their teaching practice and results in improvements in student learning.
- Working with teachers’ line mangers and their line managers (principals and district directors) enables a system of support for working with class teachers and is more likely to lead to sustainable development in the longer term.

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Learning about teaching and teaching about learning: Using video data for research and professional development

Hilary Hollingsworth
Education Consultant, Victoria

Hilary Hollingsworth is an education consultant and researcher who works with schools, universities, and education organisations in Australia and the United States. Her current interests which focus on the use of video cases for teacher professional learning were generated through her work over the last several years at LessonLab in Los Angeles, California. While there, she was the representative for ACER working on the Third International Mathematics and Science Study (TIMSS) 1999 Video Study. As a Senior Researcher for that study, she shared responsibility for the development, implementation and analyses of the video data coding scheme, and the authoring of the international and Australian reports. In addition to her research role in the TIMSS 1999 Video Study, she worked with school systems, school districts, universities, professional development organisations, and textbook publishers across the United States, as a Director for the Teacher Learning Division of LessonLab. This work involved the design and implementation of video cases in a unique and powerful web-based technology platform. She has previously worked as a lecturer at the University of Melbourne, a mathematics consultant in Victorian schools, and a primary teacher in Victoria. She has published papers related to her research in mathematics education and teacher professional learning, as well as resource books for teachers and parents.

Although video technology has been available for several decades, the collection and use of classroom video data for supporting and improving teaching and learning can still be considered to be in its infancy. A variety of research and professional development projects have made use of video data, revealing promising initial outcomes and identifying many possibilities for its use. However, relatively little systematic research has been conducted on the feasibility and effectiveness of various types and uses of video in education (Brophy, 2004).

This paper outlines the nature and virtues of video data, and describes several Australian examples of research and professional development projects that utilise classroom video data. It reports some of the formative evaluations attesting to the positive outcomes of these projects, as well as some of the challenges associated with them. Finally, it anticipates possible future directions for the use of classroom video data for supporting and improving teaching and learning.

The nature and virtues of classroom video data

Research projects incorporating video data vary in scope and scale, from large international video surveys capturing single lesson snapshots of classroom activity (for example, the Third International Mathematics and Science Study (TIMSS) 1999 Video Study, involving the videotaping, coding, and analysis of over 1000 lessons in seven countries, see Hiebert et al., 2003), to studies that involve the videotaping of one classroom across extended periods (months or years), capturing developments in teaching and learning over time (for example, Lampert and Ball’s mathematics teaching study, see Lampert & Ball, 1998).

Professional development projects incorporating video data also vary in scope and scale. For example, from projects designed by national and State education organisations, university faculties, and independent organisations, to projects initiated at the local school level.

In both research and professional development contexts, a variety of methodologies have been developed for collecting, storing, retrieving, coding, navigating, and analysing classroom video data. Over recent years technologies for storing and showing video have proliferated (for example, tape, laserdisc, CD Rom, DVD, and web streaming), and some sophisticated software/technology platforms have been designed to function purposefully as research tools (for example, vPrism and Studiocode), or as tools for practitioners to explore and work with video data (for example, LessonLab’s Visibility platform).

Several authors have reported detailed descriptions of the virtues of video data (see for example, Brophy, 2004; Clarke & Hollingsworth, 2000; Stigler & Hiebert, 1999). Among these are the capacity of video to: preserve classroom activity so that it can be ‘slowed down’ to enable detailed examinations of teaching and learning from multiple perspectives; reveal alternatives through comparative analysis; and, stimulate discussions about choices related to teaching and learning. Brophy (2004) notes that video offers unique affordances especially powerful for supporting teaching and learning:
Videos show both teacher and student actions and thus can be viewed from both the teacher’s and the student’s perspective, allowing attention to both teaching and learning issues. (Brophy, 2004, p. 299)

Projects utilising video data

In what ways are classroom video data being used in efforts to support and improve teaching and learning in Australia? To illustrate some of the possibilities, descriptions of several projects that the author is associated with are presented below. The examples include research and professional development projects, conducted by national education organisations, universities, and schools. Each project uses different methodologies for data collection, analysis, and use, and while it is beyond the scope of this paper to include details about these, related references are provided where appropriate. The intent of this section is to provide a sense of the ways classroom video data are being used, and provoke thought about possibilities for their further use. Each of the projects included in this section exploit the technology’s unique affordances, and tailor the use of the video – and in several cases the video itself – to their specific project goals.

Example 1 - Use of video data in research: Edith Cowan University

Classroom video data was an integral component of the research study, In Teachers’ Hands: Effective Literacy Teaching Practices in the Early Years of Schooling conducted by Edith Cowan University and funded by the Australian Government Department of Education, Science and Training under the Grants for National Literacy and Numeracy Strategies and Projects Programme. With the aim of ‘identifying teaching practices that lead to improved literacy outcomes for children in the early years of schooling’ (Louden et al., in press, p. iv), the study design included the collection, observation, and analyses of video of literacy teaching sessions in classrooms where students’ literacy performance had been assessed the previous year as ‘more than expected’, ‘as expected’, or ‘less than expected’. Using a Classroom Literacy Observation Schedule (CLOS) that was based on the project literature review, the classroom video data were analysed for the presence or absence of 33 literacy teaching practices considered important to effective literacy teaching. These teaching practices were grouped into six dimensions: participation, knowledge, orchestration, support, differentiation, and respect.

Quantitative and qualitative methods were used to analyse the video data in the study. Quantitative analysis, included a simple descriptive analysis by frequency to provide a picture of the teaching practices demonstrated by each teacher. For this purpose researchers used vPrism, a software package that enables detailed, time-linked coding of video. Further qualitative analysis of the video data provided ‘a textured and nuanced account of the application of each of the 33 literacy teaching practices’ by the teachers’ videotaped (Louden et al., in press, p.v).

In addition to the publication of a written report of the study findings a web site is being developed that includes video examples of the 33 literacy teaching practices. It is anticipated that these video examples will be invaluable in communicating the results of the study.

A further research project building directly on the methodology developed in the In Teachers’ Hands study has commenced in 2005. The Student Growth Study, Effective Teaching: An Evidence Based Approach, being conducted by Edith Cowan University, is an evidence-based enquiry into the characteristics of effective teaching in Western Australian Government Schools. This study will make use of video data in a similar way to In Teachers’ Hands, and will focus on two areas: literacy in pre-school and Year 1, and mathematics in Year 8.

Example 2 - Use of research video data for teacher professional learning: Engaging in excellence in mathematics teaching, ACER and AAMT

Designed by ACER and AAMT, Engaging in Excellence in Mathematics Teaching is a pilot professional learning program in which teachers (1) conduct a self-evaluation against the AAMT Standards for Excellence in Teaching Mathematics, (2) design and undertake a customised, needs-based, workplace, professional learning program, and (3) present the outcomes of their program to fellow participants. A key opportunity for participants of the program is to observe selected examples of public release classroom video data from the TIMSS 1999 Video Study, and interpret them in terms of the AAMT Standards.

The mathematics component of the TIMSS 1999 Video Study examined teaching practices in seven countries through in-depth analysis of 638 eighth-

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1For details regarding the Engaging in Excellence program, see Peck, Hollingsworth & Morony, 2004.
grade mathematics lesson videotapes\(^1\). Public release video data from the Study is available on a set of CD ROMs using LessonLab’s Visibility technology platform\(^2\). Each CD ROM contains video and related materials including time-linked transcripts in both English and the native language, time-linked indexes enabling efficient navigation around different segments in the lessons, lesson graphs displaying plans of the lessons, time-linked images of textbook and worksheet pages, and time-linked commentaries on the lessons. Teachers participating in the Engaging in Excellence pilot program had the opportunity to use LessonLab’s cutting edge technology to observe and analyse teaching practices and learning environments from seven countries. This experience stimulated discussion about alternative practices and provoked teachers to reflect on their own practice.

Participants in the Engaging in Excellence program reported that the TIMSS video materials were an extremely useful part of the initial workshop. Participants valued the rare opportunity to look into the classrooms of teachers in other countries and observe their strategies and learning environments. They also valued the analysis of these videos against the [AAMT] Standards’ (Peck, Hollingsworth & Morony, 2004, pp. 375-376). This evaluation is in accordance with the views of Clarke and Hollingsworth (2000):

> When teachers view videotapes of classrooms the familiarity of the classroom setting can reduce the power of the video clip to catalyse teacher reflection. However, if the videotaped lessons are taken from a very different culture, the teacher’s assumptions about accepted and expected practice no longer apply. In this situation, teachers are more inclined to interrogate the videotape and, by implication, their own practice. The unfamiliarity of what they are viewing challenges their assumptions about what is acceptable, competent teaching practice. (Clarke & Hollingsworth, 2000)

Example 3 - Use of video data in preservice education: Edith Cowan University

In 2003 and 2004, faculty in the School of Education at Edith Cowan University developed and trialed a preservice education unit, ‘Becoming a Teacher’, that made use of authentic classroom video data to create links between traditional face-to-face lecturing and tutorials, practicum experience, and online learning opportunities. The unit was designed for first year students to take in first semester of their teacher education course. A major goal of the initiative was for teachers entering the profession to understand the importance of developing sound professional practices – such as observation, analyses, and reflection – and to gain experience with these practices.

The ‘Becoming a Teacher’ unit was developed in LessonLab’s Visibility technology platform. That platform enabled the design of a tailored, interactive ‘Course’ that could be directly authored by faculty members. As part of the course, student teachers were engaged in viewing classroom videos and completing ‘Tasks’ and ‘Forums’ associated with their observations, analyses, and reflections. These activities were purposefully linked to the theoretical content of the lectures and tutorials student teachers attended, and to their school practicum experiences. Rather than having only one example of practice from which to draw professional insights at this stage of their course, student teachers had multiple examples to examine and compare through the use of the video data.

In a unit evaluation survey, student teachers nominated ‘Becoming a Teacher’ as the most satisfying unit in their first year education program. And, tutors of the unit reported increased quality and depth of understanding by student teachers generated through their observation and analysis of the classroom video data.

The success of this first unit led to the development of additional units using the Visibility platform across the second half of 2004, for implementation in the 2005 academic year. Professional learning workshops were conducted for academic staff in the School of Education to assist them to reconceptualise their pedagogy to effectively incorporate classroom video data into their education units. In 2005, four units are making use of classroom video data in the Visibility platform, and several more are currently under development for 2006.

Example 4 - Use of video data for teacher professional learning: Lesson study at Ballarat and Clarendon College, Victoria

Over the past four years, staff at Ballarat and Clarendon College in Victoria have engaged in whole-school...
strategic professional development. Through this process a focus on literacy and numeracy has emerged, and one initiative that is currently being implemented to provide opportunities for teachers to work on improving their teaching in these areas is a local adaptation of the Japanese ‘Lesson Study’ model of teacher learning.

Lesson study is an ongoing professional learning experience involving small groups of teachers meeting regularly to engage in a collaborative process of lesson planning, implementation, evaluation and refinement. Key to their work is the hypothesising of anticipated student responses, the testing of those hypotheses, and the refinement of the lesson design. The groups typically meet weekly or bi-weekly for several hours and focus on only a few lessons over the year with the aim of perfecting them. Once the lessons have been refined to a point of ‘readiness’ where the group feels they can not perfect them any further – usually after several months or even years – they are shared with other teachers and other schools, complete with development and test information, and expected student responses and problems. Skills gained through the detailed process of observation and analysis in lesson study transfer to teachers’ work on other lessons. As Hiebert and Stigler (2000) suggest, ‘lesson study reverses the relationship prevalent in the United States [and Australia] between improving teaching and improving teachers. Working on improving teaching yields teacher development, rather than vice versa.’

At Ballarat and Clarendon College, two lesson study groups formed in Term 4 of 2004; one focused on literacy and one focused on numeracy. These groups are continuing to work on the refinement of their lessons through 2005. Video data of their work are being collected and used in two ways. First, each of the collaborative group meetings is videotaped so that teachers can reflect on the group discussions. These videotapes also provide a record of the group’s progress for evaluative and training purposes. Second, each of the group’s research lessons is videotaped so that teachers can observe and analyse them, and refer to specific examples in them for discussion in the lesson study meetings.

Teachers who have been involved in the first two lesson study groups at the College have reported that the process they have engaged in has had a significant positive impact on their teaching of literacy and numeracy. In particular, they consider that the opportunities to reflect on their own and others’ practice, become aware of new alternatives, engage in serious questions and discussions about content and pedagogy, and develop observational and analytical skills, have led to improvements in their teaching. A further lesson study group was formed recently, making a total of three groups active in the school during 2005.

Example 5 - Use of video data for teacher professional learning: Performance management at Ballarat and Clarendon College, Victoria

As part of the whole school strategic approach to professional development described in Example 4, Ballarat and Clarendon College staff also participate in a performance management program utilising video data of their own classroom teaching. Each member of the academic staff is videotaped teaching a lesson at different stages in the year. The video is viewed by the teacher, and by a colleague who is a designated performance manager. The video is then used as a point of specific reference to discuss teacher performance, and to provide feedback focused on improvement. The use of each teacher’s classroom video data in this way, provides real evidence of teaching performance and evidence of improvement in teaching performance over time. It also contextualises performance management as part of the ongoing learning process of teachers within the ongoing learning community of the school.

Promising initial outcomes, challenges, and future directions

In each of the projects described above, promising initial outcomes regarding the use of video data have been reported through formative evaluations. In the context of research, classroom video data are highly valued because they enable rich and detailed studies of the complex activities of teaching and learning, and their reusability allow for examination from different perspectives for different purposes. The report of the Negotiation of Meaning Project conducted through the University of Melbourne and edited by Clarke (2001), evidences the value of multi-perspective analysis of research video data.

Classroom video data also offer a plethora of opportunities for teacher’s professional learning. Video data provide new avenues for teachers, schools,

*For further reading about lesson study see Stigler & Hiebert, 1999.*
in universities, professional developers, and professional organisations, to engage in rigorous and serious observation and analyses of classroom activity to support and improve teaching and learning.

While positive outcomes of projects using classroom video data are being reported and celebrated, a number of challenges have also emerged. Elsewhere, authors have recorded details of practical and logistical challenges associated with the collection, analysis, and use of video data, including cost, time, quality of video production, ethics, copyright, and technology constraints (Brophy, 2004; Clarke & Hollingsworth, 2000; Jacobs et al., 2004). In the Australian context, each of these challenges exists; however, as evidenced by the number of projects already under way, none are insurmountable. Perhaps the most pertinent challenge associated with the use of video data in Australia relates to the collection and use of video data. The ideas and examples presented in this paper represent only some of the possibilities for using video data to support and improve teaching and learning. Other groups are working with video data in different ways, and knowledge and expertise in the area is growing. It is possible, and in some cases planned, that projects like the ones described earlier (as well as others not reported here) be scaled up to extend to schools, universities, and professional organisations across the country. As skill and efficiencies in video data capture, store, and use develop, and as the teaching profession embraces the collection and use of video data, even more options will open up. As the field expands, an important issue to address will be the need for summative evaluation of projects. As Brophy (2004) contends:

Along with continual developments in the state of the art of both the technology itself and its applications for teacher education purposes [and research], the field now needs systematic research designed to provide summative evaluation of the effectiveness of video-based programs and assessment of the trade-offs involved in alternative approaches. (Brophy, 2004, p. 304)

Video data offer tremendous opportunity for authentic learning about teaching and teaching about learning, and provide a rich resource for helping set future directions for improvement.

References


An evidence-based approach to improvement: A case study of the Victorian Catholic Sector

The evidence-based approach is integral to efforts by the Victorian Catholic sector to continually improve its effectiveness. There has been a concerted effort in the Victorian Catholic sector to broaden the professional experience and judgement of system personnel, school leaders and teachers by locating it within the available evidence and generating research studies to continually explore and test it. Evidence generation and transfer have been instrumental in shaping the design of literacy and numeracy programs. There is an increasing emphasis on using evidence as a tool for professional learning and to inform decision making related to improving the overall performance of schools. In addition to using evidence to facilitate reform within the sector, the Catholic sector system authority has used evidence to make a case for improving the level of financial support provided by the State Government for Victorian Catholic schools.

There are 483 Catholic primary, secondary and special schools representing over 180,000 student enrolments in Victoria. A key priority for the Victorian Catholic sector system authority over the last decade has been the building of capacity for the system, schools and classrooms to continually improve their effectiveness. A critical feature of the capacity building agenda has been the centrality of evidence as the basis for decision-making and action. The impetus for this has been the evidence-based movement in education defined by Whitehurst (2001) as the integration of professional wisdom (which is acquired through experience and consensus) with the best available empirical evidence in making decisions about how to deliver instruction.

There has been a concerted effort in the Victorian Catholic sector to broaden the professional experience and judgement of system personnel, school leaders and teachers by locating it within the available evidence and generating research studies to continually explore and test it. This paper illustrates the instrumental role of evidence generation and transfer in shaping the design of literacy and numeracy programs, informing the content of professional learning initiatives, and informing decision-making related to improving the overall performance of schools and the system as a whole.

Literacy and numeracy program development

The systemic approach to the collection of student and teacher data through the Literacy Advance research project provided schools with evidence about the impact of various literacy programs on student achievement. The data collected included students’ literacy assessment and information about schools, classes, teachers and students. The strong performance of students attending schools where the Children’s Literacy Success Strategy (CLaSS) program was being implemented led to an increase in the number of schools implementing the program. Ainley and Fleming (2003, pxi) indicate an increase from 11 per cent of schools in 1999 to 79 per cent in 2002. The key elements of the CLaSS approach include the following: the importance of designating a literacy coordination position in the school; the provision of a designated
time for literacy in the daily timetable; and the opportunity for students to have access to intervention program support.

The two-year longitudinal study showed that the CLaSS program delivered positive benefits for students in the Catholic sector (Ainley & Fleming, 2000). Five years on, the longitudinal study highlighted the importance of a good foundation to literacy beginning in the preparatory year. Enjoyment of activities is a further element vital to continued growth in literacy, pointing to the importance of providing literacy activities and processes that engage and motivate students at different year levels. A challenge remains to find effective strategies with which to assist students who are experiencing difficulties in literacy beyond Year 1, and to lessen the widening gap between students with differing abilities (Ainley & Fleming, 2003).

Decisions informing the design of numeracy programs have been based on evidence arising from three major research initiatives undertaken in partnership with a team of researchers associated with the Australian Catholic University (ACU). The Early Numeracy Research Project (ENRP), implemented from 1999 to 2001, developed a hierarchical framework to monitor children’s understanding and development of mathematics called growth point. This framework allows teachers to track children’s mathematical advancement through the use of a clinical interview. The Middle Years Research Project (MYNRP), implemented from 2001 to 2002, was instrumental in informing the development of a tool called Rich Assessment Tasks to track students’ understanding. Finally, the Researching Numeracy Teaching Approaches in the Primary School Project, implemented from 2001 to 2003, developed twelve effective scaffolding approaches (Lewis & Lindsay, 2005).

The performance levels of students enrolled in schools participating in these projects were measured through the use of clinical interviews. Student data was collected at the beginning and the end of the project and compared to students enrolled in non-participating schools to test the effectiveness of curriculum and assessment approaches and instruments. At the end of 2004, a research study was commissioned to identify factors affecting high student achievement at the VCE level. The research undertaken by Kaye Stacey (University of Melbourne) identified a number of variables that are positively correlated with high performance such as a larger student cohort; a broader range of mathematics subject offerings; high quality program provision for all students; a culture of high achievement; and the capacity to attract and retain quality teachers. A seminar was held on 3 June 2005 for the purpose of reflecting on the research evidence emerging from these research studies. Participants identified a number of strategies for supporting high achievement in mathematics education in the Victorian Catholic sector: Suggestions arising from this seminar will be published in a Seminar Series Paper and school personnel will be invited to respond. Suggestions include the importance of making student performance data accessible and the provision of professional development support.

Professional learning

Given the importance of combining professional wisdom with empirical evidence, the Catholic sector is faced with an ongoing challenge to find effective and efficient ways of improving leader and teacher quality. Over the past years, there has been a concerted effort to increase the level of confidence and skills of personnel working at both the system and school level through a range of professional learning activities, including sponsorship to undertake accredited courses. There is a heightened awareness of the need to incorporate data literacy in the range of professional learning initiatives.

For instance, the collection of documented evidence, as part of the development of a Professional Portfolio is central to the Leadership Standards initiative which is designed for teachers aspiring to work towards formal leadership positions and undertaken in partnership with the Australian Council for Educational Research (ACER). Participants are required to document an initiative in which they managed and lead a change effort with colleagues in their school, providing both quantitative and qualitative evidence to support the attainment of standards for practice related to five areas of school life and operations. The five areas include the following: the Faith Community; A Vision for the Whole School; Teaching and Learning; People and Resources; and Pastoral and Community.

Project participants record action taken, and evidence of professional growth includes elements such as content and practice of teaching, communication and interpersonal skills, assessment and reporting, evidence of professional reading and contribution to the profession. Reports from participants indicate that the documentation is facilitating learning as it provides a basis for analysis of practice. Through this analysis, participants acquire a heightened awareness of their strengths and weaknesses. As one teacher notes,
the documentation ‘made me think about the possible impact of my teaching and leading, and how I must plan for this in advance’ (Audley & McDonald, 2005).

School improvement

Data collection is central to the overall process of school improvement. Schools use a range of data sources to inform the identification of priorities for the school as a whole, for the professional learning of not only the staff as a whole but also of the individual members. Data is collected through external system-based sources and through school-level initiatives.

According to Pascoe and Jane (2005), all Victorian Catholic principals and staff members have access to the Catholic Education Victoria Network (CEVN) Information and Support portal which has been created to support school improvement. This site provides online dynamic resources including directories, document repositories, profiles and reports of personnel, finance and student outcomes data, professional development programs and links to support programs.

An important feature of the CECV Information and Support portal is the online School Profile Report (SIR) which provides a one-page summary for each school and a link to a suite of School Improvement Reports that school leaders can use to inform their own planning for ongoing school improvement. Data are dynamically drawn from the system database to provide up-to-date reports to users providing schools’ individual and comparative data and indicators of their attainment of system-wide targets. Currently, reports are provided for six key dimensions of school programs: student enrolments; student learning outcomes; Religious Education; school finances; school facilities; and personnel. Further reports will be developed over time including in a seventh area of Student Wellbeing.

The School Improvement Reports provide schools with summative reports of their own data over time as well as comparisons with all Victorian Catholic Schools and Like Schools (by enrolment bands, funding category, language background or socioeconomic status). The development of additional reports and enhancements to existing reports will be informed by the recommendations from a recent trial and review of the information system. Another initiative to be released later this year is an extensive online reporting system for literacy assessments in primary schools and a detailed financial report. Professional development and consultancy services are provided to strengthen school leaders’ capacity to analyse their own data and use it in their planning for school improvement.

Catholic schools also access the Victorian Certificate of Education (VCE) Data Service, providing them with information about their students’ performance in any studies or in all studies offered by their school. The service allows schools to extract information about performance over time and in specific assessment tasks. For instance, data has been used at Presentation College Windsor to enhance the effectiveness of VCE study periods and had led to the development of a formal trial exam program, with the English exam being assessed externally to provide feedback to students and their teachers on areas for improvement (McGunn & Farrar, 2005 forthcoming). The interpretation of this data depends on professional judgement. As McGurn and Farrar (2005 forthcoming) indicate there is a need for careful reflection about contextual factors impacting on results and a need to consider results over a period of time.

In addition to systemic information services, Catholic schools also collect data at the local level. Evidence about school climate and community member perceptions are collected through attitudinal surveys. O’Donnell (2005 forthcoming) principal of St Gregory the Great Primary Doncaster, outlines a number of survey instruments that will be implemented every two years. The staff surveys include The School as a Workplace and the Psychological Health of Staff. The student data survey focuses on social outcomes and the Parent Opinion survey collects data about perceived teaching quality, academic rigour, customer responsiveness and general satisfaction.

Schools recognise the importance of using data to build individual student profiles in order to support them in their learning. Presentation College Windsor (in McGunn & Farrar, 2005, forthcoming), is currently drawing together information from AIM testing, primary school reports, transition interviews and student absenteeism in the middle and senior years. The school is also devising a survey designed to track students’ movements from school with a view to supporting students in making decisions about course options and pathways from schooling. Data on students’ part-time work habits will also be collected with a view to integrating the teaching of time management skills. The school is interested in finding out whether part-time work and heavy involvement in extra-curricular activities has the potential to adversely affect
student performance.

**Systemic improvement**

The need for well-grounded empirical evidence to support the case for increasing the level of funding from the State Government to Victorian Catholic schools led to the commissioning of three research studies in 2004 by the system authority (these can be accessed at www.cecv.melb.catholic.edu.au). A case for change could not be made on the basis of perceptions and judgements of personnel working within the Catholic sector. The *Affordability of Catholic Schools in Victoria* undertaken in partnership with Monash University, showed that Catholic schools are becoming less affordable and with fewer lower income families able to attend. The *Welfare Needs of Victorian Catholic Schools*, undertaken in partnership with the University of Melbourne, indicated that students and parents are seeking help from schools in a range of welfare areas as schools are becoming the point of care for the local community. Many principals report that they and their staff are under-resourced to deal with the range of needs encountered.

Finally, The *Contribution of Catholic Schools to the Victorian Economy and the Community*, undertaken in partnership with Victoria University, shows that in 2002 the per pupil Victorian Catholic school recurrent expenditure for primary schools was 21% lower than the average Government school and 31% lower than the average Independent school. For secondary schools, the recurrent expenditure was 6% lower than the average Government school and 33% lower than the average Independent school. The study also shows that Catholic schools achieve better than average educational outcomes on a range of measures, with the increment over average outcomes being particularly pronounced for students from lower socioeconomic backgrounds. Social capital is identified as a factor in achieving higher than average educational outcomes at lower costs.

The research findings were disseminated to policymakers, senior public servants and academics involved in the high level discussions. A seminar was held to provide researchers with an opportunity to present their findings, and responses were invited. Seminar Reports were developed and published in hard copy and online. In addition, the print media was invited to a briefing and provided with a media release statement and the full report and, as a result, all projects received coverage. Catholic school communities were invited to regional briefings to respond to and discuss the research evidence. In communicating research findings in the public arena, the Catholic sector has been able to more clearly articulate a discourse about Catholic schools that emphasises their contribution to the achievement of public goals of excellence and equity.

The research findings are currently informing strategic and policy development processes with a view to supporting the overall process of improvement and effectiveness. The priorities underpinning the development and review of a number of the strategy and operational plans are reflecting issues arising from the research studies. For instance, the needs-based formula used to allocate funding to schools was reviewed and a new policy is being developed on schools fees which is designed to encourage schools to keep fees at affordable levels.

Most importantly, the research evidence has been instrumental in supporting the campaign to increase the level of State Government funding for Victorian Catholic schools. The campaign has been successful in bringing about an improvement in funding for not only needy Catholic schools but also a number of needy Independent schools. Increased support for needy non-government schools evident in the 2005–06 State Budget was provided as part of the overall budget for social disadvantage. On 18 May 2005, the Catholic sector signed a landmark agreement with the State Government for a four-year period.

**Conclusion**

The evidence-based approach is integral to efforts by the Victorian Catholic sector to continually improve its effectiveness. Evidence generation and transfer has been instrumental in shaping the design of literacy and numeracy programs. There is an increasing emphasis on using evidence as a tool for professional learning and to inform decision-making related to

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1 For example, the strategy plan for the Archdiocese of Melbourne the 2006–10 plan, the communication strategy and the policy reform strategy.

2 For example, the centrality of pastoral care in Catholic schools, the sponsorship of accredited training in welfare studies and the support for specific innovative practices.

3 The existing formula allocates recurrent government grants on a ‘needs-based’ formula that favours low socioeconomic school communities. It is intended that the review process will result in a strengthened weighting of grants to lower socioeconomic regions and schools.

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Using Data to Support Learning
improving the overall performance of schools. In addition to using evidence to facilitate reform within the sector, the Catholic sector system authority has used evidence to make a case for improving the level of financial support provided by the State Government for Victorian Catholic schools.

The reliance on evidence underpins the long-standing practice of forging collaborative partnerships with a wide range of personnel associated with research organisations such as the Australian Council for Educational Research (ACER), the University of Melbourne, Australian Catholic University (ACU), Victoria University, and Monash University. These partnerships have been significant in ensuring that data collection, analysis and reporting methods have been of high quality. In addition, system efficiency is enhanced through the promotion of system-based data services.

References


Poster presentations
A model of data analysis for continuous school improvement in South Australia

During 2004, the ‘High Performance Outcomes’ trial was established with four site teams and districts. The trial aimed to examine the principle of ‘Making Data Count’ and trial the application of Victoria Bernhardt’s approaches to data analysis for continuous school improvement.

This poster will present a Multiple Measures Venn Diagram which will display the model presented in Victoria Bernhardt’s (2004) ‘Data Analysis for Continuous School Improvement’ text. The model identifies the four categories of data that are important for continuous school improvement and also describes what the data tell us by intersecting these categories of data. Several SA schools have engaged with this model, and it is now being further explored by all the districts in SA as part of the data4learning.conf expo in June 2005. The school’s application of the model will also be presented in the poster display.

Assessment for Learning Lighthouse Project – Geraldton Schools WA

The Midwest District Education Office in conjunction with the Standards and Accountability Directorate last year developed an Assessment for Learning Lighthouse Project that was run for eight schools in the Midwest over semester two.

The project aimed to build skills, knowledge and understandings of school-based teaching leaders to sustain implementation of policy initiatives. WA Plan for Government Schools has an objective of: “Building assessment literacy: Assisting schools and teachers to enhance their skills in collecting, analyzing and using student performance information for improvement purposes”.

The purpose of the project was to build the leadership capacity within and across a cluster of schools through focusing on recurrent, collaborative, data driven processes in which teachers regularly examine student work and assessment results for the purpose of making teaching and learning adjustments.

This was achieved by:

- Developing understandings of current research from Black and Wiliam (1998), Wiggins and McTighe (1998) and Stiggins (2002);
- Developing evidence-based approaches to plan for student improvement;
- Using the Curriculum Framework and Outcomes and Standards Framework to plan, monitor, evaluate and communicate progress of student learning;
- To assist teachers in interpreting assessment data and using these to improve their teaching strategies; and
- Using the MSE Assessing Students’ exemplars and other system resources to support consistency in teacher judgements.

ACER’s Data Interpretation Service

ACER’s Data Interpretation Service (DIS) seeks to make schools data informed rather than data driven. It measures the relationship between student ability and current achievement.

The DIS analyses a range of performance data provided by the school. It does so in the context of expected performance as measured by an objective instrument the students sit. This instrument tests innate skills rather than learned knowledge. This analysis enables the school to identify individual student’s actual performance against expected performance within a particular subject, across subjects and over time. As such, it recognises learning needs as well as discerning patterns across classes, subjects and year levels. In this way student data informs teaching and learning practices and helps monitor subject outcomes.
4 Peter Weddell  
National Awards for Quality Schools  

National Awards for Quality Schooling  
The poster will display the achievements of winners in the 2004 National Awards for Quality Schooling. Using an evidence-based approach to research, planning, implementation and reporting, applicants were required to tell the story of an innovative school improvement project or initiative that demonstrated improved and sustainable outcomes for students. The winning applications reflected innovative work across all learning areas, school management, social outcomes and the curriculum.

5 Deborah Hartman and Victoria Clay  
Boys in Schools Program  
Family Action Centre  
University of Newcastle  

Boys Education: – identity, learning and relationships  
The Boys in Schools Program poster display (with research by Deborah Hartman and Victoria Clay) will feature evidence from research into boys education that links male identity, learning and relationships. It will highlight research methods and practical tools that support teachers to develop appropriate pedagogy and assessment methods to enhance academic self-concept, general self-concept and the specific learning of boys.

6 Frank Keighley  
Department of Education and Training, Australian Capital Territory  

Using multi data sources to support improvement and achievement in ACT schools  
This poster describes the process and outcomes of developing a system report based on the over-arching concept of the ACT School Excellence Initiative, combining qualitative and quantitative sources of information in moving to a new paradigm of system reporting, using the four domains of schooling from the ACT’s School Improvement Framework as the organising themes.

7 Louise Ellis¹, Herbert Marsh and Rhonda Craven²  
¹Australian Council for Educational Research  
²University of Western Sydney  

Using an evidence-based research approach to examine the impact of peer support  
The early adolescent years are marked by a confluence of change, including biological, psychological and social developments, as well as the move from primary to secondary school. Awareness of the problems facing adolescents has led to the promotion of school-based intervention strategies to help students maintain positive self-concepts and overcome their adjustment difficulties. However, evidence-based research on the effectiveness of peer support programs is currently lacking. We have sought to address this void in previous research by empirically examining the effectiveness of a widely-used peer support program on both Year 7 students and their peer support leaders (Year 10/11 students). The findings of this research have important implications and suggest that the provision of peer support has the potential to make a significant contribution to schools’ efforts to orchestrate positive outcomes not only for early adolescents, but also for older students who implement the program.
Conference program
Sunday 7 August
6.00 – 7.30  Welcome reception  Lumina, Grand Hyatt Hotel

Monday 8 August

9.00  Conference opening  Savoy Ballroom  Professor Geoff Masters, Chief Executive Officer, ACER

9.30  Keynote address  Savoy Ballroom  ‘Benchmarks and growth and success…Oh, my!’  Dr Gage Kingsbury, Research Director, Northwest Evaluation Association (NWEA), USA  Chair: Dr John Ainley, Deputy Chief Executive Officer, ACER; Research Director, National and International Surveys

10.30  Morning tea
11.00  Concurrent sessions 1
Session A: Savoy I  ‘Good data, bad news, good policy making…’  Dr Gabrielle Matters, Principal Research Fellow and Manager, Brisbane Office, ACER  Chair: Margaret Forster, ACER

Session B: Kensington  ‘Moving on from Count Me In Too: Evidence-based teaching and learning in the early and middle years of schooling’  Lynn Tozer and Marilyn Holmes, Dunedin College of Education, New Zealand  Chair: Barry McCrae, ACER

Session C: Savoy 2  ‘Getting SMART with data in schools: Lessons from NSW’  Dr Max Smith, Manager, Data Analysis and Regional Support, NSW Department of Education and Training  Chair: Marion Meiers, ACER

Session D: Savoy 3  ‘Data-driven school improvement through the VCE Data Service’  Dr Glenn Rowley, General Manager Policy, Measurement and Research, VCAA & Peter Congdon, Manager Educational Measurement, VCAA  Chair: Kerry-Anne Hoad, ACER

12.15  Lunch and poster displays
1.15  Concurrent sessions 2
Session E: Savoy I  ‘Getting it Right’ Symposium  Dr Lawrence Ingvarson, Research Director, Teaching and Learning, ACER, Marion Meiers, Senior Research Fellow, ACER and Rosemary Cahil, Manager, Curriculum Directorate, Department of Education and Training, WA  Chair: Peter McGuckian, ACER

Session F: Savoy 2  ‘Data and school improvement — A school perspective’  Wayne Craig, Director, Northern Metropolitan Region, Department of Education and Training VIC  Chair: Nick Thornton, ACER, APC

Session G: Savoy 3  ‘Using the evidence of student achievement for improvements at individual, class and school level’  Dr Reg Allen, CEO, Tasmania Qualifications Authority  Chair: Kerry-Anne Hoad, ACER

Session H: Kensington  ‘Using HSC data to give principals leverage’  Dr John DeCourcy, Principal, St Andrew’s College, Marayong, NSW  Chair: Andrew Jackson, ACER, APC

2.30  Afternoon tea
3.00  Concurrent sessions 3
Session I: Kensington  ‘An evidence-based approach to teaching and learning’  Dr Michele Bruniges, CEO, ACT Department of Education and Training  Chair: Sheldon Rothman, ACER

Session J: Savoy 2  ‘Assessment for learning: Using Statewide Literacy & Numeracy tests as diagnostic tools’  Philip Holmes-Smith, Director School Research Evaluation and Measurement, VIC  Chair: Marion Meiers, ACER

Session K: Savoy 3  ‘Data-informed research and practice: Evaluating student achievement in secondary schools’  Carmel Richardson, Senior Research Fellow, ACER  Chair: Kerry-Anne Hoad, ACER

Session L: Savoy I  ‘Using online assessment to inform teaching and learning in primary and secondary classrooms’  Professor Jim Tognolini, Research Director, System and School Testing, ACER  Chair: Alison Elliott, ACER

4.15  Close of discussion
7.00  Conference dinner  Savoy Ballroom
Tuesday 9 August

9.15  Keynote address  Savoy Ballroom  
‘From accounting to accountability: Harnessing data for school improvement’
Associate Professor Lorna Earl, Ontario Institute for Studies in Education, University of Toronto, Canada
Chair  Dr John Ainley, ACER

10.30  Morning tea

11.00  Concurrent sessions 4
Session M: Savoy 2
‘Turning data into information that improves learning: The WA experience’
Dr David Axworthy, Research Director, Performance and Accountability, Department of Education and Training WA
Chair  Marion Meiers, ACER

Session N: Savoy 1
‘Evidence for the kinds of feedback data that support both student and teacher learning’
Dr Ken Rowe, Research Director, Learning Processes and Contexts, ACER
Chair  Pamela Macklin, ACER

Session O: Savoy 3
‘Learning about teaching and teaching about learning: Using video data for research and professional development’
Dr Hilary Hollingsworth, Consultant, Victoria
Chair  Kerry-Anne Hoad, ACER

Session P: Kensington
‘An evidence-based approach to improvement: A case study of the Victorian Catholic Sector’
Dr Teresa Angelico, Assistant Director, Catholic Education Office, Melbourne
Chair  Deirdre Jackson, ACER

12.15  Lunch and poster displays

1.15  Keynote address  Savoy Ballroom  
‘What is the nature of evidence that makes a difference to learning?’
Professor John Hattie, Auckland University NZ
Chair  Dr John Ainley, ACER

2.30  Closing address  Savoy Ballroom  
Professor Geoff Masters, CEO, ACER

3.00  Close of Conference
Conference delegates
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<tr>
<th>Dinner Table No.</th>
<th>Delegate Name</th>
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<td>Ms Ibtisam Abu-Duhou</td>
<td>Department of Employment, Education &amp; Training, NT</td>
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<td>32</td>
<td>Mrs Vanessa Aguirre</td>
<td>St. Michael's Primary, NSW</td>
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<td>Dr John Ainley</td>
<td>ACER, Deputy CEO</td>
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<td>Mr Nerissa Albon</td>
<td>Grey Street Primary School, VIC</td>
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<td>Miss Gail Allen</td>
<td>Orrvale Primary School, VIC</td>
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<td>Ms Kelly Allen</td>
<td>Woodridge Senior High School, QLD</td>
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<td>Mr Peter Allen</td>
<td>Christchurch College of Education, NZ</td>
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<td>Dr Reg Allen</td>
<td>Tasmanian Qualifications Authority</td>
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<td>Ms Paula Allt</td>
<td>Cerdon College, NSW</td>
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<td>Ms Jennifer Amaranathan</td>
<td>University of Auckland, NZ</td>
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<td>19</td>
<td>Mrs Prue Anderson</td>
<td>ACER, Assessment &amp; Reporting</td>
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<td>Mr John Anderton</td>
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<td>Dr Stephen Andrews</td>
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<td>Mrs Kerrie Atkins</td>
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Mrs Vivienne Belcher  Christchurch College of Education, NZ
Mrs Lynne Bell  Nerang State High School, QLD
Mr Luciano Benedet  Catholic Education Office, NSW
Mrs Annette Bennet  Kingswood College, VIC
Mrs Susan Benson  Catholic Education Office, WA
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Ms Sharon Broadbent  Northfield Primary School, SA
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Mr Paul Brooks  Catholic Education Office Sydney, NSW
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Mr Christopher Brown  St Paul’s College, NSW
Mr Luke Brown  Our Lady of Lourdes, QLD
Mr Richard Brown  Toowoomba Christian College, QLD
Mr Vin Brown  St Joseph’s College, VIC
Ms Claire Browne  Edith Cowan University, WA
Mr Nicholas Browne  The Peninsula School, VIC
Mr Jeff Bruce  Cherrybrook Technology High School, NSW
Dr Michele Bruniges  ACT Department of Education & Training
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<td>Ms Sue Clarke</td>
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<td>Victorian Curriculum &amp; Assessment Auth.</td>
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<td>Mr Vince Connor</td>
<td>CEO Bathurst</td>
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<td>Dr Maxine Cooper</td>
<td>Griffith University, QLD</td>
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<td>Dr Ian Cosier</td>
<td>Queensland Studies Authority</td>
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<td>Mrs Christine Cottell-Mayhew</td>
<td>Albany Junior High School, NZ</td>
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<td>37</td>
<td>Mr Neil Couch</td>
<td>University of Waikato, NZ</td>
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Using Data to Support Learning

Mr Patrick Coughlan
St Anthony's School, QLD

Ms Meg Cowey
Department of Education & Training, WA

Mr Wayne Craig
Department of Education & Training, VIC

Ms Anne-Marie Creevane
Balwyn North Primary School, VIC

Mr Alan Crierie
St Michael's College, SA

Dr Brian Croke
ACER Board Member

Mr Pedro Cruz
Emmanuel Christian Comm. School, WA

Dr Everarda Cunningham
Swinburne University, VIC

Mr Craig Curry
Department of Education & Training, ACT

Mr Walter Czernetzky
Urrbrae Agricultural High School, SA

Mrs Bronwyn Davies
DET, WA

Mr Hugh Davies
Lynham High School, ACT

Mrs Susan Davies
Kuyper Christian School, NSW

Ms Rhonda Davis
Braemar College, VIC

Mr Barry Dean
Brisbane Boys' College, QLD

Dr Lenore Decenteceo
Center for Education Measurement, Philippines

Dr John DeCourcy
St Andrew's College, NSW

Ms Bronwyn Dell
Liddiard Road Primary School, VIC

Mrs Donna Denham
Brisbane Catholic Education Centre, QLD

Ms Jenny Denham
Melville Senior High School, WA

Ms Susan Dennett
DE&T, VIC

Mrs Lee Denton
St Oliver's Primary School, NSW

Dr Joanne Deppeler
Monash University, VIC

Mr Mark Dickenson
Office for Educ. Review, TAS

Mrs Deborah Dickson
Salford School, NZ

Mr Paul Dillon
Brisbane School of Distance Education, VIC

Mrs Rebecca Dillon
Trinity College, SA

Ms Leanne Distefano
Killester College, VIC

Mr Peter Dodd
Radford College, ACT

Mr Alan Dodson
Department of Education & Training, WA

Mr Paul Dolan
Cerdon College, NSW

Mr Steve Donatti
Department of Education & Training, WA

Ms Trish Donohue
NSW DET

Dr Jenny Donovan
Educational Assessment Australia, NSW

Mr Tim Dorming
St Michael's Grammar, VIC

Mr Jamie Dorrington
St Stephen's College, QLD

Mr Harold Dover
Curriculum Corporation, VIC

Mr Robert Dowdell
Sydney Boys High School, NSW

Mr Geoffrey Dowling
Athelstone Primary School, SA

Ms Kylie Doye
DET, VIC

Mr Greg Duggan
Catholic Education Office, Sydney, NSW

Ms Jennifer Duggan
Fountain Gate Primary School, VIC
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<tr>
<th>Name</th>
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<tr>
<td>Mrs Debbie Dunwoody</td>
<td>Methodist Ladies' College, VIC</td>
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<td>Mrs Gaye Durnford</td>
<td>St Laurence's College, QLD</td>
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<td>Mrs Anne Dwyer</td>
<td>Toorak College, VIC</td>
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<td>Assoc. Prof. Lorna Earl</td>
<td>OISE-UT, Canada</td>
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<td>Ms Kim Eckersley</td>
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<td>Glenroy West Primary, VIC</td>
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<td>Edith Cowan University, WA</td>
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<td>Dr Alison Elliot</td>
<td>ACER, Early Childhood Education</td>
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<td>Mr Geoffrey Elliott</td>
<td>Mt Tarcoola Primary School, WA</td>
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<td>Mrs Jane Elliott</td>
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<td>Mr Ron Elliott</td>
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<td>Mrs Brigitte Ellis</td>
<td>Catholic Education Commission, NSW</td>
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<td>Carwatha College, VIC</td>
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<td>Dr Louise Ellis</td>
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<td>NZCER</td>
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<td>Flora Hill Secondary College, VIC</td>
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<td>Catholic Education Commission, NSW</td>
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<td>Ms Catherine Ford</td>
<td>Wantima College, VIC</td>
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<td>Mrs Marion Gaertner-Jones</td>
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Mr Graham Gallas
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<td>3</td>
<td>Professor John Hattie</td>
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<td>Nerang State High School, QLD</td>
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<td>Mrs Sheereen Kindler</td>
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<td>Ms Anna King</td>
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<td>Dr Gage Kingsbury</td>
<td>Northwest Evaluation Assoc. (NWEA), USA</td>
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<td>Ms Elizabeth Klenhnenz</td>
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<td>Mr Philip Knight</td>
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Balwyn North Primary School, VIC
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Western Heights College, VIC
St Margaret Mary’s School, NSW
Upwey High School, VIC
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