Teachers Registration Board of South Australia
THE DIGEST

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IN THIS EDITION

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The Digests

This Digest is one of a series of periodic digests produced by the Australian Council for Educational Research (ACER) for the Teachers Registration Board of South Australia.

Each digest focuses on a single topical issue, and provides a review of major messages from research on the issue. A key feature of the digests is an emphasis on what the research means for teachers and teaching. Over the course of several editions, a wide range of issues will be covered, so that teachers from different areas of schooling will find topics of particular relevance to their needs.

Previous Issues

The Digest
Number 3

What does research tell us about how schools and teachers can use data to inform teaching in ways that lead to improvements in student achievement?

This *Digest* is focused on studies that have investigated how data can be used in schools to examine teaching practices in order to improve student learning. A selection of relevant websites is listed, and a full reference list is provided. Links to those references for which full-text online access is freely available are also included.

School systems, principals and teachers have access to an extensive range of data that can be used for a variety of purposes. Accountability processes and data have come to play a significant place in policy development and reform efforts. There is a large body of research about the use of data for improvement at the system level. The key question addressed by this digest is "What does research tell us about how schools and teachers can use data to inform teaching in ways that lead to improvements in student achievement?"

The digest draws on searches of a number of databases and bibliographic resources, including the Australian Education Index, Education Resources Information Centre (ERIC,) Education Research Complete, British Education Index and Scopus.

ACER

Data in
schools

Using data to support learning has recently become a matter of significant interest in schools.

Earl (2005) suggested some key reasons why this is so.

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.

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.

Technological advances have led to data from external assessments being made accessible to schools in a range of ways so that data can be used meaningfully. Schools also have access to a wide range of formal and informal data generated in the course of everyday teaching.

Data can be used to generate change. Earl (2005) points out that educational change depends on collaborative professional learning . She reminds us that

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.

Matters (2006) in a review of a series of papers focused on research about the use of data to improve learning, describes how data shape the landscape of our professional lives. She highlights recent changes in data use, suggesting that increased accessibility opens up wider possibilities for using data in many contexts, including classrooms.

In the not-too-distant past, educational data were slow to turn around, unwieldy to manage, and too disparate to enable meaningful comparisons to be made between groups or over

time. Today, owing to advances in computing and communications technology, the widespread use of data for decision making is practical and possible at every level of the education system – from students and teachers to parents and school administrators to stakeholders and policy makers.

Matters (2006) drew from a categorisation of sources of data provided by Earl (2005) to identify potential sources of data about student achievement:

◗ standardised, norm-referenced, criterion-referenced tests
◗ questioning in class
◗ performance and standards-based assessments
◗ teacher-made tests, projects, quizzes
◗ teachers' observations
◗ student work.

Understanding and interpreting data

The availability of this extensive range of data poses challenges for schools and teachers, not least in understanding and interpreting data. Work done in the Western Australian project that has come to be known as the Data Club has focused on representing data from state-wide assessments in ways that help schools. Schools' own data has been the focus of this project. The developers of the Data Club indicate that

There is evidence that the best support for interpreting data is a combination of information about data analysis and representation strategies together with application of this information to participants' own data. (Wildy, 2003)

In New South Wales, another example of support provided to schools to use data effectively is found in the School Measurement, Assessment and Reporting Toolkit (SMART) that facilitates the gathering, monitoring, analysis and reporting of data in NSW public schools.

Smith (2005) describes the vast store of information available within the system and its schools on academic, social and affective student outcomes; and the vital importance of providing support to schools to use this data.

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.

The Victorian Curriculum and Assessment Authority (VCAA) offers a Data Service to schools. This service provides data about students' results in the Victorian Certificate of Education to schools in ways that help school staff to use the data effectively and easily for planning improvement.

Charts and tables provided to schools through this service can address a range of key questions:

◗ 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?

◗ 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? (Rowley, 2005)

These services are interesting examples of ways in which performance feedback from large scale assessment has been provided to schools, so that it can inform the future planning of classroom programs.

Purposes for using data

System leaders, principals and teachers all use data, for overlapping yet different purposes. For teachers, the central purpose of analysing data is described by Allen (2005) as being to

> *By locating evidence in the classroom … we can influence the major agent that influences student and learning – the teacher*

… 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.

Interest in the uses of data has accelerated, as, increasingly, schools receive performance feedback from a variety of sources. Hattie (2005) notes that *schools are awash with data.* He argues that the discussion about using data needs be located in the classroom, and to move

… away from data towards interpretations, from student outcomes to teaching successes and improvements, and from accountability models located in schools to located first in the classroom to support such evidence-based teaching and learning. … By locating evidence in the classroom … 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 (Hattie, 2005).

Research about what makes a difference to teaching and learning indicates that what students bring to learning accounts for 50% of the variance in students' achievement. Teachers account for account for 30% of the variance, with home, peers, schools and principals making up the remaining 20%. (Hattie 2003) In further research, Hattie (2005) emphasises the importance of teachers using data:

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 causal effects on learning: the teachers. (Hattie, 2005)

Studies at the school level provide insights into how teachers, supported by school leaders, use data for the purpose of improving learning. Much can be learnt from these studies. Three examples illustrate this.

In the first example, a recently published case study (Waddell, 2008) from an elementary school in the US, provides insights into how an ongoing review of summative student achievement data collected over three years transformed teaching practices and closed the achievement gap for students.

Data as an impetus for examining practice: one school's journey

At Viewmont Elementary School in North Carolina the incoming principal noticed that the data from state assessments showed that some groups of students were failing to meet state benchmarks, and the achievement gap between the highest and lowest performing students was around 40%. The decision was made to change this situation.

Over three years the school worked towards becoming a professional learning community. They began by reviewing data from current and previous years, which showed that what was happening in classrooms did not benefit all students. The school set the goal of establishing a focus on data-driven, collaborative professional work. 'Dialogue' and 'data' were key words, and data became the impetus to examine practice. Staff became engaged in conversations about data and teaching practices in small- and large- group meetings.

By the end of the first year, teams had made presentations to the whole staff, and it was recognised that there was a need to change instruction to be more responsive to the needs of all students. In the second year, staff had developed a deeper understanding of literacy instruction, and a model of peer coaching had been established. Significant changes in instructional practices had been made by the end of the second year by many, but not all, staff members. The analysis of data at the end of this year showed that the achievement of students overall had increased, and that there were large spikes in the achievement of lower achieving students.

The evidence provided by the data convinced teachers who had resisted the changes, and school wide implementation commenced. Support was continued in the form of half-day meetings, model lessons, peer coaching and whole-group discussions.

By the end of the third year, the data validated the work of the principal and the whole staff. All students continued to perform well, and the achievement gap had closed from 40% to less than 10% over three years. The staff's commitment to reflection, research and professional growth had become embedded in the school's daily work, and much had changed. (Waddell, 2008)

A second, school-level study is described by Timperley (2005) who reported on a study of a New Zealand school where the assistant principal:

…wanted to use student achievement information during team meetings as a catalyst for professional learning about improving the delivery of literacy programs. Over the time of the study, the teachers shifted from initial beliefs that achievement was determined primarily by outside influences, and therefore, the data were irrelevant to their practices, to using data to improve their practice. Indicative measures of student achievement showed that it improved as a result of their efforts.

In this school, located in a poor suburban area, ninety-five per cent of children enrolled were Maori or from one the Pacific Islands, groups that traditionally underachieve in New Zealand schools. The assistant principal and the teachers collected a range of literacy achievement data in the early years, including, for example, running records and reading tracking sheets, and the Observation Survey (Clay 2002). The assistant principal had considerable expertise in using data to plan programs to meet student needs, but she observed that the teachers were not using the available data for teaching purposes. *"I actually don't see it in their planning. I don't see that it informs their next steps." (Timperley, 2005)*

A characteristic of good data is its potential to help teachers make good decisions about children's learning. Data tell a story. …
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?

She began a process of professional learning in a team meeting by giving teachers the Observation Survey data taken from her records and *showed how she had started to graph the results, which indicated that the students were not progressing at a rate expected for their age. (Timperley, 2005)* This process continued, with the assistant principal helping teachers to make links

Purposes for using data

between the skills and understandings of the students, and teaching practice.

As the project continued, gains in student achievement were evident. Teachers described gains associated with changes in teaching practices, and commented on the achievements of some students:

"... one student who had written nothing the first time had 27 words the second time." (Timperley, 2005)

A year after the focus on using data to plan teaching, teachers described how they had been working together:

" 'You can identify where you need to put more effort in,' 'We all support each other – we ask, Hey what are your doing to get yours [text levels] up', and 'What do we need to do?'" (Timperley, 2005)

Timperley (2005) teases out the issues that, in this context, needed to be addressed simultaneously to support teachers to use the data to change practice:

◗ identifying the knowledge and skills required to use achievement data;

◗ setting up a situation whereby the data on initial improvement in students achievement challenged the teachers' initial assumptions, and teachers came to realise that the achievement data related to teaching practices;

◗ providing the opportunity for the teachers to make explicit how they might teach differently to improve achievement.

The third example relates to work in numeracy teaching.

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. (Tozer & Holmes, 2005)

A characteristic of good data is its potential to help teachers make good decisions about children's learning. Data tell a story. … 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? (Tozer & Holmes, 2005).

These comments come from an account of New Zealand work in using numeracy interviews to provide the teacher with immediate and detailed information about children's number knowledge and mental strategies and allowing behavioural observations to be made in response to oral questions. This work demonstrates a process of data gathering in classrooms, and leads to conclusions such as:

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. (Tozer & Holmes, 2005)

Does performance feedback lead to improvement?

A paper from the National Foundation for Educational Research (NFER) reports on a study which investigated whether this kind of feedback is useful to schools, and whether it leads to improvement in schools. The results of the study, in general, suggested that feedback did have an impact on performance. The study was focused on primary schools that had received feedback from NFER projects and found that

school receiving feedback had better attainment. … It appears that supplying feedback to schools is a positive approach. This method should be encouraged, but support systems for schools, teachers, policy maker and practitioners should be widely available. This would enable them to make the most of the rich data that is available to them in today's society. (Hammond, 2007)

Visscher and Coe (2002) reviewed the available literature on the impact of performance feedback in schools, and, despite finding that its effects are extremely complex and not well understood, identified a number of tentative suggestions for optimising the beneficial effects of performance feedback.

The main requirement is that feedback should direct attention to an achievable gap between desired and actual performance. (Visscher 2002)

Recognition of the role of assessment for learning has been significant in recent years. Research on formative assessment has indicated that there is clear *evidence that formative assessment raises standards and that current practices are weak. (Black, Harrison, Lee, Marshall & William, 2003)*

The OECD Centre for Educational Research and Development (CERI) published a study analysing the formative approach to assessment in eight countries, including Australia (OECD, 2005). Case studies of schools indicated how teachers used formative assessment as a framework for teaching and learning. Key elements were found to be the use of varied teaching methods and varied approaches to assessing students' understanding, in recognition of the diversity of students' needs. The classroom culture in these schools encouraged interaction, and students were actively involved in learning. Learning goals were clearly established, and were used to track students' progress. Feedback to students was critical, together with the ongoing adjustment of teaching and learning activities to keep pace with students' learning.

…assessment may also serve a formative function. In classrooms, formative assessment refers to frequent, interactive assessments of student progress and understanding to identify learning needs and adjust teaching appropriately. Teachers using formative assessment approaches and techniques are better prepared to meet diverse students' needs – through differentiation and adaptation of teaching to raise levels of student achievement and to achieve greater equity of student outcomes. (OECD, 2005)

The main requirement is that feedback should direct attention to an achievable gap between desired and actual performance.
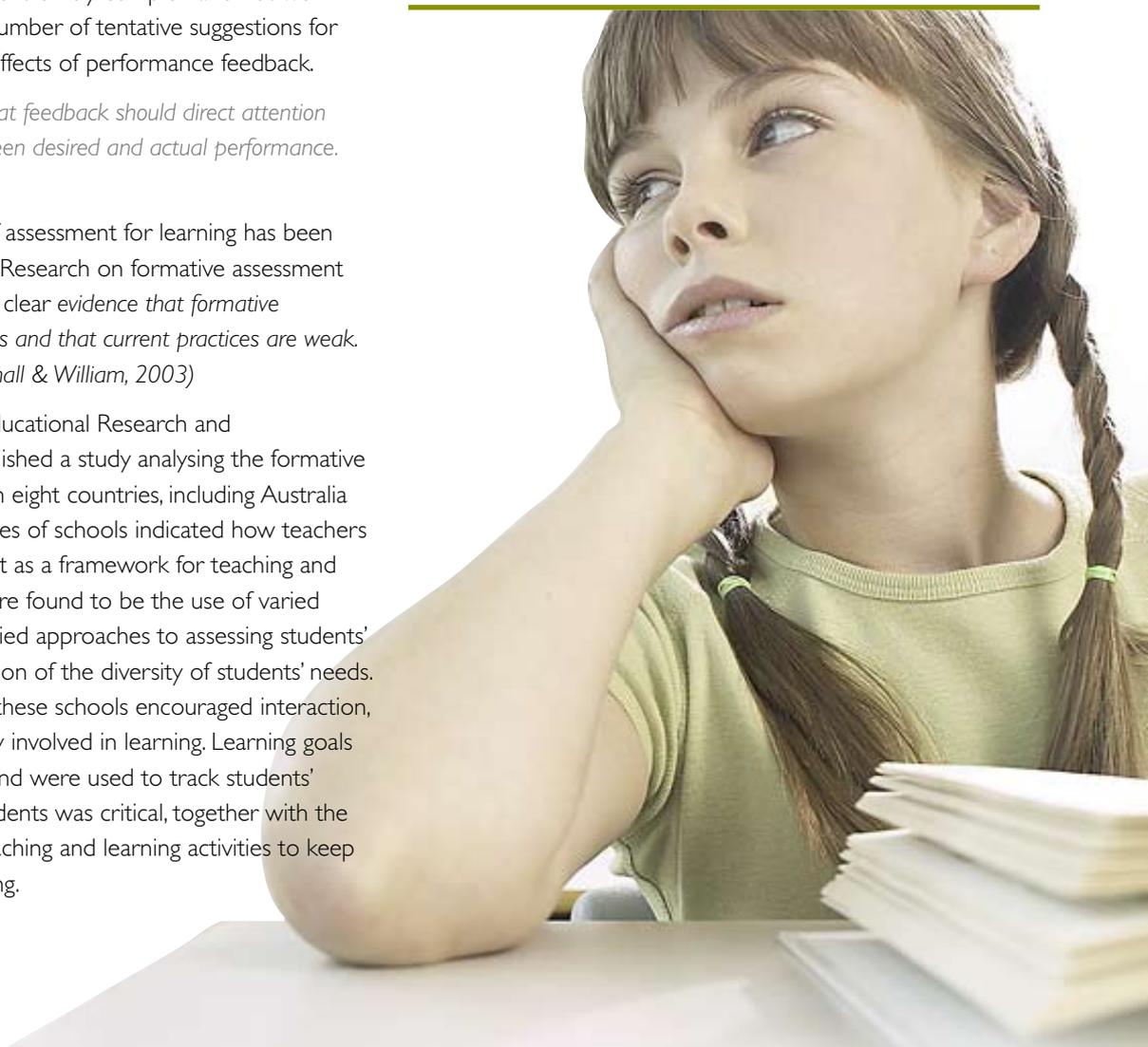
On a large scale

A recent large scale study in England (Kirkup, Sizmur, Sturman & Lewis, 2005) was designed to investigate how data was used to promote learning in schools, and to identify good practice in the effective use of data to improve learning. A key finding of this study was that

'Good practice' emerged from the use to which the data was put rather than specific systems or tools. A recurrent theme was that data only becomes effective if it stimulates questions about the actual learning that is taking place and how it can be developed further. (Kirkup, al., 2005)

This study found that, at pupil level, effective use of data

◗ informs accurate curricular targets for individual pupils
◗ highlights weaknesses in specific topics for classes or groups
◗ highlights specific weaknesses for individual pupils
◗ provides evidence to support decisions as to where to focus resources and teaching
◗ informs setting and grouping of pupils. (Kirkup et al., 2005)

Using a questionnaire survey and case studies, another English study by Kirkup (2006) looked specifically at the extent to which schools and teachers are able to integrate analyses of summative tests within an assessment for learning approach to teaching. Indications from the survey were that information from formal tests was considered very useful by teachers at the class or year group level, as it could feed into teaching strategies, planning, grouping and target setting strategies.

comment

Using data in classrooms

Using data to improve learning poses many challenges. A significant challenge is that of transforming data into information which leads teachers to improve the learning of their students. Axworthy (2005) identifies some of the lessons that have been learnt in Western Australia when this challenge has been addressed.

▸ 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. (Axworthy, 2005)

A significant challenge is that of transforming data into information which leads teachers to improve the learning of their students.

The research indicates the potential value of using data for classroom planning. Understanding and interpreting the wide range of data available to teachers, ranging from external assessments as well as formal and informal data gathered from everyday teaching, provides a basis for teaching directed towards supporting all students to make progress from current levels of achievement.

Collaborative work with teams of colleagues, sometimes the whole staff, sometimes with smaller groups, supported by school leadership, builds a context in which teachers can interpret and use data more effectively. Key questions to be addressed in planning are: What story does the data tell us? What does it mean? How can we use it to improve children's achievements? Asking and answering these questions helps teachers to make informed decisions about children's learning.

Data from their own observations and from many other sources provides feedback to teachers about the performance of individuals and groups of students, and teachers can draw on this data to provide feedback to students. Feedback improves learning by identifying achievable gaps between desired and actual performance. Teaching successes and improvements in learning thus develop from evidence-based teaching and learning.

Collaborative work with teams of colleagues, sometimes the whole staff, sometimes with smaller groups, supported by school leadership, builds a context in which teachers can interpret and use data more effectively.

USEFUL WEBSITES

Teachers TV Australia http://www.teacherstv.com.au/
This site provides professional development videos for teachers at no cost. For example, there are two videos on formative assessment featuring Paul Black and Christine Harrision.

American Association of School Administrators. (nd). *Using data to improve schools: What's working.* Retrieved August 11, 2008 from http://www.aasa.org/files/PDFs/Publications/UsingDataToImproveSchools.pdf

asTTle

asTTle stands for Assessment Tools for Teaching and Learning. These are tools for assessing literacy and numeracy, and can be further tailored for any language. They have been developed for the Ministry of Education by The University of Auckland and are now being developed in several other countries through Auckland UniServices Limited. These tools enable teachers to track the progress and achievement of both individual students and groups of students against national standards.

http://www.asttle.com

The website of the Assessment Reform Group in the UK.

http://www.assessment-reform-group.org/

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

http://www.curriculum.edu.au/assessment

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