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Turning data into information that improves teaching and learning: the WA experience

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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 r 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 panelling 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.

References

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