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Assessment and Learning Partnerships: The influence of teaching practices on student achievement

This report presents key findings of the study of factors affecting student numeracy and literacy. The research partners are the Catholic Education Office (Melbourne) the Department of Education and Early Childhood Development, Government of Victoria (Northern Metropolitan Region, Gippsland Region and Southern Metropolitan Region), and the Assessment Research Centre, Melbourne Graduate School of Education, The University of Melbourne. It was funded by the Australian Research Council under Linkage Project LP 0991123.

Patrick Griffin, Esther Care, Michael Francis, Danielle Hutchinson, Alejandra Arratia-Martinez (University of Melbourne) and Carolyn McCabe (Catholic Education Office-Melbourne)

Assessment Research Centre

Melbourne Graduate School of Education
The University of Melbourne
Victoria 3010 Australia
Telephone +61 3 9035 4425
Facsimile +61 3 8344 8739
www.education.unimelb.edu.au/arc/
education-arc-info@unimelb.edu.au

Project team

Chief Investigators

University of Melbourne
P. Griffin, E. Care

Partner Investigators

Catholic Education Office, Melbourne
Leanne Murray (Education Officer, Literacy); Rosemary McLoughlin (Team Leader, Literacy); Paul Sedunary (Manager, Curriculum & Innovation)

Gippsland Region, Department of Education and Early Childhood Development, Victoria
Karen Cain

Northern Metropolitan Region, **Department of Education and Early Childhood Development, Victoria**
Wayne Craig

Southern Metropolitan Region, **Department of Education and Early Childhood Development, Victoria**
Robert Stephens

Academic Research Team

Patrick Griffin, Esther Care, Nafisa Awwal, Alejandra Arratia-Martinez, Elizabeth Bone, Judy Crigan, Michael Francis, Danielle Hutchinson, Carolyn McCabe, Leanne Murray, Masa Pavlovic, Patricia Quan, Pam Robertson, Katina Tan, Alvin Vista, Zuraimi Zakaria

Online Facilitators

Alejandra Arratia-Martinez, Natalie Climpson, Michael Francis, Danielle Hutchinson, Phil Mackenzie, Mary-Caroline O'Flynn, Zuraimi Zakaria

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Executive summary

This research has been conducted to investigate the influences of teaching practice on student achievement. The research follows on from work on the Literacy Assessment Project, conducted for the Catholic Education Office, Archdioceses of Melbourne (CEOM), and Assessment and Learning Partnerships (ALP), a collaborative, large-scale Australian Research Council Linkage project between the University of Melbourne, the DEECD Victoria and CEOM. ALP has been conducted since 2010 and has involved over 400 schools with teachers working in professional learning teams (PLTs) to use student data to inform their teaching.

Over the past seven years the Assessment Research Centre at the Melbourne Graduate School of Education has worked with CEOM on the Literacy Assessment Project. The work has emphasized the development of reading comprehension performances by students, which were promoted and assisted by teachers targeting instruction to the level of development or the Vygotsky zone of proximal development (1974). The hypothesis was that if the teachers targeted instruction where students were most ready to learn, improvements in performance would be pronounced. By and large this has remained the case for the Catholic schools in Melbourne.

Four years ago the project was expanded to include DEECD schools in Victoria and expanded to focus on mathematics as well as reading comprehension. The research, titled Assessment and Learning Partnerships, found similar results but the gains were less pronounced. The hypothesis was still that if targeted instruction could be aimed at the level of development or the zone of proximal development, increased improvement would be achieved.

Data collections and analysis on student achievement for ALP schools were timed to occur within the Australian Research Council Linkage project at two points in the year – March and October. The project tested 36,000 students in years 3 to 9 in reading comprehension, maths and critical thinking. This data provided information as to which schools were experiencing the greatest improvements in student achievement. Invitations to join the workshops used in this research were linked to school improvement. Further, data published in John Hattie's work, *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement* (2009), was a key source. Hattie argues that student response probability is 0.4 without specific intervention. The ALP project has explored ways of at least doubling that effect size.

Data analysis showed that most of the observed improvement occurred at lower levels of proficiency. Smaller gains were made at the higher order skills level of reading comprehension or mathematics. These varying levels of improvement were examined further using the workshops with teachers. Four workshops were held, with between 20 and 30 teachers participating in each. The participating teachers were able to freely offer options and strategies for student development in mathematics and reading at lower-order skill levels.

It should be noted that the strategies presented are not ends unto themselves; rather, they are means of promoting professional discourse: discourse about student developmental reading and

numeracy levels, discourse about the elements of comprehension, discourse about teacher content knowledge, and discourse about teacher pedagogical content knowledge.

In this way, these strategies are a sample of the kind of strategies that teachers can use for students at different readiness to learn points, but they do not intend to be a comprehensive set of samples. Instead, it is hoped that these set of strategies can be used to facilitate teachers' collaborative reflection about students at different skills' levels and then new targeted strategies can be adapted from the repertoire teachers already are using. Teachers are advised to use the strategies as starting points for discussions during PLT meetings and to consult the references provided through the 'Teaching Resources' page on the ARC website[1].

An absolutely key outcome of the work of this project has been the observation that teachers were less likely to provide strategies to develop higher order skills in either mathematics or reading comprehension. This led to some intriguing issues associated with the rhetoric of 'closing the gap' and may have serious implications for both in-service and pre-service teacher education.

It may be that the emphasis on 'closing the gap' means that teachers are encouraged to emphasise intervention at the bottom end of the proficiency scale. The logic says that students at the top end of the scale are higher-ability students. As such they should be able to improve at a faster rate than those at the lower levels. This study is showing the opposite. Students at the bottom levels of the proficiency scale are improving rapidly. Students at the top end of the scale are hardly improving at all. The link to teacher strategies and teacher resources is a disturbing link.

Our recommendations focus on:

- Avenues for promoting the results of the project.
- The merit pay debate, and the necessity for discussions of both the upper and lower quartiles of student improvement in this context.
- Media strategy and campaigning to broaden public perceptions of equality of opportunity and closing the opportunity gap, in order to spotlight the challenge of developing our higher-order skills students.
- The clear need for a re-think of professional development for teachers and the development of programs to address the lack of growth in upper quartile students.

[1] http://education.unimelb.edu.au/arc/teaching_resources

Introduction

This project includes analyses of large-scale student achievement data, and links these with teacher strategies, material and resources associated with developmentally appropriate teaching interventions in literacy and numeracy. This information will inform a resource bank available from the DEECD and the Assessment Research Centre website which will assist teachers develop appropriate strategies and materials to help scaffold students' learning.

This publication follows on from work on LAP and is part of the Australian Research Council Linkage project, ALP, which examines the collaborative use of student assessment data in schools to inform teaching within a developmental approach to learning and teaching.

The hypothesis was that if the teachers targeted instruction where students were most ready to learn, improvements in performance would be pronounced. By and large this has remained the case for the Catholic schools in Melbourne. Four years ago the project was expanded to include DEECD schools in Victoria and expanded to focus on mathematics as well as reading comprehension.

Among the goals of the ARC Linkage project is an investigation of the implications of shifting from a deficit or remedial model of teaching to a developmental approach to improving student outcomes. Based on the work of Vygotsky, a developmental approach focuses on students' readiness to learn (i.e. their zone of proximal development) and individual differences in their capacity to respond to scaffolding of their learning. The teaching strategies, learning activities and resources listed in this report are similarly underpinned by the theories of Vygotsky.

Research questions

If teachers' use of data within a developmental framework can be demonstrated to improve the student performance what then is the relationship between teacher behaviour, knowledge and values to this improved performance?

How does teachers' use of data in a developmental framework lead to improved student outcomes by way of changes to teacher behaviour, knowledge and values?

Rationale

This project examined the way teachers used data to teach literacy and numeracy. It examined the implications of a shift from a deficit model to a developmental approach. In recent PISA results Australia's position had slipped while other countries had improved. McGaw (2008) argued that improving nations encourage high-performing students as well as low performers to improve, whereas Australia focuses on remedial action for low-performing students. Our objective is to enable teachers to use data within a developmental framework to improve performance of *all* students. The teachers work in a culture where evidence is challenged and discussed rather than one in which there is only mutual endorsement of shared teaching strategies. They become increasingly

skilled in the theory and application of assessment and the developmental construct they are teaching and better able to link evidence of student learning readiness to targeted intervention.

As teachers learn to differentiate between deficit and developmental teaching and learning approaches, the relationship between teacher behaviour, knowledge and values with student learning was the key issue to be addressed. The effectiveness of intervention has been assumed to depend on teacher knowledge and understanding of how best to use data to improve learning outcomes. In this project, students were assessed twice within each calendar year so that value added estimates were obtained and baseline annual improvements can be established. Hattie, in his book, *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement* (2009) argues that this is approximately 0.4 without specific intervention. This project has explored ways of at least doubling that effect size.

Benefits

There are several aspects of this task that set it apart from other work in this area. Test data are interpreted in a developmental assessment framework. Substantial gains in reading achievement have occurred when measured by independent tests but without external criteria.

Linking teacher behaviour to measures of student learning outcomes enables teachers to be increasingly aware of students' readiness to learn points. In order to achieve this, there has to be change in many teachers' skills and values.

One of the most important gains from the partnership with teachers for this project has been the identification of possible areas of teacher professional development. Most exciting is the prospect of empowering teachers to better target their own professional development to more specific aspects of their own capacity to develop each student's skills.

The project is directly aligned with government targets and benchmarks for literacy and numeracy (through the NAPLAN and COAG agreements), and provides an evidence-based model to assist planning and implementation for education of Victoria's youth.

The partnership

Our aim in this partnership is to investigate how well prepared children are for school, how well they progress during school, and how successful they are in building on school in their transition to work or further study.

The partnership enables us to continually test our knowledge and evaluate it in terms of potential-to-change. We can only do this by working closely with our research partner (DEECD). This has entailed collaboration in research design, in analysis, in evaluation and in communication. Success has been possible through a two-way relationship of capacity building, based on a negotiated program of shared-site research.

Research into teaching practice

In 2004 CEOM began trials of a range of reading tests in 20 schools, seeking advice on how the test data could be used to improve students' reading comprehension, the pilot study was known as LAP (Murray & Rintoul, 2008; Griffin, Murray, Care, Thomas, & Perri, 2010).

Literacy leaders in schools led the professional learning teams (PLTs) of teachers. The PLTs engaged in collaborative discussions based on challenging peer evidence of learning and links between intervention and learning gains. Gains in reading comprehension were compelling (Griffin et al., 2010). Several hypotheses were formulated and this study examined and systematically tested those hypotheses in order to generalise and scale up the procedures across systems, year levels and subjects.

The premise was that teachers who used a specific style of evidence-based teaching, and operated within a developmental learning paradigm had an increased effect on student learning outcomes. The study examined the role of collaborative teaching teams (PLTs) in the use of data to enhance decision-making regarding teaching and learning strategies. The pilot work suggested that with a data-driven, evidence-based approach to teaching and learning, teachers could manipulate the learning environment and scaffold learning for every student, regardless of the student's development or intellectual capacity (Griffin, 2007).

In the LAP project, teachers were shown how to differentiate between deficit and developmental teaching and learning approaches. The pilot study was exploratory and explanations for the improved outcomes were suggested, but have not been tested.

The relationship between teacher behaviour, knowledge and values with student learning is the key issue addressed. The criterion was measured using standardised tests of reading and mathematics. The effectiveness of the intervention was assumed to depend on teacher knowledge and understanding of how best to use assessment data to improve learning outcomes.

In examining this relationship teachers were supported in interpreting data and in linking their interpretation to targeted intervention in a differentiated instruction framework model (Perkins, 2006). There is a convergence of research that this is an effective practice in improving teaching and learning (Snow, Burns & Griffin, 1998; Taylor, Pearson, Peterson & Rodriguez, 2005).

The common theme among previous studies has been that it is essential to have a process by which teachers can be engaged in interpreting the data, linking the information to their own teaching, and testing the links using the discourse of evidence and accountability among peers.

Teachers need to understand their own practice and how it affects student achievement. They need an understanding of the developmental nature of the construct areas in which they teach, and this must precede or underpin their understanding of the developmental assessment. Critical and collaborative discussions, where teachers test their ideas about these links, are an important vehicle for doing this. Team-based models are an effective form of professional development in comparison to traditional workshop models. Change in teaching practice can occur when teachers are engaged in examining their own theories of practice (Deppeler, 2007). The LAP project emphasised this

approach which in this project was implemented in more than 100 schools, over six year levels, and in literacy and numeracy.

Teachers' collaborative reflections have been linked to improved student achievement (Phillips et al., 2003) and changed teacher perceptions (Timperley & Alton-Lee, 2008). Collaborations in PLTs enable teachers to have access to a greater number and divergence of theories to test against their own, particularly if the community draws on differing expertise, but it can be a slow and painful process of cultural change (Ladson-Billings & Gomez, 2001). In the LAP study, it was hypothesised that this approach instilled a peer approach to accountability within the team and enabled teachers constructively to draw on and challenge the expertise and experience of their colleagues (Griffin et al., 2010). Teams of teachers, school leaders, policymakers and researchers appeared to accelerate learning when they were involved in rigorous examinations of teaching and learning, rather than comfortably sharing ideas. The shift from sharing to challenge was important and facilitated when the discourse of challenge was based on observable evidence – what students do, say, make or write; not on the interpretation or inferences that are deduced from that evidence (Griffin, 2007). This changed the discourse from a teacher-centred mode to student-based evidence.

The body of evidence outlined here in the report introduction focused us in an ever increasing way on what the next step was: to conduct research, in collaboration with teachers, into practices that could successfully develop the potential of each and every student. To use and test the very collaborative framework that had proved so fruitful in our previous studies; to use this framework to develop intervention strategies that could make a real difference in our classrooms and for all our students.

The task

The task, as initially defined, involved identifying links between numeracy and reading comprehension teaching strategies and resources associated with developmentally appropriate teaching interventions and improved student performance.

Method

The method used in this partnership originally envisaged six teacher workshops to identify, refine as necessary, document and validate developmentally targeted intervention strategies in reading comprehension and numeracy. The early workshops led to a number of significant findings that resulted in a change of method and a revised outcome. The method involved three stages:

- **Stage 1** – Four teacher workshops centered around existing data on developmentally targeted numeracy and reading comprehension teaching strategies to build understanding and to inform subsequent action.

- **Stage 2** – Sample strategy writing based on a process described by templates refined in the teacher workshops.

- **Stage 3** – Validation of the strategies at a subsequent workshop.

Stage 1 – Teacher Workshops: Engagement with data and identification of processes

Participation

Teachers of numeracy and reading comprehension were selected to contribute through the workshops via the following approaches:

- Representatives were directly invited to participate
  - Selection was based on:
    - Assessment Research Centre Online Testing System (ARCOTS) results[2]
    - Quality of ALP professional development program work submitted
    - Recommendations from other research projects

Workshops	Attendees
Workshop #1 16 December 2011	30
Workshop #2 17 February 2012	26
Workshop #3 4 May 2012	20
Workshop #4 27 August 2012	23

Table 1: Teacher workshops by date and attendance

Teachers in the workshops came from schools where improvement in the test scores was most marked over a six-month period with test and retest measures. These were teachers whose students demonstrated the largest improvement and therefore it was assumed that these teachers had available the widest of potentially successful strategies. This was not an artefact of selecting schools with high ability students.

The teachers were from schools where the improvement covered all levels of this proficiency scale.

[2] Schools in the ALP project use ARCOTS to assess their students at two time points over the school year. ARCOTS is an online system and can be used to assess literacy, numeracy and problem solving. The testing system is quasi-adaptive to help teachers target assessments and match the tests to the student ability level to gain maximum information for teaching intervention.

Process

Student point of readiness to learn is the focus of the work of the PLT. If this is identified developmentally then by following defined processes the PLT can plan, target and evaluate the effectiveness of explicit teaching interventions. When PLTs follow this process members of the PLT evaluate their own practice and its effect on student learning and develop their professional knowledge and understanding. The PLT log is the means by which the PLT organises, considers and documents its work.

The partnership brief called for the identification of effective, developmentally appropriate literacy and numeracy teaching strategies. The method involved drawing on the large amounts of data available in ALP PLT logs to identify which teaching strategies teachers were likely to be most effective. Selected strategies were to be evaluated and trialled by workshop participants in their schools. Strategies deemed most effective were to be selected as exemplars for publication. Effective strategies were also to be mapped to see if they were more appropriate at some levels than others.

Teachers who were invited to join the workshops formed the Literacy and Numeracy Working Groups and examined large numbers of de-identified original PLT logs. However, these provided limited information. An examination of the PLT logs highlighted a number of questions, not just the limited focus evident on higher level skills in literacy and numeracy covered elsewhere in this report, but also the need for more effective ***processes*** to support teachers to identify effective developmentally-targeted teaching strategies.

What was clear to the working groups from the data provided in the PLT logs was that there was an inconsistent understanding of what a strategy was and how this was different from an activity. It was clear that the goal of the lesson was often lost and that there was frequently a lack of clarity about what achievement would look like. It was also clear that the information provided in the logs would often be hard for other teachers to use at a later date because of a lack of specificity. Given these observations, a shopping list of strategies would be unlikely to bring about more effective teaching. This forced a change of method with the focus falling on how the PLT logs could be re-designed to support the *process* of understanding and developing valid and effective strategies, to write examples to serve as a model, and to identify tools that might assist with this process.

Ways in which the log could be re-drafted were identified by the working parties. These included adjusting the language used to better match existing school terminology and re-organising elements of the log to better organise practice. For example, ‘learning goals’ became ‘learning intentions’. The order of PLT actions was changed to learning intention, evidence, teaching strategy, learning activity, resources, and review and reflection to better reflect the process to be followed. The order of PLT actions was numbered to emphasize the importance of aligning the learning intention with every subsequent action. The need to clarify terminology used in the log itself was identified, e.g. what is a learning intention? What is a strategy? What is an activity? What is evidence? What are resources? The need for an example of how a PLT log should be completed was also identified so that teachers learning to use logs had a model to work from.

Sample feedback from participants recorded using a Compass Point strategy
"The (new) format and change to the PLT log clarifies the intentions and processes. (It) will make a difference to how teachers think about the processes."
"(I) love the PLT log. I can map out a term's work to see an overview of the continuum of learning and skill development."
"The PLT log is a more useable format."
"(We need to address the) impression that the logs need to be done for individual students – ensure that it is clear that it is not 25 individual students."

Table 2A: Teacher feedback - PLT logs

Sample responses from schools during the trial of the PLT logs
"I think it (the PLT log) is a huge improvement on what has been used to date. I like the term 'learning intention', as it's what we talk to teachers about all of the time. It really focuses teachers on specific purpose. It also separates out strategy and activity, and ensures that the nutshell statement is not the curriculum.
"I am pleased to say that the teachers are finding using this PLT log format very logical and it's focusing their thoughts on the strategy to meet the learning intention, rather than being driven by a 'good' activity'."
"I think having a separate column for the learning activity and teaching strategy is a good idea as the learning activity describes what the student will do whereas the teaching strategy is what the teacher will do, say etc."
"I like the PLT log's differentiation between strategy and activity. It clarifies what the teacher does and what the student does and promotes developing deep understanding in learners, rather than a transmission model. Starting with a skill, moving to a strategy and then developing an activity is effective. It is a good model I believe. Starting with an activity is teacher-centred and less precise."

Table 2B: Teacher feedback – Trials

Beck's 'Taxonomy for identifying, classifying and interrelating teaching strategies' (1998) was explored by the working groups with the aim of providing a framework for teachers to identify different types of teaching strategy that could be used to realise the learning intention. Its use helped clarify the distinction between strategy – what the teacher does and activity – what the students do. It will also assist PLTs to review and reflect on the effectiveness of different strategies and at different developmental levels. See Appendix B for the taxonomy content provided to teachers at the workshops.

Stage 2 - Sample strategy writing

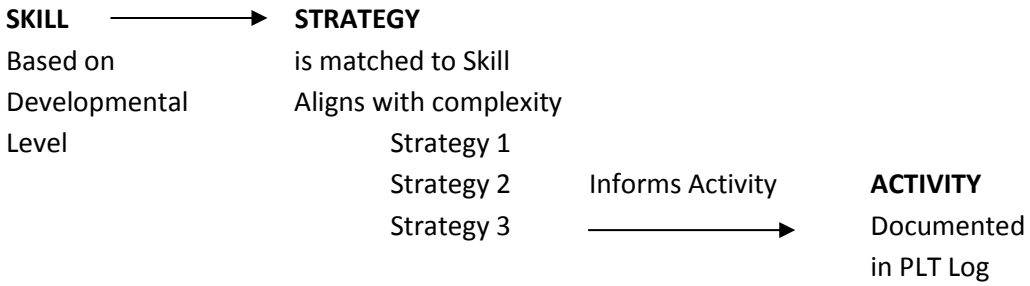
Because of the complexity of the task and the time that would be required to develop sample strategies external writers were engaged to develop them using the steps and template provided by the revised PLT log developed during the workshops and to draw on Beck's Taxonomy to categorise the types of strategies being used. Advice for the writers included:

- A description of the steps to be followed including questions to be asked about the proposed strategy.
- Data concerning the distribution of developmental levels by grade for both reading comprehension and numeracy to allow for consideration of age appropriateness when designing the teaching intervention.

Design steps

When designing new, targeted teaching strategies for the different readiness to learn points, the key task is to articulate the skill and what mastery of the skill will look like, then to match the strategy to the skill being targeted. The 'strategy' may consist of an overarching strategy and subordinate strategies or a series of related strategies. In ***matching strategies to the skill*** check that the specific objective that sits behind any given strategy is aligned with the level and complexity of the skill being targeted. Use the PLT log to document the sequence of strategies implemented in the intervention so as to provide a framework for the learning activity and to support the future development of a bank of strategies.

Thus:



Questions to interrogate the proposed strategies are:

1. Is the strategy addressing what the students are ready to learn at this particular readiness to learn point? (Evaluate the suitability with the skills level).

2. Is a student at these years able to engage with that kind of learning activities? (Evaluate the suitability with the year level).

3. Can teachers simultaneously implement the teaching strategies for different levels? (Associated with an evaluation of the feasibility of classroom management).

Distribution of developmental levels by grade

The challenge of defining suitable teaching strategies for students at different points of readiness to learn within each year level, and of students of different ages at the same developmental level across a wide range of years is highlighted in the following assessment data. The following graphs discussed in workshop 4, show the spread of students by year for all the students tested using ARCOTS in March 2011 (a total of 15,578 students for reading comprehension and of 14,304 students for numeracy). Typically, most students are clustered in one of 4-5 adjacent levels in both reading comprehension and numeracy. This has implications both in terms of the number of developmental levels in a typical class, and the age of students working at the same developmental level across a whole range of classes. The writers were asked to factor this into account when developing strategies. For reading comprehension this was addressed by using the same resource material across the full range of developmental levels (i.e. A-L) to demonstrate one way in which this could be done. In numeracy it has been addressed by identifying different approaches at the same developmental level that may be more age appropriate for junior, middle and upper level students[3].

[3] For more information on the developmental levels, see the Progression of Reading Comprehension and Progression of Numeracy Development available via: http://education.unimelb.edu.au/arc/teaching_resources

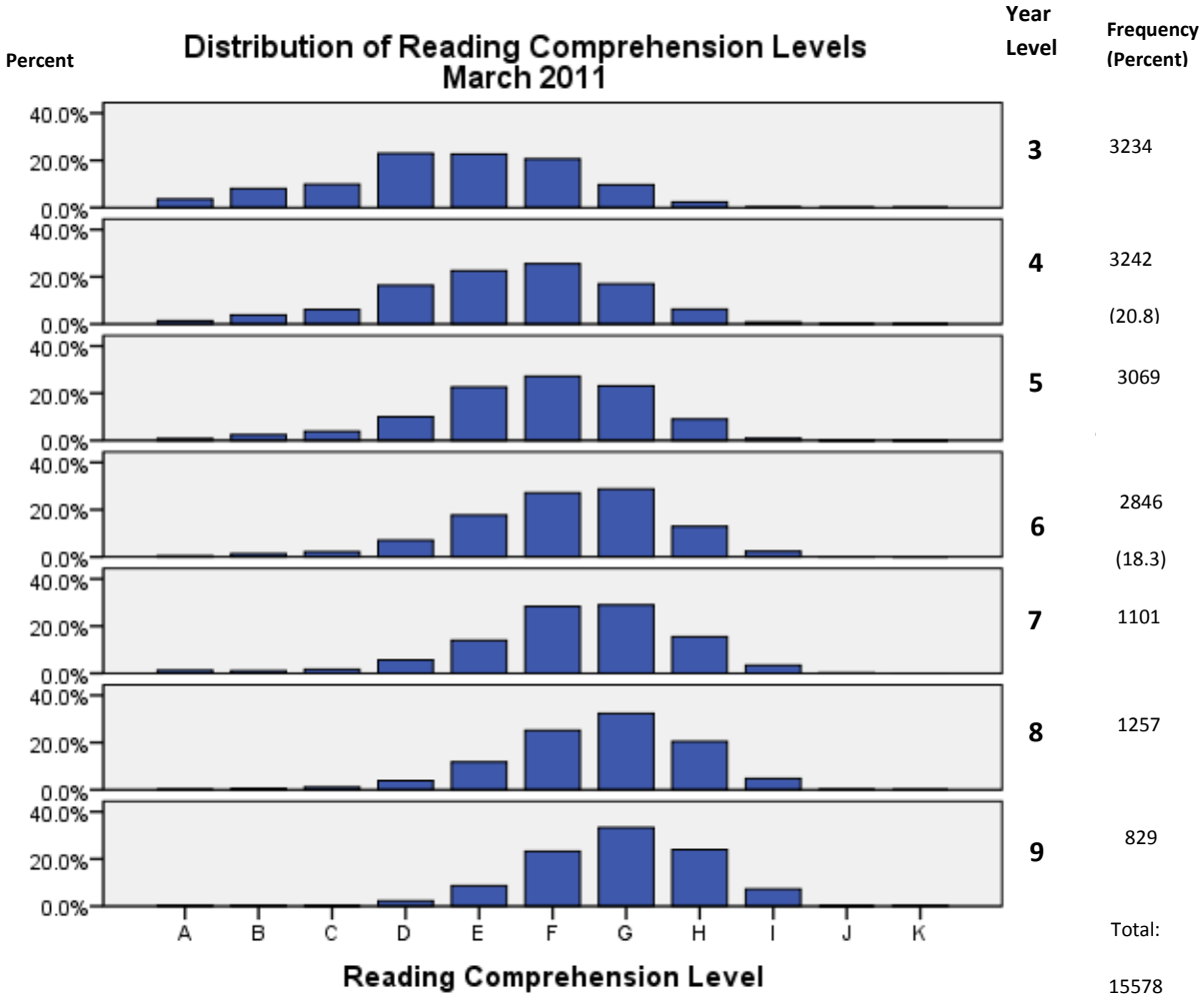


Figure 1: Distribution of reading comprehension levels

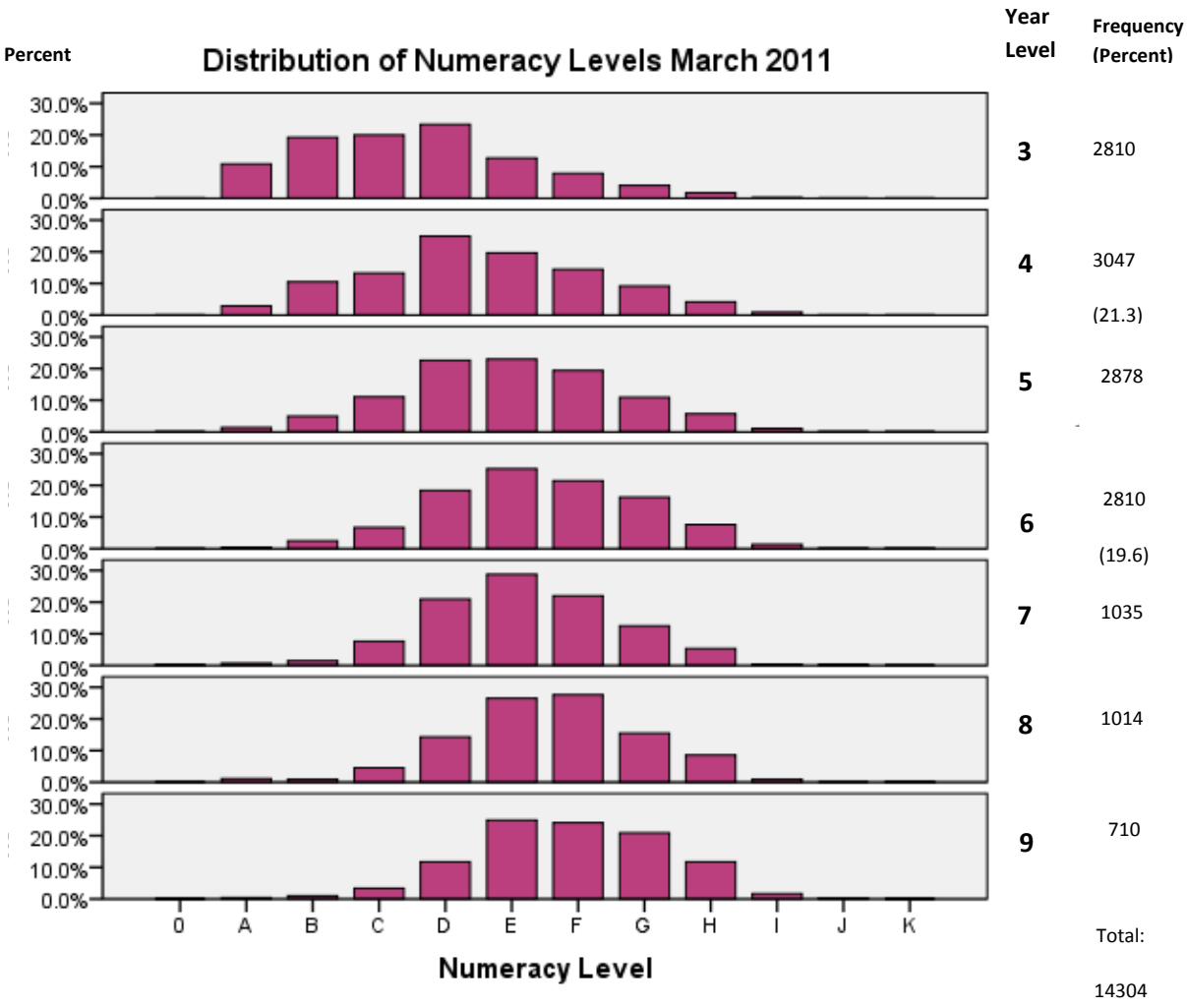


Figure 2: Distribution of numeracy levels

The sample strategies for both Reading Comprehension and Numeracy are presented on the Assessment Research Centre website. See Strategies - Narrative Poetry - A to L; and Strategies - Numeracy - A to L.

It should be noted that the strategies presented are not ends unto themselves, rather they are means of promoting professional discourse: discourse about student developmental reading and numeracy levels, discourse about the elements of comprehension, discourse about teacher content knowledge, and discourse about teacher pedagogical content knowledge. In this way, these strategies are a sample of the kind of strategies that teachers can use for students at different readiness to learn points, but they do not intend to be a comprehensive set of samples. Instead, it is hoped that these set of strategies can be used to facilitate teachers' collaborative reflection about students at different skills' levels and then new targeted strategies can be adapted from the repertoire teachers already are using. Teachers are advised to use the strategies as starting points for discussions during PLT meetings and to consult the references provided on the Assessment Research Centre website.

Stage 3 – Validation of sample strategies

A workshop will be held with the original workshop participants to review the results of the work and to validate the findings.

Sources of data and data analysis

Data collections on student achievement for ALP schools were timed to occur within the Australian Research Council Linkage project at two points in the year – March and October. This data provided information as to which schools were experiencing the greatest improvements in student achievement. Invitations to join literacy and numeracy groups were linked to school improvement as outlined earlier in this report.

A key source of data and data analysis was generated by the ALP project. The project tested 36,000 students in years 3 to 10 in reading comprehension, maths and critical thinking.

Teachers from more than 500 Catholic and state schools in Victoria were taught to analyse the test results and then divide students into groups depending on their ability, regardless of what year they were in. All students were reassessed after six months. As the graph below shows, the ALP project provided a body of evidence for the lower levels of growth in students of higher order skills, which reflected findings made in this project outlined in the Study Results.

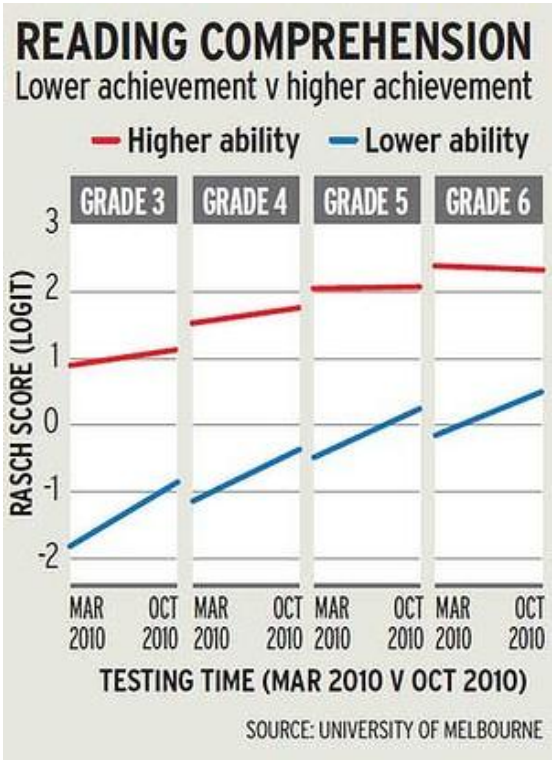


Figure 3. Source: ('Results flatline for top students', Jewel Topsfield, *The Age*, 10 January 2013).

Study results

The research question and the data

If teachers' use of data within a developmental framework can be demonstrated to improve the student performance what then is the relationship between teacher behaviour, knowledge and values to this improved performance?

How does teachers' use of data in a developmental framework lead to improved student outcomes by way of changes to teacher behaviour, knowledge and values?

Data in the form of proposed strategies available in the original PLT logs audited by the Literacy and Numeracy Working Parties demonstrated that teachers were proficient in recommending strategies for developing lower-order skills among their students. However, they were significantly less likely to identify strategies at the top levels of the reading or mathematics continua. The results of the audits conducted in these workshops are presented in Table 3A and 3B.

Using Table 3A (Mathematics) as the example, the level of proficiency is shown in the left column of the table – levels are A through L, with L being the most sophisticated or the highest order of skill. Level A was used to indicate that insufficient data was obtained in order to make a decision largely because students have not completed enough work to illustrate their competence in mathematics. Across the top of the table the labels indicate the number of suggestions made in the workshop (113 approaches to differentiated instruction), which the teachers then examined for suitable strategies. They classified the strategy according to its potential use: they could use the suggested teaching strategy without modification; they could use it if it was modified; and they could use it but it would have to be applied to a different level to that suggested. The results are presented in Table 3A and 3B for numeracy and literacy respectively. Of the 147 strategies that could be identified for mathematics across all levels 73 per cent were associated with number skills, only 1 per cent was associated with space geometry. Only 3 per cent were associated with the higher order skill levels of the learning progression.

		Decision for strategy			
Level	**Suggestions**	**Use**	**Modify**	**Re-level**	**Total**
L	0	0	0	0	0
K	1	0	1	0	1
J	2	0	4	0	4
I	2	0	5	0	5
H	7	2	6	0	6
G	11	13	10	1	19
F	9	24	6	0	30
E	9	25	4	0	29
D	23	4	15	0	19
C	7	2	5	0	7
B	37	4	6	0	10
A	2	5	3	2	10
Miscellaneous	3	0	0	0	0
Total	113	79	65	3	147

Table 3A: Frequency of suggested Numeracy strategies by level

A similar pattern emerged for strategies associated with teaching reading comprehension. More than 400 strategies were identified from the original PLT logs, of which the teachers decided that they could use 72 without modification, 79 if they were modified and a further seven if they could be applied to a different proficiency level to that recommended.

The trend in both tables indicates that there are numerous strategies for teachers to help develop lower-order skills. However, there were no strategies in the PLT logs for the development of higher order skills at the top of the developmental progression.

		Decision for strategy			
Level	**Suggestions**	**Use**	**Level**	**Suggestions**	**Use**
L	0	0	0	0	0
K	0	0	0	0	0
J	0	0	0	0	0
I	35	16	3	0	19
H	37	12	7	3	22
G	75	19	29	4	52
F	83	0	0	0	0
E	27	0	0	0	0
D	48	8	10	0	18
C	57	12	11	0	23
B	76	5	17	0	76
A	2	0	2	0	2
Miscellaneous	0	0	0	0	0
Total	440	72	79	7	158

Table 3B: Frequency of suggested Literacy strategies by level

An analysis of improvement in the test scores over a six-month period with test and retest measures indicated that improvement where it occurred was focused at the bottom end of the scale or the development of low-order skills and not at levels of higher-order skills. The possible explanations for a lack of strategies at higher order skill levels included the following:

1. The format or language of the proficiency levels inhibited teachers' interpretation. This in turn diminished their capacity to offer suggestions of intervention strategies and resources.

2. Strategies for higher order skills development are not documented in that they are identified and implemented intuitively.

3. Intervention strategies are reliant on commercially prepared resources. This means that teachers implement the strategies without necessarily understanding how they link to a developmental framework.

4. Teachers lack confidence in being able to articulate their own strategies despite the evidence that their students improve.

5. Teachers have no systematic record on which to draw on in terms of articulating teaching and intervention strategies for students developing at levels of higher-order capabilities.

6. Teachers opted to start developing strategies from the lower levels upwards.

7. Teachers do not know how to intervene with students at a higher order level.

The last explanation may be unpalatable. But the replication of the plateauing effect with students at higher-order levels may be due to the final rationale offered. It may be that the emphasis on 'closing the gap' means that teachers are encouraged to emphasise intervention at the bottom end of the proficiency scale. The logic says that students at the top end of the scale are higher-ability students. As such they should be able to improve at a faster rate than those at the lower levels. This study is showing the opposite. Students at the bottom levels of the proficiency scale are improving rapidly. Students at the top end of the scale are hardly improving at all. The link to teacher strategies and teacher resources is a disturbing link.

Because of the way in which the developmental progressions are formulated it is possible to argue that each level in the progression should provide an opportunity for developing skills amongst the students already placed at that level. Because the scales are developed using item response modelling with the response probability of 0.4, students at each level of the scale have approximately 50 per cent chance of being able to demonstrate skills at that level. Lower-ability students are identified as being at the lower-order skill levels associated with their Vygotskian zone of proximal development. This applies to students based at a higher-order skill levels as much as it applies to students based at the lower-order skill levels. The ability of the students is matched to the difficulty of the skills embedded in the levels on the developmental progressions. Hence it can be expected that the higher-ability students have the same chance of success at the higher-order skills as do the lower-ability students have of success in the lower-order skill levels.

Teachers were less able to offer intervention strategies at the top end of the proficiency scale, but they were able to offer numerous intervention strategies at the bottom end of the scale. Emphasising improvement at the bottom end of the skill level continuum perhaps indicates that the rhetoric of 'closing the gap' may be denying students at the top end of the scale an opportunity for accelerated progress. It also suggests that at a national or state level overall improvement is constrained by the emphasis on intervention at the bottom end while allowing the top end students to develop unaided.

Influences on development of intervention strategies

Deficit approaches to diagnosis of student learning focus on the things that students cannot do and are insufficient to improve learning. In particular they focus on a 'rescue' package for low-achievers.

Developmental models scaffold existing knowledge bases of all students. They focus on readiness to learn and follow a generic thesis of developing the student. For this approach the expertise of the teacher both in content and in developmental learning and assessment is critical (Wilson & Draney, 1999).

The normal practice in teacher professional development programs and in pre-service training is to focus first on teaching strategy. The LAP study made it explicit that there was a prior student

condition that had to be measured and generalised to a level of development. Only after these steps was it appropriate to design intervention linked to an overall level of development (Griffin et al., 2010; Murray & Rintoul, 2008). Resource allocation and decision making about instruction then follow the generalisation.

Criteria for success

1. A report indicating the cognitive models will be published as research papers and disseminated through journals and conferences.

Griffin, P., Care, E., Francis, M., Hutchinson, D., & Pavlovic, M. (2012). The influence of teaching strategies on student achievement in higher order skills.
Paper presented at the ACER Research Conference 2012. School Improvement: What does research tell us about effective strategies? Sydney Convention and Exhibition Centre, Darling Harbour, NSW.

Care, E., Griffin, P., Zhang, Z., & Hutchinson, D. (in press). In C. Wyatt-Smith and V. Klenowski. The Enabling Power of Assessment. Springer.

2. Workshops for teachers and policy makers in systems of education will also be held.

Four workshops were held in 2012, during which teachers from a total of 18 schools used formative assessment data (see the Methodology section of this report) to inform the development of teaching strategies, learning activities and resources. The development of these teaching strategies and learning activities was driven by the identification of the students' current zone of proximal development, then the strategies were defined targeting to the readiness to learn of students at different readiness to learn points.

In this study it was proposed to measure learning team activity and cohesion and to relate the discussion to clarification of decisions and their links to learning outcomes. In LAP, how teacher teams developed the capacity to use data to improve student learning was also linked to the way in which teacher teams developed data-driven instructional systems to improve classroom practice and monitor student learning. Griffin (2007), Griffin et al. (2010) and Timperley and Alton-Lee (2008) have shown how team leaders and teachers developed formative feedback systems. Timperley and Alton-Lee (2008) have also shown that teachers in teams need to develop as members of their teams. Cohorts of teachers learned how to challenge each other and use evidence to discuss specific issues in a professional experience-based learning approach.

Follow-up and support was needed in the schools. Professional development was shown to match the readiness to learn points of students so that the new skills can transfer into the classroom. A range of interesting findings arose from the workshops; some of these are highlighted in Griffin et al. (2012).

Despite the challenges faced in developing the set of intervention strategies, the workshops yielded several positive outcomes. The workshops highlighted a need for an enhanced ***process*** to identify,

select and document teaching strategies at the PLT and school level. The process requires an order: learning intention linked to developmental level, evidence, teaching strategy, learning activity, resource allocation, review and reflection.

The process focused professional conversations on identifying and selecting the best strategies to teach the identified skill. This included iteration. It was clear that the revised process supports ongoing planning and documentation to facilitate evaluation and to ensure learning is not lost.

The process requires not only the relevant developmental progression but also a means of classifying and auditing the types of strategies proposed.

This has been extrapolated in the Methodology section of this report.

3. Teacher advice on successful strategies and materials will be posted on an interactive website that enables both access and analysis. This will be made available to all schools depending on the approval of the participating sectors. It will emphasise the practice of teaching to a construct rather than a preparation exercise for test taking. This will help to address many of the more strident criticisms of the NAPLAN and its pressure on teachers to drill and practice test taking skills.

Suggestions for teachers:

- Teachers should use the PLT template to plan their own teaching interventions taking into account their own collaborative team contexts and classrooms.
- Teachers should use the completed PLT logs as models making sure that each step links back to the learning intention and that there is a level of detail sufficient to explain what was done and why.
- For numeracy resources, teachers should make use of the e-book boxes which have been aligned to suggested strategies.
- The reading comprehension strategies should be interrogated and validated at a workshop with participating teachers (and coaches) and with University-based experts.
- Incorporate the revised logs into teaching to target group(s) in ALP schools.
- Where junior year students are working at J, K or L the age-appropriateness of the application of these strategies needs to be considered on a case-by-case basis.

Recommendations

1. The results of this project should be disseminated through a series of road shows delivered by senior government officials.

2. The DEECD, CEOM and the University of Melbourne should prepare a joint paper and slideshow presentation to be published and presented through teacher and school leadership publications.

3. The merit pay debate should focus on schools being rewarded where it can be shown that both upper and lower quartiles improved by more than the Hattie benchmark of effect size 0.4. These results should be externally and objectively verified and such evidence provided by schools that the growth was achieved within one school year.

4. A media campaign should be undertaken by education systems in Victoria to educate the media and the public of the importance of growth targets for ***all*** students including the equity principle of equality of opportunity for all. “Close the opportunity gap” instead of “close the gap”.

5. A program of professional development should be launched for teachers at all grades from 1 to 10 to redress the lack of growth in the upper quartile of students and these professional development programs should be evaluated and rewarded (continued) on the basis of externally verifiable data illustrating that both upper and lower quartiles improve by amounts greater than the Hattie benchmark.

An expansion of what 'closing the gap' really means for all students

Teachers were less able to offer intervention strategies at the top end of the proficiency scale, but they were able to offer numerous intervention strategies at the bottom end of the scale. Emphasising improvement at the bottom end of the skill level continuum perhaps indicates that the rhetoric of ‘closing the gap’ may be denying students at the top end of the scale an opportunity for accelerated progress. It also suggests that at a national or state level overall improvement is constrained by the emphasis on intervention at the bottom end while allowing the top end students to develop unaided. This perhaps means that if this is a systemic problem replicated in the PISA and NAPLAN data there may be a national and systemic problem of a lack of teaching strategies or resources to encourage higher ability students to improve or progress at a rate commensurate with their ability. This points to a need for a shift in rhetoric.

The workshops highlighted a need to develop a *process* to identify, select and document teaching strategies at the PLT and school level. The process requires order: skill, evidence, teaching strategy, learning activity, resource allocation, review and reflection.

The process requires not only the relevant developmental progression but also a means of classifying and auditing the types of strategies proposed.

Importantly, a positive outcome of the workshops was that the process focused professional conversations on identifying and selecting the best strategies to teach the identified skill. This includes iteration. It was clear that the process supports ongoing planning and documentation to facilitate evaluation and to ensure learning is not lost.

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