Assessment beyond NAPLAN

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Broad scale assessment at national level (NAPLAN) is valuable in helping answer the question of how well we are doing across the nation in literacy. There are limitations to the national testing regime when the only tasks included are those intended to assess reading comprehension. It is unquestionably a major function of reading, but not the only important component.

The assessment of other critical components can supply valuable information not available in the NAPLAN process. For example, other forms of assessment can assist in the identification and management of students at-risk even before reading instruction commences. They can also help identify those making slow progress at any year level. This is especially important given the usually stable learning trajectory from the very early stages. If specific interventions are implemented, appropriate reading assessment can provide on-going information about the effectiveness of the chosen approach. There is an important question implicit in this potentially valuable activity. What sorts of assessment are likely to be most beneficial in precluding reading pitfalls and enhancing reading success? In this submission, the emphasis is directed towards assessment of those aspects of reading that have been identified by research as critical to reading development. These other forms of data collection may be made by teachers and other education-oriented professionals such as educational psychologists and speech pathologists.

Assessing literacy in Australia

The attainment of high levels of literacy in Australia remains a distant objective, apparently no closer now than in the past, despite the investment of huge sums on smaller class sizes and various instructional initiatives (Leigh & Ryan, 2008). Until recently, national assessment results have not been available in Australia, as they are in the USA through their National Assessment of Educational Progress (NAEP; Koretz, 1992), a program that has measured the reading of students in years 4, 8, and 12 since 1992. An absence of explicit, regularly collected national data has made it difficult to be precise about the extent of literacy development across the nation.

The Australian Government House of Representatives Enquiry (1993) estimated that between 10-20 % of students finish primary school with literacy problems. More recently it was reported that the remedial program known as Reading Recovery is provided to on average 40 to 50 % of Year 1 students (Office of the Victorian Auditor General, 2003). Concern has been expressed that after their Year 3 at school students with reading problems have little prospect of adequate progress (Australian Government House of Representatives Enquiry, 1993). Providing additional foundation for that fear was a Victorian study (Hill, 1995) that noted little discernible progress in literacy for the lowest 10% between Year Four and Year Ten. Nationally, according to

the Australian Council for Educational Research, more than 30 % of Australian children entering high school (mainly in government and Catholic schools) cannot read or write properly (Hill, 2000). This figure of 30% is also reported by Louden et al. (2000), and Livingston (2006). Almost half of all Australians aged 15-74 years have literacy skills below the minimum level needed to manage the literacy demands of our modern society (Australian Bureau of Statistics, 2008).

In contrast to these alarming figures, government pronouncements on literacy success are usually more positive. In the recent NAPLAN national assessment of students in Year 3, 5, 7, and 9, approximately 90% of students reportedly achieved the required minimum standards (MCEETYA, 2008). Unfortunately, the benchmarks were not made transparent, and hence it is difficult to reconcile these findings with other assessments described above. Knowing what constitutes minimum standards is vital, given the marked variability displayed in the previous national and state assessment schemes that the NAPLAN replaced.

A weakness of such opaque data is the potential for benchmarks to be manipulated to show governments of the day in the best possible light. There are examples in which benchmarks have been so low as to be at the level of chance. For example, when four multiple choice items constitute the response set for students, a 25% mark could be obtained by chance alone. Surely benchmarks would never be so low that chance alone could produce a proficiency level?

> "In 2006, the results needed to meet national benchmarks for students in Years 3, 5 and 7 ranged from 22% to 44%, with an average of less than 34%. Year 3 students needed to achieve only 22% for reading, 39% for numeracy, and 30% for writing to be classified as meeting the minimum acceptable standard (Strutt, 2007, p.1)."

Recently in Great Britain (Paton, 2008), the Assessment and Qualifications Alliance exam board admitted that standards had been lowered to elevate scores in 2008. In one exam paper, C grades (a good pass) were awarded to pupils who obtained a score of only 20%. Over recent years in the USA, eight states had their reading and/or maths tests become significantly easier in at least two grades (Cronin, Dahlin, Adkins, & Gage Kingsbury, 2007). The report, entitled The Proficiency Illusion, also found that recent improvements in proficiency rates on US state tests could be explained largely by declines in the difficulty of those tests.

Parental concerns about literacy are becoming increasingly evident. In the *Parents' Attitudes to Schooling* report (Department of Education, Science and Training, 2007), only 37.5% of the surveyed parents believed that students were leaving school with adequate skills in literacy. There has been an increase in dissatisfaction since the previous *Parents' Attitudes to Schooling* survey in 2003, when 61% of parents considered primary school education as good or very good, and 51% reported secondary education as good or very good. Recent reports in

the press suggest that employers too have concerns about literacy development among young people generally, not simply for those usually considered to comprise an at-risk group (Collier, 2008).

If community interest in literacy has been sparked, and there is some concern about the validity of the national broad scale assessment model, it is important for educators to offer guidance about high quality assessment. Part of the current literacy problem can be attributed to educators because they have not offered this high quality assessment in their schools to monitor progress. There has been a tendency to rely on informal assessment, such as through the use of unhelpful techniques like miscue analysis (Hempenstall, 1998), and the perusal of student folios (Fehring, 2001). If every teacher did implement a standard, agreed upon assessment schedule, based upon the current evidence on reading development, then there would be no real need for national assessment. Data would be comparable across the nation, based upon an similar metric.

It is recognised that literacy assessment itself has little intrinsic value; rather, it is only the consequences flowing from the assessment process that have the potential to enhance the prospects of those students currently struggling to master reading. Assessment also allows for the monitoring of progress during an intervention, and evaluation of success at the end of the intervention; however, the initial value relates to the question of whether there is a problem, and if so, what should be done. What should be done is inevitably tied to the conception of the reading process, and what can impede its progress. How do educationists tend to view the genesis of reading problems?

Perceptions of literacy problems and causes

Alessi (1988) contacted 50 school psychologists who, between them, produced about 5000 assessment reports in a year. The school psychologists agreed that a lack of academic or behavioural progress could be attributed to one or more of the five factors below. Alessi then examined the reports to see what factors had been assigned as the causes of their students' educational problems.

1. Curriculum factors? No reports.
2. Inappropriate teaching practices? No reports.
3. School administrative factors? No reports.
4. Parent and home factors? 10-20% of reports.
5. Factors associated with the child? 100%.

In another study this time surveying classroom teachers, Wade and Moore (1993) noted that when students failed to learn 65% of teachers considered that student characteristics were responsible while a further 32% emphasised home factors. Only the remaining 3% believed that the education system was the most important factor in student achievement, a finding utterly at odds with the research into teacher effects (Cuttance, 1998; Hattie, Clinton, Thompson, & Schmidt-Davies, 1995).

This highlights one of the ways in which assessment can be unnecessarily limiting in its breadth, if the causes of students' difficulties are presumed to reside solely within the students, rather than within the instructional system. Assessment of students is not a productive use of time unless it is carefully integrated into a plan involving instructional action.

When the incidence of failure is unacceptably high, as in Australia, then an appropriate direction for resource allocation is towards the assessment of instruction. It can only be flawed instruction that intensifies the reading problem from a realistic incidence of reading disability of around 5% (Brown & Felton, 1990; Felton, 1993; Marshall & Hynd, 1993; Torgesen, Wagner, Rashotte, Alexander, & Conway, 1997; Vellutino et al., 1996) to that which we find in Australia of 20 - 30% (see earlier). A tendency can arise for victim blame. "Learning disabilities have become a sociological sponge to wipe up the spills of general education. … It's where children who weren't taught well go (p.A1)" (Lyon, 1999).

Though it is not the focus of this submission, there is an increasing recognition that an education system must constantly assess the quality of instruction provided in its schools, and that it should take account of the findings of research in establishing its benchmarks and policies. "Thus the central problem for a scientific approach to the matter is not to find out what is wrong with the children, but what can be done to improve the educational system" (Labov, 2003, p.128). The interest in the national English curriculum is an example of this emerging system interest. Up to this time, education systems in Australia have been relatively impervious to such findings (Hempenstall, 1996, 2006), lagging behind significant, if tenuous, changes in the USA with Reading First (Al Otaiba et al., 2008) and in Great Britain, the Primary National Strategy (2006).

Even allowing that the major problem for the education system lies in the realm of instruction, particularly in the initial teaching of reading, individual student assessment remains of value. It is, of course, necessary as a means of evaluating instructional adequacy. Beyond that, there is great potential value in the early identification of potential reading problems, in determining the appropriate focus for instruction, in the monitoring of progress in relevant skill areas, and with the evaluation of reading interventions. It is the assumption in this paper that decisions about assessment should be driven by up-to-date conceptions of the important elements in reading development.

Issues in reading development that could guide assessment

In the largest, most comprehensive evidenced-based review ever conducted of research on how children learn to read the National Reading Panel (NRP; National Institute of Child Health and Human Development, 2000) presented its findings. For its review, the Panel selected methodologically sound research from the approximately 100,000 reading studies that have been published since 1966, and from another 15,000 earlier studies.

The specific areas the NRP noted as crucial for reading instruction were phonemic awareness, phonics, fluency, vocabulary, and comprehension. Students should be explicitly and systematically taught:

1. Phonemic awareness: The ability to hear and identify individual sounds in spoken words.
2. Phonics: The relationship between the letters of written language and the sounds of spoken language.
3. Fluency: The capacity to read text accurately and quickly.
4. Vocabulary: All the words students must know to communicate effectively.
5. Comprehension: The ability to understand what has been read.

For children in pre-school and in their first year of formal schooling, the Panel found that early training in phonemic awareness skills, especially blending and segmenting, provided strong subsequent benefits to reading progress. It further recommended that conjoint phonemic awareness and phonics emphases should be taught directly, rather than incidentally, as effective instruction in both skills leads to strong early progress in reading and spelling.

The Panel's emphasis on these five elements is also consonant with the findings of other several major reports, such as those of the National Research Council (Snow, Burns, & Griffin, 1998), the National Institute for Child Health and Human Development (Grossen, 1997), the British National Literacy Strategy (Department for Education and Employment, 1998), and recently in the Rose Report (Rose, 2006) and the Primary National Strategy (2006).

In 2006, the Primary Framework for Literacy and Mathematics (Primary National Strategy, 2006) was released, updating its 1998 predecessor, and mandating practice even more firmly onto an evidence base. In particular, it withdrew its imprimatur from the 3-cueing system (Hempenstall, 2003), and embraced the Simple View (Hoover & Gough, 1990) of reading that highlights the importance of decoding as the pre-eminent strategy for saying what's on the page, and comprehension for understanding that which has been decoded. Under the 3-cueing system, making meaning by any method (for example, pictures, syntactic, and semantic cues) was considered worthwhile, and, for many protagonists, took precedence over decoding as the prime strategy (Weaver, 1988).

The new 2006 Strategy mandates a synthetic phonics approach, in which letter–sound correspondences are taught in a clearly defined sequence, and the skills of blending and segmenting phonemes are assigned high priority. This approach contrasts with the less effective analytic phonics, in which the phonemes associated with particular graphemes are not pronounced in isolation (i.e., outside of whole words). In the analytic phonics approach, students are asked to analyse the common phoneme in a set of words in which each word contains the phoneme being introduced (Hempenstall, 2001). The lesser overall effectiveness of analytic phonics instruction may be due to a lack of sufficient systematic practice and feedback usually required by the less able reading student (Adams, 1990).

In Australia, the National Enquiry into the Teaching of Literacy (Department of Education, Science, and Training, 2005) recommendations exhorted the education field to turn towards science for its inspiration. For example, the committee argued strongly for empirical evidence to be used to improve the manner in which reading is taught in Australia.

> In sum, the incontrovertible finding from the extensive body of local and international evidence-based literacy research is that for children during the early years of schooling (and subsequently if needed), to be able to link their knowledge of spoken language to their knowledge of written language, they must first master the alphabetic code – the system of grapheme-phoneme correspondences that link written words to their pronunciations. Because these are both foundational and essential skills for the development of competence in reading, writing and spelling, they must be taught explicitly, systematically, early and well (p.37).

Research supporting an early emphasis on the code for both assessment and instruction?

Even though it is comprehension that is the hallmark of skilled reading, it is not comprehension per se that presents the major hurdle for most struggling young readers. There is increasing acknowledgement that the majority of reading problems observed in such students occur primarily at the level of single word decoding (Rack, Snowling, & Olson, 1992; Stanovich, 1988a; Stuart, 1995; Vellutino & Scanlon, 1987), and that in most cases this difficulty reflects an underlying struggle with some aspect of phonological processing (Bradley & Bryant, 1983; Bruck, 1992; Lyon, 1995; Perfetti, 1992; Oakhill & Garnham, 1988; Rack et al., 1992; Share, 1995; Stanovich, 1988a, 1992; Vellutino & Scanlon, 1987; Wagner & Torgesen, 1987). In the Shaywitz (2003) study, 88 percent of the children with reading problems had phonologically-based difficulties. Lovett, Steinbach, and Frijters (2000) summarise neatly this emphasis. "Work over the past 2 decades has yielded overwhelming evidence that a core linguistic deficit implicated in reading acquisition problems involves an area of metalinguistic competence called phonological awareness" (p.334).

Unless resolved, phonological problems predictably impede reading development, and they continue to be evident throughout the school years and beyond (Al Otaiba et al., 2008). A study by Shankweiler, Lundquist, Dreyer, and Dickinson (1996) provided some evidence for the fundamental problem area. Their study of Year 9 and Year 10 learning disabled and low to middle range students found significant deficiencies in decoding across the groups, even among the average students. They argued for a code-based intervention as an important focus. They also noted that differences in comprehension were largely reflecting levels of decoding skill, even among senior students, a point echoed by Simos et al. (2007) in their magnetoencephalographic study, and Scammacca et al. (2008) in their meta-analysis. Shankweiler and colleagues (1999) also found that decoding,

assessed by reading aloud a list of non-words (e.g., skirm, bant), correlated very highly with reading comprehension -- accounting for 62% of the variance.

A number of similar studies involving adults with reading difficulties have revealed marked deficits in decoding (Bear, Truax, & Barone, 1989; Bruck, 1990, 1992, 1993; Byrne & Letz, 1983; Perin, 1983; Pratt & Brady, 1988; Read & Ruyter, 1985; cited in Greenberg, Ehri, & Perin, 1997). In the Greenberg et al. (1997) study with such adults, performance on phonologically-based tests resembled those of children below Year Three. Even the very bright well-compensated adult readers acknowledged that they had laboriously to remember word shapes (an ineffective strategy), had little or no idea how to spell, and were constantly struggling to decode new words, especially technical terms related to their occupations.

The emphasis on decoding is not to say that difficulties at the level of comprehension do not occur, but rather, that for many students they occur as a consequence of a failure to develop early fluent, context-free decoding ability. The capacity to actively transact with the text develops with reading experience, that is, it is partly developed by the very act of reading. Students who engage in little reading usually struggle to develop the knowledge of the world and the vocabulary necessary as a foundation for comprehension (Nagy & Anderson, 1984; Stanovich, 1986, 1993). " … the phonological processing problem reduces opportunities to learn from exposure to printed words and, hence, has a powerful effect on the acquisition of knowledge about printed words, including word-specific spellings and orthographic regularities" (Manis, Doi, & Bhadha, 2000, p.325).

Schools often espouse the goal of teaching all students to read. So, they need to know how students are progressing along the way to meet this goal (Kame'enui, Simmons, & Coyne, 2000). This implies the existence of long-term reading goals, and some sort of performance benchmarks for their students. Criterion-based benchmarks supply one form of progress monitoring. They should be aligned with the skills emphasised by the National Reading Panel, and assessed regularly during the primary years at least, to provide schools with information about student progress and the appropriateness (focus, intensity, duration) of the current instruction (Coyne, Kame'enui, & Simmons, 2004).

Effective initial instruction can reduce the need for much individual assessment, but it is predicated on the provision of regular whole class monitoring. For example, at the beginning of the year all students could be provided with a reading assessment to assess overall literacy competence. A mid-year progress assessment can be used to evaluate instructional adequacy, and inform any revised instructional decisions. For those detected as being at risk, more fine-grained assessment information allows for efficient, pinpoint instruction. This group of students require elevated intensity of programming with specific short-term measurable objectives. Those short-term learning goals could be monitored at least monthly. In this system, those who struggle are observed more closely and more frequently.

Given the confluence of the findings of empirical research on reading instruction, it is appropriate for reading assessment to reflect this current understanding. If the five NRP elements are critical to development, then designing assessment around these five offers the best chance of detecting *where* something goes wrong, rather than solely that something is wrong. Of the five important elements, phonemic awareness, phonics, and fluency are lower order skills related to efficiently getting the words off the page; whereas, vocabulary and comprehension are higher order language skills associated with appreciating the meaning of the words obtained through efficient use of these well developed lower order processes.

Reading assessment that reflects the current understanding

At *beginning* stage:

Early reading delay is sometimes viewed as indicative of a slow starter who will catch up later; however, this is a dangerous assumption. It is based upon a belief that learning to read is as natural as learning to speak, and that immersion in interesting literature is sufficient to promote the process of development. An associated assumption that delays early identification and intervention is that children have a natural and immutable developmental trajectory that cannot profitably be hurried (Hempenstall, 2005).

Juel (1988) reported a probability of .88 that a student classified as a poor reader at the beginning of Year 1 would remain so when re-tested at Year 4, a finding echoing earlier work by Satz, Fletcher, Clark, and Morris (1981) who found that 93.9% of severely poor readers in Year 2 continued to be poor readers in Year 5. There is now a strong consensus (Al Otaiba et al., 2008; Shaywitz et al., 1999) about this nexus. The Matthew Effect (Stanovich, 1986) describes how relatively minor early deficits often broaden into a cascade of problems that intensify over a student's career. Early identification and intervention should be paramount issues for the sake of those children who are at present needlessly exposed to crippling, extended failure.

Methods of identification

It is possible to obtain information from a wide array of domains possibly relevant to reading success, for example, perceptuo-motor development, and skills related to vision, balance, speech, handedness, self-help, language, and socialisation. One important issue is to what degree the potential components add to the predictive power of any intended assessment battery.

A second is how accurately the test(s) predict membership of the group of students who will struggle. A test or test battery, when employed with a group of children, will have a false positive rate and a false negative rate. In the former, there are children identified as at-risk who, without intervention, do not subsequently present with literacy difficulties. In the latter, there are children who do not appear as at-risk in the assessment, but who do later develop literacy problems. Scarborough (2003) refers to these occurrences as miss errors. Depending on the test(s) chosen and the cut-offs selected as the risk levels, the test(s) may be overly inclusive, identifying an unreasonably large cohort of students as at-risk. Alternatively, the results may underestimate the number of

children at risk. The choice of tests needs to take these issues into account, and a higher than desirable false positive rate is considered more acceptable than a high false negative rate. Although one might waste resources on some students who didn't really require additional assistance, at least you don't miss many of those who do need your help.

Tests are necessary because teacher predictions are highly variable. As a group, teachers tend to predict reasonably well those students who will not experience reading difficulty, but predict much less well those students who will subsequently endure literacy problems (Rathvon, 2004).

The third requirement is that any screening test be relatively brief, and readily administered by teachers (Snow, Burns, & Griffin, 1998). The more (relevant) tests you add, the more accurate will be your predictions; however, the scarce resources available for testing all children demand brief assessment times. Scarborough (1998) in her review of screening tools suggested the extra work involved in administering and interpreting large test batteries is not reflected in a commensurate improvement in accuracy of screening.

The choice of tests also involves a consideration of the theoretical relevance of the tests, their soundness as instruments (validity and reliability), and their time demands. The length of some tests and batteries makes their use on large cohorts unworkable. There is usually some trade-off when selecting tests between the higher reliability of longer tests and multiple tests of the same skill, and the feasibility of test use with cohorts of students. However, a great deal of effort is being expended in constructing tests (both standardised and curriculum-based) that are brief, and yet able to provide trustworthy and valuable information. The tests described in this paper are generally considered to be of sound construction, and have adequate validity and reliability. However, a problem with many tests involves floor effects (Rathvon, 2004). When there are insufficient low-complexity items in a test, a very low score may not be adequately interpreted as an at risk score when standardised. Thus, a test with a high floor may fail to detect serious deficits. This problem occurs most frequently with the youngest children in a test's age range. For example, a raw score of 1 out of 20 items in the Elision subtest of the *Comprehensive Test of Phonological Processing (CTOPP)* (Wagner, Torgesen, & Rashotte, 1999) produces a standard score of 8 for a five year old, which is less than one standard deviation from the mean (M=10, SD=3). Thus, test users need to be alert to test issues generally, and especially to the risk of even highly regarded tests having weaknesses at their lower age ranges.

The advantage of broadscale screening is that it avoids the backlog, delay, and variable accuracy of teacher judgement when individual referral is the only detection system. Individual referral is a much less reliable system, and often results in reading difficulties lying undiscovered until they are well advanced, resistant to intervention, and have broadened to include many curriculum areas (Coyne, Kame'enui, & Simmons, 2004).

Schedule for assessment

A further question involves when best to schedule these screens. The later the screen, the more accurate the predictions tend to be (Scarborough, 1998). However, screening in mid Year 1, while it may provide a clearer picture of who is in need of intervention, allows more than a year to be wasted and failure to become entrenched. On the other hand, screening during the pre-school year may over-identify those who have simply had little literacy experience. One compromise is to schedule screening on several occasions during the primary years, most frequently in the early years (Rathvon, 2004). Work is still progressing in endeavouring to make accurate predictions at the preschool and beginning reading stage.

Again there are several broad formats. One might initially screen all incoming beginning students, for example. Those who fall below a predetermined criterion are allocated additional or more intensive assistance, and subsequently re-screened. The criterion or cut-off is often the lowest quartile (25%), but some suggest selecting the lowest 10%. The choice depends to some degree on the resources available to address the resultant demands on the school resources. If one selects the lowest 25% there will be a larger cohort for whom intervention will need to be supplied. The outcome will entail a larger false positive rate, but a lower false negative rate. A larger group will include students who didn't really need extra help, as it eventuates, but it shouldn't miss many of those who really do. If the resources are available, this more inclusive criterion is a good option. If the lowest 10% are chosen, fewer false positives but more false negatives will arise. So, this system may ignore some students who subsequently display reading difficulties.

A variant is to employ a two-tier screen in which those detected in the process above are provided with more detailed assessment, involving a more comprehensive set of measures designed to specify with more precision the optimal area(s) for prophylactic intervention. A child's low score on a screening test does not describe the nature of the problem, but rather serves as a beacon that there is an issue of concern.

A third model treats all students as the target group. Everyone is screened with, for example, a fluency measure that establishes their baseline attainment in February. All the students participate in an evidence-based literacy program, and their growth is monitored with similar, but time-sensitive, scheduled progress (formative) assessments, usually three times over the year. Those students not displaying acceptable growth curves are assigned additional support.

California's Reading First Plan (California Department of Education, 1999) is well regarded as a model of careful, regular, evidence-based assessment. The sequence they have adopted is summarised in Table 1.

Table 1

California's Reading First Plan

Phoneme Awareness: Mid-year for Prep; *End of Grade 1 (if needed); only if needed for Grades 2 and 3* *Tasks:* Deletion: Initial and Final Sounds, Phoneme Segmentation, Counting Syllables.

Beginning Phonics: Late Prep; *only if needed for Grades 1, 2, and 3;*

Tasks: Alphabet Names, Consonant Sounds, Short Vowel Sounds.

Phonics: Every 4 to 6 Weeks for Grade 2; *only if needed for Grade 3;*

Tasks: Word Study, Decoding, Early spellings.

Oral Reading Fluency: Early Grade 1, then 3 to 6 times per year for Grades 2 and 3;

Tasks: Timed Fluency – Words Correct Per Minute (WCPM).

Reading Comprehension: Every 8-10 Weeks, Grades 1, Every 6-8 Weeks, Grades 2 and 3*;*

Tasks: Main idea, Author's point of view, Analysis, and Inference.

Vocabulary: Every 8-10 Weeks, Grades 1; Every 6-8 Weeks, Grades 2 and 3;

Tasks: Antonyms, Synonyms, Multiple Meanings, Context Meanings.

This approach is sometimes called dynamic or interactive assessment, and sometimes the *test-teach-test* model. It is based upon the idea that more may be learned about children's cognitive development through the assessment of what they can achieve after teaching, rather than solely assessing unassisted performance, as in static tests. It is considered by Tzuriel (2000) to more accurately reflect the learning potential of children than do snapshot tests. It also forms the basis for the approach to special education known as Response to Intervention (RTI; Gresham, 2001). Children displaying signs of failing in the early grades receive scientifically based instruction as soon as possible. Special education services focus on those who, even with these services, are not successful. These have been described as treatment resisters (Torgesen, 2000). The focus of RTI is on responding to the instructional challenges caused by the disability, rather than solely giving tests to document the failure of the student.

According to Carnine (2003), the Response to Intervention model includes five major steps:
First, criteria in the beginning grade determine if any child exhibits a significant difference between actual and expected rate of learning in one or more of the academic domains included in the definition of specific learning disabilities
Second, develop a plan to provide an evidence-based intervention. Ensure that the teacher receives training sufficient to fully implement the intervention.
Third, monitor and document the child's progress, and regularly report this information to parents.
Fourth, if the child is not progressing at a desired rate, determine if the intervention is being implemented with fidelity -- and if not, provide additional assistance to the teacher.
Fifth, lack of progress over an agreed limited period of time leads to a full child-centred evaluation conducted by a team. In the USA, this process could lead to identification of the child as having a specific learning disability, and subsequently to the provision of special education services.

A crucial and far reaching element in establishing a systematic assessment plan in a school is the likely casualty rate. The figures cited earlier suggest 20-30% of students currently struggle to varying degrees. It is also

considered by many that the most common approaches to the initial teaching of reading are suboptimal, and are themselves responsible for a high proportion of the failure rate (National Inquiry into the Teaching of Literacy, 2005). Given the number of students who struggle to master reading, efficiency in the provision of initial teaching and subsequent support becomes very important for education systems (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001). There are several components of effective whole-system or whole-school approaches. The first is attention to evidence as a means of determining the most effective approaches. Then, adequate time must be assigned to the task of providing initial reading instruction, although not all students require the same level of direct teacher input. With improvements in intensity and program quality, a reduction in the number of students requiring significant 1:1 teacher time then allows additional time to be provided for the seriously struggling students. This circumstance can eventuate when initial instruction reflects effective, research-supported approaches, thereby producing fewer casualties, and enabling the school costs of providing intensive support to be maintained at realistic levels. The third component entails a recognition that, for some students, the duration of intervention may be markedly extended beyond the average for literacy to develop successfully (Torgesen, 2000).

An early screen protocol

Over time it has become apparent that the strongest predictors of success in beginning reading are a knowledge of letter-sound correspondences (Chall, 1967; Stage, Sheppard, Davidson, & Browning, 2001) and phonemic awareness (Torgesen, 1998). This provides a theoretical rationale for focussing assessment on these areas initially.

Torgesen (1998) suggests a screening procedure involving: 1) a test of knowledge of letter names or sounds, because letter knowledge continues to be the best single predictor of reading difficulties; and 2) a test of phonemic awareness. Torgesen's research indicates that, individually, knowledge of letter names is the stronger predictor for children in their first year, and knowledge of letter-sounds is stronger for first graders. McBride-Chang (1999) considers letter-sound knowledge to be more closely related to reading skills than is a grasp of letter names, because of the stronger phonological basis for letter-sound knowledge. Thus, assessing letter names has predictive value only because it is a marker for a range of previous useful literacy experiences rather than a direct cause of progress. However, letter-sound knowledge appears to have a causal rather than merely correlational relationship to reading progress (Levin, Shatil-Carmon, & Asif-Rave, 2006).

As phonemic awareness is thought to involve a developmental sequence, the decision as to which form of test to employ for a student cohort assumes importance. For example, it is recognised that blending, segmenting, and deletion are quite difficult tasks for children before and during their first year of school (Schatschneider, Francis, Foorman, Fletcher, & Mehta, 1999). Tests in which few students can achieve success or tests in which most students are near ceiling are of little use as screening devices.

In a longitudinal study of 499 children from kindergarten through Grade 3 (Vervaeke, McNamara, & Scissons, 2007), an accuracy figure of 80% was obtained when kindergarten assessment of phonological awareness and letter-sound correspondence was compared to their Grade 3 reading achievement. The false negative and false positive rates were each 12%, representing encouraging predictive capacity over a significant period of time.

Letter knowledge

One letter knowledge test is the Letter Identification subtest of the *Woodcock Reading Mastery Test-Revised NU* (Woodcock, 1998). It presents letters in several different fonts for which either the sound or the name is scored as correct. Its use of different fonts appears to be intended to enable the assessment of the concept of sound-symbol relationship, not simply the association between one letter-shape and its name/sound.

The *Comprehensive Inventory of Basic Skills -Revised (Brigance, 2000)* has several useful subtests. Visual discrimination of upper and lower case letters, Recitation of the alphabet, Reading upper and lower case letters, Printing upper and lower case letters in alphabetic sequence, and, Printing upper and lower case letters as dictated.

The *Neale Analysis of Reading Ability (Revised)* (Neale, 1988) has a supplementary test that assesses the names and sounds of the alphabet.

Good and his colleagues (Good & Kaminski, 2002) have established performance-based benchmarks using the freely available *Dynamic Indicators of Basic Early Literacy Skills* (*DIBELS*). The tests relevant to this screening task are Letter Naming Fluency and Initial Sound Fluency. Note that these tests are timed, so they add a component of speed along with power – efficiency along with knowledge. Employing fluency in the measurement of subword skills (e.g., letter names/sounds) has become of increasing interest (Speece, Mills, Ritchey, & Hillman, 2003) because of the significance of automaticity as a quality beyond mastery.

The *DIBELS* measures are also very brief, and easy to administer. Letter Naming Fluency involves a sheet with upper and lower-case letters, and students name as many letters as possible in 1 min. Fewer than 2 letters in 1 min at preschool or early first year at school is considered at-risk, between 2 and 7 constitute some risk, and 8 or more is classed as low risk.

Phonemic awareness

In the *DIBELS* Initial Sound Fluency, students are shown (for 1 minute) a series of pages containing 4 pictures. (*Pointing to the pictures) This is: tomato, cub, plate, doughnut. Which picture begins with /d/?* Fewer than 4 initial sounds correct in 1 minute at preschool or early first year at school is considered at-risk, between 4 and 7 constitute some risk, and 8 or more is classed as low risk.

A similar free system called *AIMSweb* is available for download (The Psychological Corporation, 2007). It includes subtests for Phoneme Segmentation, Letter Naming Fluency, and Letter Sound Fluency.

Thus, one direction is early screening of all students using a couple of simple tests. When more detailed testing is required, what areas are most fruitfully explored? It seems appropriate to focus on the areas deemed by the National Reading Panel (2000) to be pivotal to reading development.

More detailed testing of each of the NRP five instructional emphases

NRP instructional recommendation 1: Phonological (or phonemic) awareness

There is strong consensus among researchers that phonemic awareness is a robust predictor of future reading progress, markedly better than is intelligence (Stanovich, 1991). As this awareness is also thought by many (Adams, 1990), but not all (Castles & Coltheart, 2004), to be a major causal factor in early reading progress assessment of current levels allows both a prediction of a child's likely progress in the absence of appropriate intervention, and a direction for any intervention to take.

Phonological (or phonemic) awareness is an auditory skill enabling the recognition that the spoken word consists of individual sounds. It appears to follow a developmental sequence: from simple (Do *cat* and *comb* begin with the same sound?) to complex (blending, and then segmenting). A study by Schatschneider et al. (1999) suggests that phonemic awareness is a unitary construct, but that its development is best charted as a sequence of tasks from simple phonological tasks, like rhyming to more complex appreciation and manipulation of phonemes, as in elision, blending, and segmenting.

In a huge study (Hoien, Lundberg, Stanovich, & Bjaarlid, 1995), initial-phoneme and final-phoneme matching tasks (such as assessed by the *TOPA*: *Test of Phonological Awareness* (Torgesen & Bryant, 1994)) were by far the most potent phonological predictors of early reading acquisition. There are a number of screening tests available, but fewer with norms, the *TOPA* being one that has an age range of 5.0 - 8.11 years. Another advantage of this instrument is its facility for group-testing.

Another test is the *Phonological Awareness Screening Test* (Henty, 1993) developed in Tasmania for which the author has been attempting to obtain normative data. The *Sutherland Phonological Awareness Test–Revised (SPAT-R;* Neilson, 2003) has norms (Australian) for Years P-3. The *Lindamood Auditory Conceptualization Test* (Lindamood & Lindamood, 1979) has norms for Years P-12. The Rosner *Test of Auditory Analysis Skills* (Rosner, 1975) is a 13 item test with norms for Years P-3. *The Yopp-Singer Test of Phoneme Segmentation* (Yopp, 1995) is a brief test for P-1 students. Informal un-normed tests are available in *A Sound Way* (Love & Reilly, 1995), *Sound Linkage* (Hatcher, 1994), *Phonemic Awareness Checklist* (Lewkowicz, 1980), *Phonemic Awareness in Young Children* (Adams, Foorman, Lundberg, & Beeler, 1998), among others.

Other phonological processes

There are at least two phonological skills besides phonemic awareness, and they are beginning to assume importance in the research literature because of their capacity to add discrimination power to test batteries (Badian, 1994; Cornwall, 1992; Felton, 1992; Hurford et al., 1993; Hurford, Schauf, Bunce, Blaich, & Moore, 1994; Spector, 1992), and because they may play a role in the development of reading beyond that contributed by phonemic awareness (Savage & Frederickson, 2005). They will often form part of the more comprehensive assessment in the two-tier screen approach.

1. Phonological recoding in lexical access.

Humans store the internal representations of words in sound form known as phonological segments. These representations need to be clearly distinguishable from other stored sound segments, or else the wrong word may be selected when, for example, one is asked to name an object presented in a picture, or a written number, or letter.

Not only must the representations be distinct, but they must be quickly and accurately accessible. Students with reading difficulties often display significant difficulty with rapidly retrieving and accessing names for visual material, even though the relevant names are known to them. The impact on reading development is that a deficit in this area will also adversely impact upon the basic processing necessary for fluent word recognition processes, and thereby reading comprehension (Wolf, Miller, & Donnelly, 2000). Savage and Frederickson (2005) found that alphanumeric naming capacity was particularly strongly associated with reading fluency.

These speed and accuracy problems may be evident even prior to experience with print. Naming speed for pictures or objects may be slow, as too, subsequently, naming of (known) numbers and letters. A number of researchers have noted the predictive power of naming-speed tasks, using pictures, numbers, and letters. Both naming speed and sight word reading depend on rapid, automatic symbol retrieval. Bowers (1995) argues that slow naming speed is specific to reading disability, and not common to children with either broad-based reading problems, or Attention-Deficit Hyperactivity Disorder.

Wolf and Bowers (2000) discuss the possibility that naming speed is independent of phonemic awareness and represents a second core deficit among some disabled readers (Bowers & Wolf, 1993; Miller & Felton, 2001; Wolf & Bowers, 1999). This issue is important because there may be a group whose phonemic awareness is developing normally, and who would be unidentified by a phonemic awareness screen, but who may subsequently have reading difficulties.

Additionally, there may be a group of students who have deficits in both phonemic awareness and rapid naming. Their dual difficulty may well lead them to be especially resistant to the standard procedures in reading instruction. Wolf and colleagues have described this as the Double Deficit Hypothesis. Identifying this group

before the failure process commences is obviously worthwhile, because it enables the marshalling of resources to provide very intense (evidence-based) instruction to this targeted group.

A study by Lovett, Steinbach, and Frijters (2000) underlines the importance of recognising such treatment resisters. They noted that, when intensive phonologically-based instruction was implemented, even the Double Deficit students made progress commensurate with their less disabled single deficit peers. Without such carefully planned intervention, they tend to be the most severely disabled readers, and their difficulties are not relieved by maturation (Lovett, et al., 2000; Wiig, Zureich, & Chan, 2000).

Tests: *RAN: Rapid Automatized Naming* (Denckla & Rudel, 1974); *BNT: Boston Naming Test* (Kaplan, Goodglass & Weintraub, 1983); *SNS: Symbol Naming Speed* (Swanson, 1989); *Picture Naming Test* (Hempenstall, 1995). Wiig, Zureich, and Chan (2000) argue for pictures and colours as more suitable because of the exceptionally automatised nature of letter and number knowledge. However, others have found that, for children with well-established letter-sound recognition, a letter-naming test may be a better predictor (Manis, Doi, & Bhadha, 2000; Savage & Frederickson, 2006).

2. Phonological recoding in working memory.
The beginning reader is required to decode a series of graphemes, and temporarily order them to allow the cognitively expensive task of blending to occur. This skill has been found to be an important determinant of early reading success. It is usually assessed by digit span (oral & visual) and sentence memory tasks.
Tests:
Wechsler Intelligence Scale for Children: 4th Edition (WISC IV) (Wechsler, 2003): Digit Span subtest; *Wechsler Pre-School and Primary Scale of Intelligence- III (WPPSI-III)* (Wechsler, 2002): Sentences; *Stanford-Binet: Fifth Edition* (Roid, 2003): Memory subtests; *Comprehensive Inventory of Basic Skills-Revised* (Brigance, 2000): Sentence Memory.

Assessing all three processes

The *Comprehensive Test of Phonological Processing (CTOPP)* (Wagner, Torgesen & Rashotte, 1999) assesses all three phonological processes: phonological awareness, rapid naming, and phonological memory. The CTOPP is designed to identify individuals from prep to tertiary level whose reading would benefit from development of their phonological skills. One version, developed for children aged 5 and 6 has seven core subtests and one supplementary test. The second version (ages 7 to 24 years) contains six core subtests and six supplementary tests. Individual administration requires about 30 minutes for the core subtests. The CTOPP authors argue for three potential classroom uses: to provide a screening test for students who may not be developing their phonological abilities; to indicate any student's areas of strength and weakness among those processes; and, to measure progress in phonological processes when intervention programs are in place. The subtests are Elision, Blending Words, Sound Matching, Memory for Digits, Nonword Repetition, Rapid Color

Naming, Rapid Digit Naming, Rapid Letter Naming, Rapid Object Naming, Blending Nonwords, Phoneme Reversal, Segmenting Words, and Segmenting Nonwords.

Training other phonological processes?

Even though rapid naming tasks assist in the prediction of early reading success, there is as yet little evidence that directly training those tasks improves reading (Spear-Swerling, 1998). That is not to say that such efforts can never be fruitful. Wolf, Miller, & Donnelly (2000) have developed a program (Rave-O) designed to directly address the processing deficits they consider produce impediments to reading fluency. The RAVE-O program is not a stand-alone approach, but is integrated with a phonological analysis and blending strategy based upon Reading Mastery I/II Fast Cycle (Engelmann & Bruner, 1988). The additions emphasise orthographic pattern recognition, semantic development, and retrieval strategies. Independent evaluations are as yet incomplete.

Several studies have noted improvement in lexical access following phonemic awareness intervention (Beck, Perfetti, & McKeown, 1982; McGregor & Leonard, 1995). Gillam and Van Kleeck (1996) reported a study in which pre-school aged children with speech and language disorders improved both in phonemic awareness and phonological working memory following a phonemic awareness training program. Further, they noted that children with poor initial phonological working memory were as responsive to the intervention as were those with better phonological working memory. No studies thus far have supported the value of directly teaching naming or short term memory skills.

Elbro, Nielsen, and Petersen (1994) argue that poor phonological representations of words form the core deficit in disabled readers. In this view, lexical access and working memory are restricted not because of specific modular deficits in these processes, but rather because what is sought in the lexicon, or to be held in working memory, is lacking in readily distinguishing features. They noted the confusion of similar sounding words, and the less distinct word-naming in such readers. This view also finds support in a study by Eden, Stein, Wood, and Wood (1995a; 1995b). The phonological representation explanation allows for the possibility that improved phonemic awareness may lead to an assessed improvement in one or more of these other phonological processes. In fact, Rubin, Rottella, Schwartz, and Bernstein (1991) found that training Year 3 children in phonemic awareness had a significantly beneficial effect on the picture naming speed of both the good and poor readers.

Interpreting process assessment

Teachers may anticipate that students with difficulties solely in phonological awareness tasks are likely to require additional care in the teaching of decoding skills, while those with problems solely with naming speed may be expected to require assistance in whole word recognition, and careful attention to fluency development. As noted earlier, Wolf and Bowers (2000) argue that students who have difficulty with *both* phonological awareness tasks and naming speed tasks are very likely to be more resistant to reading instruction than are those

with a problem in one area only. Schools can then prepare for intensive assistance over a longer period of time (Torgesen, Wagner, & Rashotte, 1994) with these students -- too often efforts are only irregularly scheduled and prematurely discontinued for those students in greatest need. Progress may be slow and hard earned, but attention to detail in instruction and vastly increased opportunities for practice can make a great difference to the prognosis. The lesson to be learned from assessment of student's phonological processing is not about identifying learner characteristics to account for lack of progress, but rather to assist the discerning of which students demand our cutting-edge best interventions.

Assessment when reading instruction has commenced: Word level processes

NRP instructional recommendation 2. Phonics

Phonemic awareness becomes important when beginners are faced with the challenge of making sense of the English alphabetic system of writing. The phonological skills of blending and segmenting act upon the knowledge of letter-sound correspondences to enable the decoding of the written word. The facility with which students can do so to decode words not before seen is a necessary step on the way to effortless fluent reading. The decoding of non-words is considered the most appropriate measure of this process (Hoover & Gough, 1990; Siegel, 1993; Wood & Felton, 1994). While it may appear to be a task only obliquely related to reading, the measure ensures that memory for words and contextual cues can be ruled out as explanations when the non-words are read accurately. Non-word decoding also correlates very highly with reading comprehension (Shankweiler, Lundquist, Dreyer, & Dickinson, 1996).

Share (1995) argued that students must achieve a certain level of facility with decoding before a self-teaching mechanism allows them to make continuous independent progress from that stage, eventually employing for the most part the orthographic strategy that enables rapid, accurate, effortless reading. This self-teaching view is supported by several studies (Bowey & Muller, 2005; Nation, Angell, & Castles, 2007; Share, 1999; 2004) highlighting the centrality of decoding to reading development, most particularly at the early stages. These sought-after orthographic strategies can only be developed through multiple examples of success in decoding phonologically (Ehri, 1998; Share & Stanovich, 1995).

Some research using brain imaging techniques (Joseph, Noble, & Eden, 2001; Gaillard et al. 2006; Pugh et al., 2002; Turkeltaub et al. 2004) has added to our understanding of this link. It appears that the left brain's parieto-temporal region is employed in decoding (sounding-out), and in good readers this area is very active during reading. In struggling readers, there is little activity in the left hemisphere but considerably more in the less helpful right hemisphere (Simos et al., 2002).

When beginning readers have decoded a word correctly a number of times, they develop a neural model that is an exact replica of the printed word, reflecting the word's pronunciation, spelling, and meaning. This internal representation is maintained in the occipito-temporal region of the left hemisphere. Subsequent recognition of

that word becomes automatic, taking less than 150 milliseconds (less than a heartbeat). The development of orthographic processing, the key to fluent reading, depends upon the occipito-temporal region. However, the occipito-temporal region does not assume responsibility for the task without first the parieto-temporal region regularly being engaged (Richards et al., 2006; Shaywitz et al., 2004).

On average, from 4-14 accurate sounding-outs (Apel & Swank, 1999) will create the firm links necessary, although some children may require many times that number (Lyon, 2001; Swanson, 2001a) to facilitate the growth of connections between those regions. Not all children have a strong phonological talent, and there may be both genetic and environmental influences to create these individual differences.

The degree to which students are then able to use their developing parieto-temporal region in the reading task can be assessed with the Word Attack subtest, *Woodcock Reading Mastery Tests-Revised* (WRMT; Woodcock, 1998); with the Pseudoword Decoding subtest from the *Wechsler Individual Achievement Test-II* (WIAT-II; Wechsler, 2001); *DIBELS* Nonsense Word Fluency (Good & Kaminski, 2002); Phonemic Decoding Efficiency (PDE) subtest of *Test of Word Reading Efficiency* (TOWRE; Torgesen, Wagner, & Rashotte, 1999); or the *Castles Non-Word List* (Castles & Coltheart, 1993, in press). This latter test has been modified and renormed, and is published in this issue.

In the DIBELS Nonsense Word Fluency (NWF), the student in mid prep to end of 1st Year reads aloud a collection of short nonsense words as quickly as possible for one minute. NWF below 5 is considered at risk, between 5 and 12 at some risk, and 13 or more at low risk.

The TOWRE Phonemic Decoding Efficiency (PDE) subtest measures the number of pronounceable printed non-words that can be accurately decoded within a brief timeframe (45 seconds). It has norms from age 6 to 25 years.

These tests add another quality to the other tests mentioned above -- that of fluency of decoding. Fluency provides information beyond mastery, separating those who are accurate, but slow, from those for whom decoding is effortless and automatic. In Stanovich's (2000) view, the rapid decoding of nonwords is one of the best discriminators of good and struggling readers. Comprehension is disrupted by slow word reading (Perfetti, 1985; Perfetti & Hogaboam, 1975; Perfetti & Lesgold, 1977). Words should be effortlessly identified so that word reading takes up a minimal amount of processing capacity, leaving as much as possible for understanding the text meaning (Bowers & Wolf, 1993; Campton & Carlisle 1994; Joshi & Aaron, 2002; Metsala & Ehri, 1998).

The TOWRE also contains a Sight Word Efficiency (SWE) subtest that assesses the number of real printed words that can be accurately identified within 45 seconds. The TOWRE is helpful for a number of purposes,

such as in monitoring the growth in efficiency of phonemic decoding and sight word reading skills during the primary school years. It also highlights any differences between the two skills in the same student. This has implications for any intervention that may required by a student. The two subtests can be administered to a child in less than 5 minutes, and there are two parallel forms of each subtest.

It has been suggested that assessment at the level of the single word, as in lists rather than employing only authentic literature, are in some way not real tests of real reading, because it involves fractionating the reading process (Goodman, 1986). However, two studies by Landi, Perfetti, Bolger, Dunlap, and Foorman (2006) have pointed to the potential for list-type assessment to provide a purer measure of orthographic and phonological skills, because when beginning readers read words in context, they may depend on context to attempt to circumvent their inadequacies in reading unfamiliar words.

Assessment for older students

One question may be *How delayed is this child's reading development?* A general reading assessment will provide some information. It will provide an idea of the length of time it may take for the child to achieve a reasonable level of reading skill (i.e., to be able to adequately comprehend grade-level textbooks as a minimum outcome) given a good program, regularly and competently taught to a motivated student. Normed reading tests may be used for this purpose, bearing in mind the various problems they have in specifying precise grade levels. In the RMIT Clinic, the most commonly used general tests are the *Woodcock Reading Mastery Tests – Revised* NU (Woodcock, 1998), the *Neale Analysis of Reading Ability-Revised* (Neale, 1988), the *Spadafore Diagnostic Reading Test* (Spadafore, 1983), and various subtests of the *Comprehensive Inventory of Basic Skills-Revised* (Brigance, 2000).

These tests will usually provide an indication of the student's ability to read accurately from word lists or connected text (reading accuracy) and the capacity to make sense of that which they read (reading comprehension). Reading accuracy tests do not adequately discriminate between those students who have memorised whole words and those students who additionally have the capacity to decode words not recognised. The *Woodcock* has a significant advantage over the *Neale* because of the inclusion of a Word Attack subtest that indicates the degree to which the student can apply his phonemic awareness to the task of reading (sometimes called phonological recoding). Additionally, it is normed to an adult level. The *Neale* allows for testing of reading rate, an important element in a student's progress, reflecting the level of automaticity or fluency achieved. Rate also provides information about the attentional capacity a reader has available to commit to the task of reading comprehension.

Assessing reading fluency

NRP instructional recommendation 3: Reading fluency

According to Wolf and Katzir-Cohen (2001):

> In its beginnings, reading fluency is the product of the initial development of accuracy and the subsequent development of automaticity in underlying sublexical processes, lexical processes, and their integration in single-word reading and connected text. These include perceptual, phonological, orthographic, and morphological processes at the letter, letter-pattern, and word-level; as well as semantic and syntactic processes at the word-level and connected-text level. After it is fully developed, reading fluency refers to a level of accuracy and rate, where decoding is relatively effortless; where oral reading is smooth and accurate with correct prosody; and where attention can be allocated to comprehension (p. 219).

Oral reading fluency has particular relevance during the alphabetic stage of reading development because this is the phase during which self-teaching begins (Share, 1995). In the early alphabetic stage, simple letter pattern-to-sound conversion begins to provide a means of decoding unknown words, though the process is necessarily laborious (as is any new skill prior to its automatization). As they progress with their understanding of the function of the alphabet, students begin to appreciate that each time they decode an unfamiliar word its recognition subsequently becomes easier and faster. Practising decoding enables them to become adept at storing letter-patterns -- orthographic information that can dramatically hasten word recognition of these and new words (Torgesen, 1998). These are not simply visual images, but alphabetic sequences.

It is in reaching the stage of automaticity that the apparent magic of skilled reading becomes evident – whole words are recognised as quickly as are individual letters. The actual process of reading, of transforming squiggles into language, appears transparent – that is, the words seem to leap off the page and into consciousness without any noticeable effort or strategy (LaBerge & Samuels, 1974). The issue of variation in the effort required to make sense of print has been addressed by employing neuro-imaging techniques when both capable and struggling students are engaged in reading. Richards et al. (1999, 2000) noted that the poor readers used four to five times as much physical energy (oxygen, glucose) as the capable readers to complete the same phonological tasks. This difference was not observed when non-language tasks were presented. It is unsurprising that a lack of motivation to read is a serious secondary obstacle for dysfluent readers.

Oral reading fluency has been found to be strongly related to reading comprehension (Miller & Schwanenflugel, 2006; O'Connor et al., 2002; Roehrig, Petscher, Nettles, Hudson, & Torgesen, 2008). In fact, Shinn, Good, Knutson, Tilly, and Collins (1992) found that oral reading fluency in the early grades was as valid a measure of reading comprehension as of decoding ability. Others have reported correlations as high as .91 for older students (Fuchs, Fuchs, Hosp, & Jenkins, 2001). Oral reading fluency measures correlate even better with other reading comprehension tests than those same tests correlate with each other (Fuchs & Fuchs, 1992).

Both standardised and informal assessments of oral reading accuracy and rate are recommended in the National Reading Panel Report (National Institute of Child Health and Human Development, 2000). The report also

recommends guided oral reading as a valuable fluency enhancing activity, yet both fluency assessment and instruction are notably absent from the reading curricula of many schools. This is unsurprising given that reading fluency is not mentioned in the English curriculum standards documents from at least three Australian states: Victoria, South Australia, and Queensland (Department of Education, Employment & Training, 2001). Perhaps the mooted National Curriculum will incorporate such an emphasis, give that the National Inquiry into the Teaching of Literacy (2005) recommended both assessment and structured teaching of reading fluency.

While suggested rates vary among writers, Howell and Nolet (2000) recommend the following benchmarks for text appropriately graded. From early Year 1 to late Year 1, the anticipated progression is from 35–50 words correct per minute; whilst from early Year 2 to late Year 2, the target is from 70–100 correct wpm; and from early Year 3 to late Year 3 the progression is from 120–140 correct wpm. A slightly different trajectory is suggested by Binder, Haughton, and Bateman (2002). They anticipate a more rapid progression throughout Year 1 reaching between 60-100 correct wpm. They also provide additional yearly expectations: Year 2–Year 3 100–120 correct wpm; Year 4–Year 5 120–150 correct wpm; Year 6–Year 8 150–180 correct wpm; and Year 9 and above 180–200 correct wpm.

The *Gray Oral Reading Test–4* (Wiederholt & Bryant, 2001) is a standardized measure of oral reading allowing assessment of reading accuracy, rate, and passage comprehension for ages 6-19, as does the *Neale Analysis of Reading Ability –Revised* (Neale, 1988), though only for ages from 6-12 years.

An increasingly popular curriculum-based oral reading fluency measure is the DIBELS (Good & Kaminski, 2002) which provides reasonably reliable and valid indicators of skills associated with reading success from beginning to Year 6. Numerous graded passages are provided, and students read the appropriate passages orally for one minute each. The median score (words correct per minute) of the cold reading of each of three passages forms the data. Performance-based benchmarks allow the identification of children who are doing well in their reading instruction, and detects those whose response to instruction places them at risk for experiencing later reading difficulties.

They are simple, quick, and cost-effective (free) measures that are more sensitive to small changes over time than are most standardised tests. There are multiple passages for each grade level, making them easily repeatable for continuous progress monitoring. Using DIBELS, all students are expected to be assessed three times a year, while those receiving intervention are typically assessed fortnightly or monthly.

Another curriculum based measure is known as AIMSweb (The Psychological Corporation, 2007). It follows a similar protocol, and has multiple passages up to a Year 8 level.

Norms in standardised tests

An issue sometimes arises about the appropriateness of tests employing only US norms. Obviously, it would be an advantage to have local norms for all the tests we wish to use; however, the huge cost of properly norming tests is prohibitive for many local developers. There are some grounds for defending US normed tests of reading. We speak and write the same language, and, in most Australian states, we commence school at about the same age. In international comparisons (e.g., OECD, 2004; UNICEF, 2002), our average reading attainment exceeds that in the USA, perhaps because of our lower proportion of disadvantaged and non-English speaking students. The implication of this disparity is that tests using US norms may slightly flatter our students. When students do not do well on such a test, it is likely that they would actually be lower on that test using local norms than is indicated by the test manual. So, if a student, for example, scores below the 30th percentile on the TOWRE (the cut-off for being classified as at-risk), any error caused by the non-local norms is likely to lead to an underestimate of their level of difficulty.

Assessment of vocabulary

NRP instructional recommendation 4: Vocabulary

The significance of vocabulary in the context of reading development involves its role in underpinning reading comprehension (Beck & McKeown, 1991). Vocabulary produces correlations with reading comprehension of between .6 and .8 (Pearson, Hiebert, & Kamil, 2007), although receptive language assessment when performed at the beginning of school tends to produce lower figures, such as .38 (Scarborough, 1998).

It is acknowledged that early vocabulary development is important for later literacy, and that there are marked differences in the vocabulary levels of children at school entry. Hart and Risley (1995; 2003) observed that (on average) parents with *professional* jobs spoke about 2,000 words an hour to toddlers. For *working-class* parents, the rate averaged 1,200 words an hour, and for those receiving welfare only 600 words an hour. Hart and Risley concluded that by age 3, children receiving welfare have heard 30 million fewer words than children of professional families. A year's preschool experience could not entirely compensate for the experiential deprivation that could occur during the first 3 years of life.

There may in the near future be the means for very early identification of language development (Swingley, 2008). Young toddlers tend to look at images or objects that are named by an adult. Through eye movement tracking while a child observes two objects (e.g., an apple and a dog) it is possible to see if the child's eyes move to the named object. It enables a measure of a 12 month old child's knowledge of the meaning of words that they are not yet able to articulate. This early phase is quite strongly related to success of later language tasks, and may lead to early identification and support at the optimal period for changing a child's trajectory.

If schools are to attempt to compensate for these dramatic discrepancies noted by Hart and Risley, then vocabulary assessment needs to be included in the planning. However, there are a number of uses of the term: receptive and expressive vocabulary, oral and reading vocabulary, reading and writing vocabulary.

The National Reading Panel (National Institute of Child Health and Human Development, 2000) described numerous studies that emphasised the way in which vocabulary develops. New words taught directly in a year are typically about 300 to 500; however, the number of new words learned in a year is around 3,000 to 4,000 (Beck & McKeown, 1991). So, much of the development must be dependent upon reading. In fact, beyond Year 3 the amount of free reading is the major determinant of vocabulary growth, and the best readers may read 100 times that of the least adept (Nagy, 1998; Nagy & Anderson, 1984). So, the initial gap is inclined to widen. Why is reading such a source of vocabulary growth? Children's books contain 50% more "rare" words than does adult television, or even the conversation of college graduates. Even popular magazines have 3 times as many opportunities for new word learning as prime-time television and adult conversation (Stanovich, 1993). Reading stories to children appears not to adequately compensate for a lack of reading experience. Listening to stories has only been shown to increase the vocabulary of above average readers (Nicholson & Whyte, 1992). Students who don't choose to read regularly fall further behind (Matthew Effects; Stanovich, 1986). So, the extent of vocabulary knowledge is both a cause and a consequence of reading development.

It is fair to say that the field of vocabulary assessment is less well developed than some of the other dimensions of reading. A great deal of the research employed experimenter-designed tests, and hence there has not arisen a clear consensus about which type of vocabulary assessment is most helpful in relation to reading development. According to the NRP, standardized tests should only be used to provide a baseline, as they offer only a more general measure of vocabulary. For evaluating instruction, more than a single measure of vocabulary should be utilised, preferably measures associated with the teaching curriculum.

In standardized tests, one way of assessing vocabulary is to have the student select a definition for a word from a list of alternatives. Another is to ask what various words mean (WISC-IV; Wechsler, 2003). A third is to select the word that doesn't belong in a list either spoken or written (*brown, big, red, green, yellow*; Brigance, 2000). In the *Woodcock Reading Mastery Tests-Revised/Normative Update* (1998), three subtests comprise the Word Comprehension test: Antonyms, Synonyms, and Analogies.

The most commonly employed vocabulary test is one of receptive language, using the *Peabody Picture Vocabulary Test* (PPVT-3; Dunn & Dunn, 1997). There is no reading involved; the task is to identify the one picture of four that matches the word spoken by the test administrator. A similar protocol is provided in the *Wechsler Individual Achievement Test-II* (WIAT-II; Wechsler, 2001): Receptive Vocabulary subtest. Another option is in the Vocabulary subtest of the various Wechsler scales (WISC-IV, WPPSI-III, WAIS-III: Wechsler, 2004; 2002; 1997). The Wechsler task is to provide definitions for various, progressively more complex words.

Vocabulary deficits may impede reading comprehension, but reasons for students performing poorly on a comprehension measure are not immediately obvious from only the comprehension measure. Was low

attainment caused by a decoding problem, or did inattention preclude correct answers. Did the student forget the passage details because of short term memory problems, or might anxiety have interfered? Was it a metacognition failure in which the student has simply never learned strategies to aid comprehension, or was it due to a vocabulary lag? The vocabulary test can assist with this diagnosis, but is insufficient of itself.

Assessment of comprehension

NRP instructional recommendation 5: Comprehension

As the basic decoding and word recognition skills become automatised, comprehension strategies become an area of variability among students. Strategies that were adequate in simple text may become insufficient for the increasingly complex language (semantics and syntax) in the upper primary and secondary grades.

Without the automatisation of basic processes, reading comprehension progress stalls. With automatisation, students are at least able to make use of their existing oral language comprehension skills (Crowley, Shrager, & Siegler, 1997; O'Connor et al., 2002). The growth of these largely oral comprehension skills is partly dependent upon the quality and extent of oral language activities in their curriculum. The student converts print to speech (perhaps subvocally), and comprehends the speech, rather than the text directly – as in the Simple View of reading (Hoover & Gough, 1990).

However, text is not simply transcribed speech. It has its own formats, and additional comprehension strategies assume importance over the longer period of reading sophistication. Those with a history of problems will have had reduced exposure to text that hampers subsequent progress impeding their vocabulary development (Nagy, 1998), as discussed earlier.

The research into enhancing comprehension has lagged behind that for the underpinning word-level processes, though there is some agreement about a few promising components. For example, the student who interrogates the text is likely to understand more than one who passively reads it (National Reading Panel, 2000; Pressley, 2000). Useful strategies, including prediction, analyzing stories with respect to story grammar elements, question asking, image construction, and summarizing, may be intuited by some students. However, for others these strategies are highly dependent on teachers' modelling of the process orally, and their providing multiple practice opportunities (Pressley, 2001; Swanson, 2001b)). Unfortunately, many comprehension activities in schools involve only testing students (reading a text and subsequently answering questions) rather than actually providing instruction.

> Good readers are aware of why they are reading a text, gain an overview of the text before reading, make predictions about the upcoming text, read selectively based on their overview, associate ideas in text to what they already know, note whether their predictions and expectations about text content are being met, revise their prior knowledge when compelling new ideas conflicting with prior knowledge are

> encountered, figure out the meanings of unfamiliar vocabulary based on context clues, underline and reread and make notes and paraphrase to remember important points, interpret the text, evaluate its quality, review important points as they conclude reading, and think about how ideas encountered in the text might be used in the future. Young and less skilled readers, in contrast, exhibit a lack of such activity (e.g., Cordón & Day, 1996). (Pressley, 2000, p.548).

Given the under-developed state of research into reading comprehension, it is unsurprising that current testing instruments also have their problems. Much of the intervention research has involved experimenter-devised tests, and these have produced rather larger effect sizes than have standardised tests when evaluating the same instructional method. For the studies on *question generation*, the average effect size averaged about 0.90 for experimenter-written tests, which is a large effect; whereas, for standardized tests, the average effect size was small at 0.36. The pattern was similar for the *multiple strategy instruction* experiments in which for experimenter-written tests the average effect size was 0.88, and for standardized tests, only 0.32 (National Reading Panel, 2000). Clearly some consensus is needed about what forms of comprehension assessment are optimal for a specific given purpose.

Standardised comprehension tests are predicated on the assumption that there is a consensus on what are appropriate, progressively increasing grade levels of comprehension. However, there are many variables to cloud interpretation of results. Grade level materials can be analysed on the basis of their readability, usually utilising one or other algorithms based upon word length, word prevalence, and sentence length. However, difficulty levels of vocabulary and syntax can vary significantly across tests, and are not quantified by readability measures. Are the questions literal or inferential? Inferential questions are usually considered harder than literal questions, but both have difficulty levels along a continuum. To further complicate the issue, domain knowledge about a topic dramatically influences task success (Hirsch, 2006), as can command of English. It has also been observed that speed of comprehension is slower and test scores are lower when unfamiliar topics are read than when familiar topics arise. A weakness, then, of comprehension measures is that the methods chosen are only indirect indicators of whether the reader *has got it, and to what extent*. And each of the numerous and varied methods tried has had its own set of weaknesses, whether issues of validity (particularly for individual scores), external accountability, reliability, or generalisability (Pearson & Hamm, 2005). Perhaps, future brain imaging techniques will provide more insight into the process of comprehension.

Most comprehension measures occur as subtests within omnibus tests, such as the *Woodcock Reading Mastery Tests – Revised NU* (Woodcock, 1998), the *Neale Analysis of Reading Ability-Revised* (Neale, 1988), *Gray Oral Reading Test–4* (Wiederholt & Bryant, 2001), *Spadafore Diagnostic Reading Te*st (Spadafore, 1983), *WIAT-II (*Wechsler, 2001)*, DIBELS* Retell Fluency (Good & Kaminski, 2002), and the *Comprehensive Inventory of Basic Skills-Revised* (Brigance, 2000).

Of particular interest is to compare attainment on a reading comprehension task to that on a listening comprehension task. The *Comprehensive Inventory of Basic Skills-Revised* (Brigance, 2000) has the capacity to provide such a comparison, with its reading comprehension and listening comprehension subtests (up to Year 9). So too does the *Spadafore Diagnostic Reading Te*st (Spadafore, 1983), and it has an advantage in that it is normed to Year 12.

The interest lies in the degree to which performance differs on the two tasks. For the average child, if reading is fluent, then the two scores should be similar. The listening comprehension task represents the language comprehension aspect in the Simple View of Reading (Hoover & Gough, 1990), and the level of reading comprehension obtained depends also upon the adequacy of the lower level processing in addition to language comprehension.

Comparing the results of listening comprehension to reading comprehension offers the capacity to define those children who have a major problem only at the level of print. They will perform well on the listening comprehension tasks, using their impressive general language skills to answer questions about a story read to them. On the reading comprehension task, however, they will do relatively poorly as their under-developed decoding skills prevent them bringing into play their well-developed general language skills.

When required to decode a passage unassisted, these students struggle, as do their *garden-variety* peers -- those with a non-modular, broad-based reading problem (Stanovich, 1988b). On the other hand, the *garden-variety* students would be expected to perform similarly on both tasks. Their reading problems are general rather than specific, and they have more than just one or two reading subskills restricting their development. Their decoding skill is commensurate with their other language skills, such that if they know the meaning of a word (or phrase, or sentence), they can comprehend it whether it is presented orally or in print. The consequence for the high listening comprehension-low reading comprehension child should be intensive assistance at the decoding level. For the low listening comprehension-low reading comprehension child, intensive assistance at both the decoding and comprehension levels is indicated.

Other possible outcomes are high listening comprehension-high reading comprehension, a result predictable from an all-round good reader; and low listening comprehension-high reading comprehension, a rare result, possibly from a student with acute attentional, hearing, or short-term memory problems. In this case, the permanence of text would allow the student to use his intact language comprehension skills; whereas, the ephemeral nature of the spoken story precludes such access. *Hyperlexic* students (a less common sub-group with excellent word recognition but poor reading comprehension) would not be detected by this discrepancy analysis, because their listening comprehension parallels their reading comprehension (Sparks, 1995). Hyperlexic students should not be confused with the oft seen older struggling reader who may appear to decode adequately and have only under-developed comprehension skills. These students usually have a long history of

inadequate decoding skills and fluency -- a history that has compounded across domains, despite some evident improvement in decoding.

This listening comprehension - reading comprehension discrepancy represents an alternative definition of the group sometimes described as *dyslexic*; however, as with the IQ discrepancy-defined *dyslexic,* an issue is how great a discrepancy should be considered significant. Some have considered a two year discrepancy to be very significant (Anderson, 1991), given the extent of commonality of the tasks. However, this is clearly an arbitrary figure, its significance being higher the younger is the age of the child. This is its major value since the intervention techniques employed include systematic synthetic phonics instruction whether the difficulty is described as *dyslexic* or *garden-variety.* The *dyslexic* classification can, however, sensitise teachers to the possibility that *dyslexic* students may be more treatment-resistant (Berninger & Abbott, 1994) than *garden-variety* students, and may also require more intensive or extended phonologically-based instruction if their progress in a systematic synthetic phonics program appears to be unsatisfactory despite it being appropriately taught.

Assembling the results of the various assessments for a particular student leads to some interpretation of cause and possible interventions. Below is an example of the frameworks used in the RMIT Clinic to assist this judgement. It represents a way of looking at a student's scores, in this case a student diagnosed with dyslexia, and offering intervention appropriate to the diagnosis, which in turn is based upon the assessment findings.

Insert Figure 1 about here

Interventions

One purpose for the fine-grained, domain-specific assessments described in this paper is to enable the assigning any intervention precisely to the area that is seen to be impeding student progress. This targeting enables a more efficient use of scarce school resources, and increases the likelihood of rapid progress for the student. If identified and addressed early, impediments to progress can be removed before the debilitating Matthew Effects (Stanovich, 1986) are able to force the student into the familiar and depressing downward trajectory.

Consistent with research findings (Adams, 1990; Foorman, 1995; Perfetti, 1992), good results for decoding and fluency intervention at the RMIT Clinic have come from programs with a strong synthetic phonics emphasis and involve explicit, carefully planned instructional sequences, such as *Reading Mastery* (Engelmann & Bruner, 1988), *Teach Your Child to Read in 100 Easy Lessons* (Engelmann, Haddox, & Bruner, 1983), the *Corrective Reading Program – Decoding* strand (Engelmann, Meyer, Carnine, & Johnson, 1999). Also enhancing reading development are programs focusing on spelling, such as *Spelling Mastery* (Dixon, Engelmann, Bauer, Steely, & Wells, 1998); and on writing, such as *Expressive Writing* (Engelmann & Silbert, 1983) and *Reasoning and Writing* (Engelmann & Silbert, 1991). For comprehension problems, *Language for Learning (*Engelmann &

Osborn, 1999), and the *Corrective Reading Program – Comprehension* strand (Engelmann, Haddox, Hanner, & Osborne, 1989) have proved to be valuable teaching agents.

The scripted nature of these programs is a great benefit when training parents to work effectively with their children. Although this Clinic role can never hope to change the system that creates/maintains student reading failure, it does provide parents with the tools to help them compensate for the weakness of their school system.

At the system level, parents cannot be expected to be responsible for their children's literacy development. The results of reports from Australia, USA, and Great Britain have been remarkably consistent about what is needed. The next major step involves policy reform that takes as its primary source the scientific theory of reading development and empirically validated approaches that incorporate this theory. When combined with wisely used, salient assessment instruments, the potential for the education system to enter a self-sustaining improvement cycle is very exciting. All that is needed is for the education industry and political bureaucracies to see the light. As a first step, they might devise explicit, measurable standards, and insist upon close, transparent progress monitoring to evaluate instructional adequacy. Straightforward really!

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Figure 1: ***Assessment Results: Possible Interpretation***

Client	Test Results	Interpretation/Possible Causes	Interpretation might have been ruled out by..	Interventions/Recommendations

"Donna" diagnosis **Dyslexia**	**WISC-IV:**
	o Average or ↑ FSIQ
	o May or may not demonstrate a discrepancy between VCI and PRI.
	o Maybe ↓WMI or ↓PSI
	Brigance:
	o ↑LC ↓RC
	CTOPP:
	o ↓↓ score on any or all subtests
	DIBELS:
	o ↓ fluency – at risk
	TOWRE:
	o ↓↓ scores on PDE and probably on ↓ or ↓↓ on SWE
	SAST:
	o ↓↓ critically low
	TOWL
	o ↓ or ↓↓
	PPVT-3:
	o ↑↑ or ↑
	CRP Placement Test:
	o ↓↓ Decoding
	o Comprehension perhaps
	o Level of program will vary depending on age and ability level
		Dyslexia: has been characterised by the following:
		o A score on a standardised test in reading is significantly (1, 1.5, or 2 standard deviations) below IQ score, indicating a learning difficulty which is intrinsic to the individual and due to a central nervous system dysfunction.
		o A significant discrepancy between ↑LC and ↓RC
		o Low score on a standardised test of phonological processing
		o Resistance to recognised reading intervention
		Environmental Factors:
		o Inadequate instructional management
		o Failure of early identification and intervention
		o Poor or no initial teaching of phonological awareness, along with letters and their associated sounds.
		Physical Factors:
		o Genetic predisposition – tendency to experience a phonological reading difficulty possibly inherited.
		o History of ear infections?
			o Low FSIQ on WISC-IV, therefore no discrepancy between cognitive ability and academic functioning.
			o No discrepancy between RC and LC.
			o High or average score on tests of phonological processing
			o Vision and hearing difficulties.
			o Anxiety or attentional difficulties, behavioural or fatigue problems during assessment.
				o *Corrective Reading (CRP): Decoding* program or *100 Lessons* (choose appropriate program/level according to age and reading level of client).
				o Given the level of difficulty experienced, emphasise the program's *repeat tasks until firm* instruction.
				o If the client also meets criteria for the *CRP: Comprehension* program, the decoding program should be completed first, as it is likely that comprehension will improve as decoding skills improve.
				o Recommend to re-administer comprehension placement test following completion of each decoding program.
				o May need to boost intervention with a spelling program, e.g., *Spelling Mastery* Series, and a writing program, e.g., *Expressive Writing.*
				o Adapt home and school environment to accommodate for reading deficits: e.g.,
				  o New information should be presented in a modality appropriate to the task.
				  o Special consideration may need to be given e.g., modified exam and assignment situations.
				  o Make provisions for key course texts to be taped and kept in the school library; use of digital voice recorder in class.

RC = Reading Comprehension; LC = Listening Comprehension; SWE = Sight Word Efficiency; PDE = Phonemic Decoding Efficiency; SAST = South Australian Spelling Test; WISC-IV = Wechsler Intelligence Scale for Children – Fourth Edition; FSIQ = Full Scale IQ; VCI = Verbal Comprehension Index; PRI = Perceptual Reasoning Index; WMI = Working Memory Index; PSI = Processing Speed Index; PPVT-3 = Peabody Picture Vocabulary Test; TOWL: Test of Written Language; CRP = Corrective Reading program