Learning Difficulties:

Multiple Perspectives

Editors

Bruce Allen Knight
and
Wendy Scott
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FOREWORD

"While these weaknesses do exist for many students with learning difficulties they should not be viewed as obstacles too difficult for teachers to overcome, but rather as clear indications of the students' need for high quality teaching." (Westwood, 2003 p.7)

One of the aims of Learning Difficulties Australia is to promote the understanding of learning difficulties, disabilities and differences through the presentation of quality professional development and publications. Regular professional development is held throughout Australia to help teachers provide high quality teaching to those students who experience difficulties with learning.

This book started as a result of requests from delegates for copies of papers presented at an LDA conference. Speakers at the conference were asked to contribute and papers were collected. When the editors first looked at the papers received we recognised that they were of an exceptionally high quality and would be of interest to a wider audience than the conference participants. We wanted to produce a book that represented the work of researchers and practitioners from around Australia. It was important that the book covered a range of ideas and topics. Finally we recognised that it was imperative that the book contain readable text for busy classroom teachers who are thirsty for information about how to respond to the needs of students with learning difficulties and learning disabilities. To this end additional influential authors including Christa van Kraayenoord from UQ, Molly de Lemos from ACER and Peter Westwood from Hong Kong University were approached and asked to submit chapters on their areas of expertise. What has emerged is a book that can be used as a text or ready reference by classroom teachers, specialist teachers or any person with a particular interest in the field.

The contents of this book generally describe educators' attempts to meet the special learning needs of all children. In an attempt to make learning reflective and responsive to these needs, this book examines the issues and provides useful ideas and guidance for practicing and pre-service teachers. The education of students with learning difficulties is a real challenge and many useful innovative and thought provoking ideas and strategies are evident in this collection. The realities of classrooms and the implications for learning in them are explored.

The contents of the book have been clustered into four major sections including reading difficulties, provision of support, mathematics difficulties and the social-emotional well being of students.

The first cluster of papers begins with a paper by Wendy Scott in which she focuses on the identification of students who are at risk of failure to reach their educational potential. The problems of identification, the definitions used and the relevance to the Australian scene are discussed.

The second paper in this section addresses the issues involved in assisting students with learning difficulties to read. Christina van Kraayenoord describes the roles of teachers and
specialist teachers and identifies a number of principles upon which their support and intervention to assist students with learning difficulties in reading should be based.

In the third paper in this section, Molly de Lemos reports on research which examines effective strategies for teaching reading. Research on the acquisition of reading, debates such as phonics verses whole language and the relevance of research findings for teaching practice are discussed.

The next paper, written by Sue Galletly, emphasises building teacher levels of pedagogical content knowledge of reading accuracy and phonological recoding. It summarises research findings in the area and promotes a model of core literacy instruction to support teacher decision-making to achieve effective instruction matched to individual students' instructional needs.

Jenine Fogarty and Daryl Greaves investigate phonological processing in a group of students who participated in the Reading Recovery program. Changes in phonological awareness and phonological recoding were assessed and data are reported. Discriminant analysis was used to identify the post powerful pre-test predictors for success in a Reading Recovery intervention. The chapter has implications for those interested matching the reading intervention to the needs of the student.

The final paper in this reading section cluster argues how students' reading comprehension is strengthened by using verbal and mental imagery techniques. In the second section of this paper Gary Woolley and Ian Hay detail how explicit classroom teaching strategies focusing on imagery can enhance readers' comprehension of text.

The second cluster of two papers focuses on the challenges posed by diverse groups. Anne Bayetto examines the issues associated with second language learning for students with dyslexia. Supportive teaching approaches to promote the learning of a second language by students with dyslexia are discussed.

In the other paper in this section Ruth Burnett in her role as a learning support teacher presents a personal perspective on the challenge of diversity as it translates into implementing inclusive practices across two secondary school contexts. A number of generalisable propositions that inform strategies she is using to challenge the development of an inclusive culture for all students that will cater for diverse learning needs within the regular classroom are discussed.

A third cluster of papers explores issues related to learning difficulties in mathematics. The first paper from George Booker examines difficulties in mathematics and the implications for teaching. Booker promotes mathematical thinking which links powerful ideas across the whole content to offer students control over the processes they apply and the ability to use their understanding in new and productive ways.

Rhonda Pincott challenges teachers to question who is responsible for children's mathematics difficulties. In this paper Pincott explores the role of the interacting factors associated with the learner, the method of instruction, the curriculum and the teacher.
A final paper in this mathematics section zeroes in on the impact of teachers’ understanding of division on their students’ knowledge of division. Janeen Lamb reports on the results of her research which indicate that teachers need to have a depth of knowledge to teach effectively for conceptual understanding.

The final cluster of papers focuses on students’ social and emotional well-being. The paper by Bruce Knight, Lorraine Graham and Desma Hughes reviews and analyses relevant literature and then summarizes a program designed to facilitate the social interaction of children with learning difficulties in inclusive classroom settings.

The final paper by Peter Westwood explores students with learning difficulties feelings of motivation and self-efficacy. It has been well established that early failure can lead to frustration, feelings of inadequacy, withdrawal, and on-going avoidance of the task for students. Westwood reminds us that the counselling and therapeutic components of effective intervention must not be neglected.

A commitment to exploring issues that relate to students with learning difficulties bring together the papers in this collection. We believe research must be a priority for educators in order to question dominant discourses and their influence on practice (Knight, 2000; 2002). The material written in this book contains ideas of good practice, is based on sound research and informs the debates on teaching and learning issues related to children with learning difficulties.

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CHAPTER 1

Learning Difficulties and Learning Disabilities: Identifying an Issue – The Issue of Identification

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Overview
Responsive teaching is required in order to assist students with diverse abilities, experiences and backgrounds develop skills that will enable them to function interdependently in the broader community. The focus of this chapter is the identification of students who are at risk of failure to reach their educational potential, particularly in the area of literacy development, unless they receive appropriate forms of intervention and support. Some of the terms used in Australian schools to describe these students include: students with learning difficulties, learning disabled students, reading disabled students, dyslexics or simply students at risk. Terms are used interdependently both in the literature and by professionals working in the field. The primary problem for teachers is identifying students who require intervention and support, and programming appropriately for this population.

Problems with identification
There is a danger that by using terms inappropriately or in an inexpert way, educators will be incorrectly labelling some students. We may also be failing to identify others who are eligible for additional support and provision of educational service. There is a need for teachers to be able to accurately define the population of students who will receive services such as those offered by learning support teachers, support teachers: learning difficulties (STLD), resource teachers, reading recovery teachers or generalist special education teachers employed in regular schools. In 1990 Donald Hammill, in reviewing attempts to define learning abilities, noted:
It is hard to understand how a professional could successfully identify, diagnose, prescribe treatment for, teach or remediate, motivate, or generally improve the life of a person who has a learning disability without first having a clear and accurate idea of the nature of a learning disability. At the very least, knowledge about the nature and characteristics of learning disabilities is certainly no liability for a professional working in this field. (Hammill, 1990, p.74)

A second difficulty is the selection and application of appropriate interventions for students who experience difficulty. There is an abundant array of educational programs available to teachers in schools today. There are also a number of different approaches being advocated in order to assist students negotiate the literacy demands of an increasingly print dependent society. Literacy programs such as PM readers, Literacy Links, Fitzroy Readers and Sunshine Books are found in early primary classrooms throughout Queensland and Australia. Phonics programs such as Letterland, Phonological Fun and Jolly Phonics are increasingly being used in early years classrooms and there are regular advertisements in teaching journals for training in programs such as THRASS. Approaches to teaching reading such as silent reading, guided reading and literacy circles are advocated by literacy consultants and specialists. Reading Recovery, Success for All, Bridge Reading and Lindamood are examples of intervention programs used by support and specialist teachers. This list is not exhaustive. Teachers are using a wide variety of programs as part of regular instruction and as support or intervention programs for students who struggle. It would be advantageous for teachers to know how efficacious particular programs are for students who have particular patterns of strengths and weaknesses in literacy.

A problem emanating from the lack of consensus over the identification of learning disability lies in interpreting research in the field. Educators are encouraged to take care with selection of material for teaching reading and base their educational interventions and instruction on appropriate research. Implementing empirically supported interventions is made more complicated by the fact that it is often difficult to interpret research when the target groups for interventions are defined by terms that have different meanings for researchers and educators. Klassen (2002), a Canadian researcher, found little consensus of learning disabilities (LD) definition in 36 research articles. This made comparison of findings difficult. The fact that there is no operational definition of learning difficulty nationally in Australia adds to the confusion both in terms of interpreting the research and identifying prevalence of specific learning disabilities within Australian school systems.

Definitions used in the United States
Much of the research on learning disabilities has been completed in the United States, so it is necessary to understand the American context. Kavale and Forness (2000) note that over time a number of new definitions of learning disability have been proposed but none is an unequivocal favourite. The definition provided in the Disabilities Education Act (IDEA) is probably the most commonly used in current American research:
The term ‘specific learning disability’ means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in imperfect ability to listen, think, speak, read, write, spell or do mathematical calculations. The term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such term does not include a learning problem that is primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural or economic disadvantage. (IDEA amendments of 1997, PL 105-17)

Whilst the IDEA definition relates to specific disability, there is nothing specific about this definition. Rather, as in previous definitions, there appears to be more information about what learning disability does not entail, rather than any specific description of the characteristics of learning disability. As Kavale and Forness (2000) point out, the most concrete aspect of the definition is an indication about process disorders that interfere with basic academic achievement.

As definitions of learning disability tend to be exclusionary in nature, Ford and Byrd (2001) state that any student who does not fit any other category of disability and who is not learning as expected may be identified as having a learning disability. The authors point out that many students from ethnic minorities therefore carry this label. These authors point to the need to ascertain and respond to the learner’s cognitive style and cultural context, achieving a match between the two. These authors call for learning disabilities to move from a catchall category to one that is precisely delineated.

Definitions used in Queensland

It is appropriate here to look at the definition currently in use in Queensland.

1.1 Learning difficulties and learning disabilities refer to barriers which limit some students' access to, participation in and outcomes from the curriculum.

1.2 Students with learning difficulties are those whose access to the curriculum is limited because of short-term or persistent problems in one or more of the areas of literacy, numeracy and learning how to learn.

1.3 Students with learning disabilities are one small group of students with learning difficulties who because of the neurological basis of their difficulties, have persistent long-term problems and high support needs in one or more of the areas of literacy, numeracy and learning how to learn. These students do not have generalised intellectual impairments but rather demonstrate idiosyncratic learning styles which are determined by the nature of their specific disorders and inhibit their learning at school. (Department of Education Manual – CS-13, 1995)
These definitions are extremely broad; perhaps even broader than the American definitions, criticised for their lack of specificity. This author has particular concerns about the definition of learning difficulty, a term so broad it is virtually rendered meaningless as a label for a category of children. Elkins (2002, p15) notes that “the Australian state and territory education systems do not generally distinguish between learning difficulties and learning disabilities, using the former term to cover all students with high incidence education problems.” Elkins (2002) further notes that the term learning disabilities is increasingly used to describe those students who have not responded to remedial intervention, children he characterises as “hard to help”.

The Australian National Health and Medical Research Council (1990) definition states clearly that learning difficulties is the generic or umbrella term, encompassing students with low incidence disabilities such as intellectual impairment, speech language impairment, vision and hearing impairment and a range of problems including students with specific learning disabilities. The category of learning difficulties can also be seen to include those students who experience problems with schooling because of lack of appropriate educational opportunity, emotional problems or inadequate environmental experience. The Queensland definition of learning difficulties is so expansive that it must be seen as the umbrella term. Learning disabilities can be seen as a subset of this category as it is defined as a subgroup within the group of students with learning difficulties. In the Queensland definition of learning disabilities the neurological basis of the problem is noted, implying that there is a specific difference between students with learning disabilities and those with general learning problems. The definition of learning disabilities does not account for the fact that for a number of students there may be a mismatch between the students’ ability level and the tasks presented in a particular school environment, therefore these students would be deemed to have learning difficulties. It is possible that different levels of literacy attainment may relate to the fact that some students develop at different rates or have particular needs in terms of specific skill instruction, requiring explicit instruction in the strategies necessary for learning literacy tasks and varying amounts of time required for rehearsal and reinforcement of both types of skills. Rather than look at disability or difficulty, we might consider the concept of variability.

Eligibility for educational intervention in Queensland
Ascertainment is a process currently used in Queensland to identify and provide services to students in low incidence disability groups. Those students who are intellectually impaired, speech-language impaired, physically impaired, visual or hearing impaired and students diagnosed with autistic spectrum disorder are eligible for ascertainment. One might assume that ascertainment is the process used for students who have learning difficulties. This is where some confusion lies. Appraisement is the process used to identify other students with higher incidence learning problems who require adaptation or modification to instruction in the state of Queensland. Students appraised may have learning disabilities, or they may have more general problems and therefore they are said to have learning difficulties. In fact the teachers who supervise the appraisement process are called support teachers: learning difficulties or STLDs. If learning difficulties is the umbrella term, it is used to describe students who are also in low incidence disability groups. It is possible that students who have some characteristics of a disability but do not meet criteria set for ascertainment, such as those students with borderline scores on cognitive assessment tasks and students with language problems who do not quite meet criteria for ascertainment in the category of speech-language impairment, may be appraised as they are likely to experience difficulties in classrooms.
Information gained from the appraisement process is used to determine goals for the support plan and types of interventions that will occur for students. Students with both learning difficulties and learning disabilities are identified as target groups in government documentation (The State of Queensland Education Department, 2001, p.6). It is noted that these students are characterised as non-strategic learners who may have few or poor self monitoring behaviours, inefficient or inappropriate strategies, memory and attention difficulties, fragile self esteem and little automaticity or mastery of literacy or mathematics skills. It is further noted that students with learning difficulties may progress at a slower rate than their peers.

The broad definition means that, unlike the situation in the United States, all students are eligible for appraisement and subsequent educational intervention. Appraisement however is not directly linked to funding of individual students and so whilst school personnel acknowledge that a child requires additional support, this must be provided within the general staffing structure of schools. It would be difficult to use appraisement figures to determine incidence and prevalence of learning disabilities as there is no clear differentiation of this group of students. Students are identified as requiring particular types of programs. Type 1 programs involve minor modifications to the strategies, resources and learning environment, Type 2 programs require major modifications and Type 3 programs involve extensive modifications.

Information from the Queensland CS-13 Educational provision for students with learning difficulties and disabilities was used to devise the following figure:

**Figure 1: Current classification of learning difficulties.**

<table>
<thead>
<tr>
<th>Learning Difficulties</th>
<th>Students with memory and attention problems</th>
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<tbody>
<tr>
<td>Non-strategic learners</td>
<td></td>
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<tr>
<td>Physical Impairment</td>
<td>Students with poor self esteem</td>
</tr>
<tr>
<td>Visual Impairment</td>
<td></td>
</tr>
<tr>
<td>Hearing Impairment</td>
<td>Students with poor self-monitoring behaviours</td>
</tr>
<tr>
<td>Speech / Language Impairment</td>
<td></td>
</tr>
<tr>
<td>Intellectual Impairment</td>
<td></td>
</tr>
<tr>
<td>ASD</td>
<td></td>
</tr>
<tr>
<td>Learning Disabilities</td>
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</table>

It can be seen that learning difficulties in this sense is a very broad category, encompassing students with low incidence disabilities, students who don’t meet criteria for inclusion in these categories although they have some characteristics or difficulties associated with impairment categories, and students who could be described as having inefficient learning styles. It is noted that the problem is seen to lie within the child. Program modification through appraisement is an attempt to match teaching to the specific skill level of the child.
Eligibility for educational intervention in the United States

In order to access intervention or educational services under the category of learning disabilities in the United States, students must meet specific criteria. One diagnostic criterion of learning disabilities is the presence of significant discrepancy between potential as indicated by IQ score and academic achievement. It has been noted that “significant” is a fairly malleable term that is interpreted differently in different states of America (Ford & Byrd, 2001). Students who score low on IQ tests and low on reading tests do not qualify for funding through the learning disability category and therefore do not receive assistance. As Sternberg and Grigorenko (2002) point out, this makes them doubly disadvantaged as they cannot receive the services that come with being identified as learning disabled. Berninger (2001) notes that there is surprisingly little research that has focussed on evidence-based approaches for teaching literacy to students who have low overall cognitive ability. The law in the United States does not make provision for students whose measured achievement is commensurate with their cognitive development but who struggle to keep up with faster learning peers.

The term learning disabilities is a confusing mix of scientific theory, political advocacy and service delivery according to Stanovich (1999). Sternberg and Grigorenko (2001:335) go one step further when they write how “the current system for dealing with learning disabilities reflects, to a large extent, political rather than educational or scientific considerations”. These authors question the U.S. government’s definition of learning disabilities, reporting that rates of identification depend on standards used by individual school districts and upon the willingness of districts to make identifications. This could also be the case in Australia where prevalence rates for learning disabilities as reported by teachers in the Mapping the Territory document (Louden et al., 2000) varied from 6% to 30% of students. Sternberg and Grigorenko (2001) report that identification rates in Connecticut range from 7.2% to 23.8% of students. The authors further report that identification rates have increased over time. It is thought that this may be due to the fact that some schools receive additional state or federal funding based on numbers of students identified with problems.

This author cannot find reports or research that relates information about the link between funding and improvement in reading ability or reduction in learning disability. Sternberg and Grigorenko (2001) report that identification of learning disability may “pay off” for some children, in that they are subsequently provided with additional educational attention. For other students however, the curriculum may be watered down or they may be presented with commercially produced programs that do not necessarily meet their individual needs. A label of learning disability is not descriptive in that it does not denote the particular problems a student may experience. As Sternberg and Grigorenko (2001) state, a range of difficulties may be experienced by students who are labelled with a specific learning disability or reading disability. These difficulties might include phonological-coding deficit, verbal comprehension (higher-order reading) deficit, working-memory deficit, anxiety or lack of exposure to standard English.

Related research

In the last decade significant work has been undertaken by researchers investigating the cognitive and neurological processes involved in learning. Pressley (1999) reports that over the last three decades there has been a steady accumulation of evidence that there are important biological factors between good and at least some poor readers. He further contends that these biological factors translate into a variety of information-processing differences that undermine the
development of skilled reading. Along the same lines, Grigorenko (1999) and Robertson (2000) report that researchers have consistently found the presence of developmental anomalies in dyslexic brains. Increased activity in some areas of the brain during reading tasks appears to indicate inefficient processing of information. Pugh et al. (2001) report that there is reduced activation and disrupted functional connectivity between dorsal and ventral components in reading disability, however there are also compensatory characteristics with an increased reliance on the inferior frontal gyrus in reading disabled subjects during reading tasks. These researchers posit that this may reflect an inability to use linguistic information appropriately during reading. In effect, the disabled reader has to work harder to make sense of the information presented in text. It is further proposed that the disproportionate shift to frontal sites may reflect an increase in reliance on articulatory recoding in an attempt to cope with the phonological analysis of words. In a study of 144 children, 70 dyslexic and 74 non-impaired readers, Shaywitz et al. (2002) found significant functional MRI differences between the two groups while they were involved in tasks requiring phonological analysis but not during visual perception tasks. In this situation the more accurate the performance on word and non-word reading, the greater the magnitude of the MRI signal in the left hemisphere. Poorer readers were found however to engage an ancillary system in the right hemisphere during semantic categorisation tasks. Consistent links have been made between word recognition problems and the phonological domain in learning to read (Grigorenko, 1999; Pugh et al., 2001). This view is based on the collection of evidence from cognitive psychology and may assist educators and researchers in the identification of a specific group of students who experience difficulties with schooling. Access to screening or assessment in this area is at present extremely limited.

Stanovich (1999) reminds us that socio-cognitive theorists have also helped us view learning disabilities in broader terms than would be possible if we relied solely on neurological perspectives. It is this researcher's view that we must consider both the learner and the task, the learner's motivation to complete particular tasks and the particular background knowledge and set of experiences they bring to the task, which includes the learner's self esteem and emotional state. Is this broader view describing students with learning disabilities or does it describe students with learning difficulties? Is there a need to distinguish?

Despite the lack of clarity over identification, we read in the media and in current Australian literature some alarming reports. It is not uncommon to read statements such as: “Almost 50% of Australians aged 16-65 do not have the necessary literacy and numeracy levels to deal with present-day work requirements” (OECD data reported in the Age Oct, 2001). Brent, Gough and Robertson (2001, p.3) report this data and other statements made by the Australian Council of Educational Research. These include: “More than 30% of Australian children entering high school cannot read or write properly.” and “Basic literacy skills are lacking in 30% of Year 9 students.” Perhaps the most alarming of the statements reported in this publication is: “The lowest 10% of students in Year 10 have not improved their reading since Year 4.”

A description of the numeracy and literacy levels required to deal with present day work requirements are not provided by Brent et al. (2001), nor do the authors define basic literacy skills or explain clearly what constitutes reading and writing “properly”. It is apparent that these authors who write about language disability are concerned about literacy levels in Australian schools. The intended audience of their publication is teachers. However, teachers and the Australian public require more explicit explanation and description of the population of students depicted as
learning disabled, reading disabled, dyslexic or students with learning difficulties. It is clear that the ramifications of failure to attain basic reading skills in the early grades are far reaching but it is necessary to define what is meant by basic reading skills.

Smart, Prior, Sanson and Oberklaid (2001), drawing on longitudinal research from a cohort of 2000 families from urban and rural areas in Victoria, found that rates of spelling and arithmetic difficulties among adolescents who had early reading difficulties (n= 195) were somewhat higher than rates of reading difficulties for this stage of development. Almost two thirds of the students identified at an earlier age as reading disabled, had spelling difficulties as adolescents. The authors suggest that this is indicative of reading disability leading to persistent difficulty in the literacy domain and in particular in the area of orthographic coding. Smart et al. (2001, p.51) conclude “spelling may represent the clearest arena for the manifestation of literacy difficulties at the early adolescent age”. The authors concluded that children with early reading disabilities have persistent learning problems over a range of domains. Over 80% of the sample had learning problems of some kind at age 13-14 years.

Another finding of the Smart et al. (2001) study was that provision of remedial help was negatively related to recovery. Almost half, 48% of students identified as having early reading difficulties had remedial help but 65% who had remedial help were still reading disabled and 68% of students who had not received assistance had recovered. Severity of reading difficulty, duration of remedial intervention and IQ of the students were ruled out as factors influencing this result. Unfortunately there was no information provided about the type of programs offered to these students. The authors conclude that there is an urgent need to find effective early means of assisting students who have reading difficulties. The fact that much of the intervention provided appeared to be ineffective is worthy of further scrutiny.

Flowers et al. (2001) report on longitudinal research undertaken in the United States and conclude that poor readers identified in elementary school do not catch up with their peers; their reading problems persisted through 8th and 9th Grades. These researchers posit that the deficit model is based upon the notion that reading difficulties persist, along with concomitant cognitive weaknesses. Flowers et al. (2001) note that well replicated research has demonstrated that a core deficit for reading disabled children and adults is phonemic awareness - the ability to understand how sounds and sound patterns work in our language system. Phonemic awareness, orthographic processing, short-term auditory memory and fluency were described as prerequisites to efficient reading.

For the purposes of the Flowers et al. (2001) study, those with reading difficulties were divided into two groups: IQ achievement discrepant (underachievers) and non-discrepant (poor readers with poor cognition). Assessments were administered to 51 discrepant and 89 non-discrepant poor readers. The researchers found that the developmental course of discrepant and non-discrepant readers does not differ in terms of word identification, non-word coding, phoneme awareness or rapid naming from early elementary school to the end of high school. All students made rapid gains in terms of real word identification and decoding of non-words between third and fifth grades and this improvement continued to grade twelve but neither discrepant or non-discrepant poor readers caught up to their normal reading peers. Word attack skills appeared to level off for all poor readers by the end of fifth grade.
Discrepancy status was associated with greater likelihood that students had received services, as under United States guidelines this group of students would have qualified for support, having a discrepancy of 15 points between IQ and reading achievement. Only slightly over half of those students identified received assistance through a resource model. Flowers et al. (2001) note persistence of reading difficulty despite special education services. They conclude that this may be due to the fact that the assistance was received too late, may not have matched the child’s needs, was of too short duration, or was inconsistently applied. They also note that the inclusion model has resulted in the fact that by receiving assistance in their regular classroom, students may not receive direct, systematic reading instruction. Assistance in inclusive settings has as a focus completion of immediate classroom assignments rather than direct teaching of reading skills. They note in addition that compensatory accommodations such as books on tape or test modifications, without appropriate remediation, also serve to mask the child’s underlying reading disability. (It should be noted that in American studies, when researchers write about inclusion they are often referring to the inclusion of students with specific learning disabilities in regular classes. In Australia when researchers and educators write about inclusion, they are generally referring to the inclusion of students with low incidence disabilities in regular classroom programmes.)

Flowers et al. (2001) acknowledge that more specific information is required when identifying students with reading disabilities and they advocate the use of the following components:

- Criteria which stress age and grade discrepant weaknesses in underlying processing abilities and basic reading skills.
- IQ should only be used to rule out intellectual impairment.
- Emphasis should be placed on research-based identifiers in K (Preschool) through to Year 2, as early intervention is important.
- Assessment for higher-level problems at various stages of reading development is also critical.

The researchers also note that, after thorough evaluation of the reading disability, a response to remediation criteria using proven treatment protocols over a sufficient amount of time should be instituted. It would be useful for those interpreting research to have clear information about the specific problems experienced by target groups, the actual discrepancy between age and performance on graded tasks, the intervention provided to students and the results of the treatment in both qualitative and quantitative terms.

Sternberg and Grigorenko (2001) make additional recommendations relating to intervention:

- We must identify interventions to be used based on the actual learning difficulties, not on the basis of labels. “One size fits all” approaches are inappropriate.
- Accommodations and interventions should be aimed at helping students overcome their weaknesses.
- Curriculum must be taught in a way that values the full range of thinking and learning abilities. That is, it should value memory and analytical abilities but equally value creative and practical abilities.

This last point is particularly salient. Often we assess students on a narrow range of tasks. As a result, student weaknesses are very apparent, but their strengths and abilities are less obvious. If
we are to develop appropriate interventions we need to be aware of the full range of student abilities.

There is general consensus that there is a need for identification of a learning disability or a learning difficulty and this should be made early in order to make appropriate response to the needs of the student. There are however inherent problems with this practice. Identification of student needs can lead to problems associated with any form of labelling.

**Labelling**

Labelling can result in students being defined by their disability or disorder. As a lecturer in inclusive education, I am amazed at the number of students, even those at post-graduate level, who refer to students by their disability e.g., "the Aspergers child". It is as if the child is defined by what they can't achieve. Children, in this sense, do not have a problem; they are referred to as the problem. It is refreshing to encounter writers who call on teachers to reconceptualize education. Dudley-Marling (2001) notes that special education, by responding to individual school failures, relieves the pressure on schools to change the basic structure of school systems that are responsible for producing much of the failure that we see. He further notes "It is the student who is removed from the classroom, not the teacher. It is the student who fails to learn to read as expected because he or she has a learning disability" (Dudley-Marling, 2001, p.9). This view is supported by Westwood (2001) who encourages us to look carefully at our teaching as well as the difficulties experienced by the child.

Modification of the curriculum and flexible and adaptive teaching is required but, even with adaptations and modifications in place, there will be students who will require additional support and assistance above that which is possible for a single teacher operating in a classroom context to provide. This is why identification is often necessary. Perhaps it is more appropriate to ask: When we identify, is it necessary or appropriate to simply apply a global type of label such as learning disability or learning difficulty without clearly identifying the particular needs of the student?

There is always a danger that labels will be inappropriately fixed. One important aspect of the identification of students with learning disabilities is the fact that purely technical analysis of test scores and norms can result in students being misplaced in categories or missing out on placement because they don't quite fit (Scruggs & Mastropieri, 2002). It has also been noted that there is a tendency to flexible labelling that fits with concepts of social acceptability. Berninger (2001) writes how in the United States, many parents whose children fit the definitional criteria for intellectual impairment prefer the label learning disabilities as it has less social stigma. She argues that using the label in this way can be misleading.

Sternberg and Grigorenko (2001) state that too often labelling is used in place of understanding. Labelling can be used as an excuse for failure to obtain desired educational outcomes. Shinn and Shinn (2001) note that in the United States assessment is being overused for labelling and placement purposes rather than for instructional planning. There is therefore a danger that students may be over-assessed.

There has been an argument that learning disabilities do not exist as a viable condition and the process of labelling should be abandoned (Scruggs & Mastropieri, 2002; Skritic, 1999; Kavale & Forness, 1998). However, there are students in our schools who exhibit uneven development, who
have average or above average oral language skills but who exhibit moderate to extreme difficulties in acquiring skills in literacy and/or numeracy. The growing body of evidence suggesting that there is a neuro-psychological basis for learning disability cannot be totally ignored.

**Differential identification of learning disability**

As discussed, the identification of learning disabilities depends on particular standards used in different school systems, ministries and departments of education throughout Australia and the world. Often identification depends on the willingness of institutions to identify, as once identification has been made there is an expectation that a service will be provided in terms of educational intervention.

Perhaps, instead of looking at learning or reading disability, we should be thinking in terms of learning and reading variability. Students will develop at different rates due to different patterns of neuro-psychological strengths and weaknesses. Students will not develop and all learn at the same rate, despite the best efforts of teachers and the most responsive and flexible programming. It is for this reason that teachers need to be adaptive and prepared to modify according to individual differences in demonstrated rates of attainment. It is possible to think of learning variability as occurring on a continuum. Rather than describing students in terms of disability, we should be clearly and specifically describing the traits that characterise their learning in clear and specific ways so that teaching can be more responsive.

**Figure 1.1: Learning Variability**

<table>
<thead>
<tr>
<th>Learning Variability</th>
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<tr>
<td>Students who require specific skill instruction</td>
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There is empirical evidence for distinguishing between different kinds of learning disabilities. Berninger (2001) identifies three different types of learning profiles:

- Specific learning impairment, where language is underdeveloped for nonverbal cognitive development;
- Dyslexia, where reading is underdeveloped for verbal cognitive development; and
- Low verbal ability, where reading and cognitive development fall under the lower limits of the normal range.
Catts (2000) identifies four subtypes of learning disability using a measure of listening comprehension and IQ:

- Dyslexia, where there is good reading comprehension but poor word reading;
- Hyperlexia, where there is poor listening comprehension but good word reading;
- Specific language impairment; where there is poor listening comprehension coupled with poor word reading; and
- Other learning disabilities where there is good listening comprehension and good word reading.

Other characteristics may also need to be considered. Smart et al. (2001) note that behavioural adjustment difficulties precede and may be associated with reading difficulty for a substantial proportion of children, particularly boys.

After reviewing the literature, Scruggs & Mastropieri (2002) suggest:

- The criteria for learning disabilities should be based on deficits in phonological analysis and rapid continuous naming of digits and letters. These criteria have been seen to discriminate between students with reading disabilities and normally achieving students in the early years.
- There is also an argument that educators should simply look at discrepancy between chronological age and educational achievement, provided there is no evidence of intellectual impairment.
- A third method would be to look at treatment validity – students in the low achieving range who do not respond to general treatments and who require specific specialised intervention.

Just as there is a Diagnostic and Statistical Manual for Mental Disorders (APA, 1994), Berninger (2001) suggests the need for a Diagnostic and Treatment Manual for Educational Disorders. She suggests that executive functioning, the social-emotional domain, and the domain of necessary components of the curriculum are as important as the language communication, cognitive or motor domains. As Scruggs and Mastropieri (2002) remind us, the identification procedure must address the multifaceted nature of learning disabilities – reading comprehension, decoding, spelling writing and numeracy.

Some students with learning disabilities recognise the need for more specific identification of learning problems. In a 20 year longitudinal study of 41 students identified as having learning disabilities Higgins et al. (2002) report the statement of one participant: “When you say I have a learning problem, that doesn’t mean I have a problem learning. The problem isn’t learning. The problem is reading and writing.”

Clearer, more descriptive terminology needs to be used when describing students. It is not enough to state that there is a learning disability without also clearly identifying the specific characteristics of that disability and how they will translate to educational intervention. There needs to be further discussion amongst educators and researchers to determine whether we look at
the relationship between language and cognitive development; the relationship between different
listening and reading comprehension and decoding ability; phonological analysis and rapid
continuous naming of letters; and discrepancy between chronological age and/or the relationship
between educational achievement and treatment validity. It is possible that we need to look at
combinations of these factors in order to clearly describe student attainment. More specific
description of student attributes will assist educators who are attempting to interpret research
findings. It is also hoped that with clearer identification of student needs through the use of
appropriate assessment instruments, subsequent instruction will be more responsive to those
particular needs.

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CHAPTER 2


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Overview
Teaching children how to read and write has always been the primary objective of schooling. However in recent years there has been a questioning of the effectiveness of different approaches to the teaching of reading, as well as concerns that many students fail to achieve effective literacy skills by the end of the compulsory years of schooling. This has led to a renewed focus on the teaching of reading in the early years of schooling, and the introduction in Australia of new policies and practices which are aimed at improving literacy outcomes.

At the same time there have been significant advances over the past two decades in the research on reading and on the processes underlying the acquisition of reading. This research has led to the questioning of some of the assumptions on which current teaching practices have been based, and have identified some of the critical factors associated with the acquisition of reading skills.

Research on the Acquisition of Reading
The basic model of reading and writing that underlies much of the current scientific research on the acquisition of literacy is most easily understood in terms of the simple model described by Juel, Griffith and Gough (1986). According to this model reading and writing are each composed of two distinct abilities; decoding (or word recognition) and comprehension in the case of reading, and spelling and ideation (or the generation and organisation of ideas) in the case of writing. Thus word recognition combined with the skills involved in listening comprehension provides the basis for reading comprehension, while spelling combined with the generation of ideas provides the basis for writing.

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1 This paper is an abridged version of the paper Closing the gap between research and practice: Foundations for the acquisition of literacy, published by the Australian Council for Educational Research. It is based on a review of the research literature on the acquisition of literacy, undertaken as a part of the ACER Core-funded research program over the period 1999 to 2002.
While the specific skills underlying the acquisition of reading and writing are different, both share a common denominator, in that both are dependent on the set of spelling-sound correspondence rules of the language, or what is termed in the literature the orthographic cipher.

Knowledge of the cipher is therefore seen as critical to the acquisition of literacy, since it is a basic component of both decoding, which underlies the acquisition of reading, and spelling, which underlies the acquisition of writing. Knowledge of the cipher is in turn dependent on two main factors; phonemic awareness, or the knowledge that the spoken word can be broken down into a series of specific sounds, and exposure to print, which provides models of written text and specific letters and words, which can then be connected to specific sound sequences. Phonemic awareness and exposure to print are therefore the two factors that are most critical to the acquisition of literacy.

While word recognition and spelling are essential to the ability to read and write, these abilities do not in themselves ensure comprehension of complex text or production of coherent and well organised writing. These higher level skills are dependent on a range of factors, including vocabulary knowledge, familiarity with particular areas of knowledge, knowledge and values associated with membership of a particular social or cultural group, and critical thinking skills. However, these higher-level skills apply equally to effective use of spoken language. What distinguishes reading and writing skills from listening comprehension and speaking skills is the fact that these skills are expressed through the medium of written text rather than through the medium of the spoken language.

Once children have acquired an understanding of the alphabetic principle, and are able to translate print to sound through the process of phonological recoding, this provides a basis for self-teaching based on the independent generation of target pronunciations for novel orthographic strings. That is to say, as children encounter new words or letter cluster strings they are able to apply phonological recoding to generate the sound equivalents of the unfamiliar words or strings, and in this way to acquire the detailed orthographic representations that are necessary for rapid, autonomous visual word recognition (see Share, 1995). Thus the more a child reads, the greater the number of words that they will be able to recognise visually, thus enabling more fluent reading and the freeing up of the cognitive demands of the task to allow for more cognitive focus on comprehension as opposed to decoding. This leads to what Stanovitch (1986) has termed the Matthew effect, with the better readers reading more and therefore increasing their exposure to print, and consequently their word recognition skills and their fluency and speed of reading, while poor readers, who read more slowly, will have less exposure to print and therefore less opportunity to build up a store of visually recognised words, thus spending more of their time and cognitive energy on decoding unfamiliar words, and therefore falling further behind in their reading achievement.

This self-teaching mechanism is based on two fundamental prerequisites – symbol-sound knowledge and phonemic awareness. Neither of these skills develop spontaneously through exposure to print. Thus explicit teaching of symbol-sound relationships and phonemic awareness is essential in learning to read.
Research evidence that has been accumulated over the past two to three decades has supported this model of the basic processes underlying the acquisition of literacy, and particularly the important role played by phonemic awareness in the development of reading and writing skills. While there may be differences in the specific models proposed by different researchers to explain exactly how phonemic awareness, word recognition and spelling skills are acquired, and how these skills interact in the process of learning to read and write, there is general agreement about the overall model and the crucial role of phonemic awareness and recognition of spelling-sound correspondences in the development of reading and writing.

The Australian Context

The teaching of reading in Australia over the past thirty years has been dominated by the principles and practices of whole language (see, for example, van Kraaynoord and Paris (1994), and Freebody and Gilbert (1996)). This approach places emphasis on reading for meaning, and rejects the view that reading is dependent on a series of sub-skills which have to be mastered before meaning can be conveyed by written texts. This approach is linked with the view that literacy is a socio-cultural phenomenon that cannot be separated from its social context. As a consequence, the bulk of Australian research on literacy, and particularly the research funded through the Children's Literacy National Projects Programme (CLP) by the Department of Education, Training and Youth Affairs (DETYA), has been research into literacy practices in a variety of social contexts, in which the dominant research methods are descriptive and ethnographic, with an emphasis on observational and case study techniques.

There is relatively little Australian research which has involved the systematic evaluation of educational programs designed to enhance literacy skills. Despite the widespread adoption of programs such as the Western Australian First Steps Program and the Victorian Early Years Literacy Program, as well as intervention programs such as Reading Recovery, and the various state assessment programs that have been adopted at primary and school entry level, presumably on the assumption that such assessments will have a positive effect on student outcomes, there is as yet no cumulative body of research which can be used as a basis for evaluating the impact of these programs or initiatives on students' literacy achievement.

The International Context

While the socio-cultural approach has its supporters in other countries, it is less dominant and has not been as influential in terms of its impact on educational policy and research as has been the case in Australia. This is particularly evident in the United States, where a series of reports published over the last few decades have been influential in drawing attention to the findings of research in the reading area, and the implications of this research for teaching practice and educational policy.

A useful presentation of these two opposing views of literacy development is provided in the two special issues of the Journal of Research in Reading (Vol. 16, 2, September 1993, and Vol. 18, 2, September 1995) which present the positions of both the 'new literacy group', represented by Street, Bloome, and their colleagues (in the 1993 issue), and the response of the reading research group, represented by Oakhill and Beard, Gough, Stanovitch, Perfetti, Ehri, Goswami, Juel, and others (in the 1995 issue); the paper by Gough (1995) in the 1995 issue is particularly useful in terms of clarifying the distinction between the positions held by these two groups.

Since renamed the Department of Education, Science and Training (DEST)
The most recent of these reports is the Report of the National Reading Panel convened by the Director of the National Institute of Child Health and Human Development, at the request of the United States Congress, in order to assess the status of research-based knowledge on reading, including the effectiveness of various approaches to teaching children to read (National Reading Panel, 2000). This report is particularly significant in that the Panel decided to adopt a set of rigorous standards to assess the efficacy of materials and methodologies used in the teaching of reading and in the prevention or treatment of reading disabilities. The standards adopted were the same as those applied to research into the efficacy of interventions in psychological and medical research, on the argument that the standards applied to determining the efficacy of educational interventions should be no less rigorous than those applied to determining the efficacy of behaviourally based interventions, medications or medical procedures proposed for use in the prevention or treatment of medical or psychological conditions affecting the person's physical or psychological health. If this approach is applied to other areas of education and educational research, it could well mark a turning point in the history of education, where up to now innovative educational practices and interventions have been adopted without any requirement for research-based evidence as to their effectiveness or their impact on children's learning or other aspects of their social or psychological development, including the possibility of unintended negative effects.

In order to understand the context in which this panel was requested, at the highest level of government, to assess the research-based knowledge relating to the effectiveness of different approaches to the teaching of reading, it is necessary to understand the background to this request and particularly the heated and at times acrimonious educational debate that preceded it.

Predecessors to the Report of the National Reading Panel
Prior to the release of the report of the National Reading Panel there were four landmark reports on the status of reading instruction in the United States, each regarded as providing an authoritative view of the research evidence relating to the effectiveness of different approaches to the teaching of reading at the time of their publication.

The first of these reports was Jean Chall's influential book Learning to Read, the Great Debate, published in 1967. This was followed in 1985 by the report Becoming a Nation of Readers, by Anderson, Hiebert, Scott and Wilkinson. The book "Beginning to Read: Thinking and Learning About Print" by Marilyn Adams was published in 1990, and the report Preventing Reading Difficulties in Young Children, edited by Snow, Burns and Griffin, was published in 1998.

Each of these reports was commissioned or funded by a major national body, and all came up with essentially the same conclusion; that systematic teaching of phonics was a necessary and essential component of any program for the teaching of beginning readers. Despite the range of programs studied and the various other factors associated with reading achievement, there was a consistent finding of higher achievement being associated with programs that included systematic teaching of phonics.

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4 A historically based review of this report, which identifies the links between this report and its predecessors, is provided by Pearson (1999).
Despite the consistency of the findings from these reports, the debate with regard to the effectiveness of different approaches to the teaching of reading continued, and it was felt that a more systematic review of the research evidence relating to the teaching of reading was required. This led to the constitution by the US Congress of the National Reading Panel, charged with the task of assessing the status of research-based knowledge, including the effectiveness of various approaches to teaching children to read. The panel was composed of 14 individuals, including leading scientists in reading research, representatives of colleges of education, reading teachers, educational administrators, and parents. In order to cover the major topics designated, the Panel established five subgroups to cover the areas of alphabetics, comprehension, fluency, teacher preparation, and computer-linked instruction.

The Panel developed a set of rigorous scientific standards to evaluate the research on the effectiveness of different instructional approaches used in teaching reading skills. Regional hearings were held to allow public input, and to inform the panel of the issues that were considered important by the public, and the needs and concerns of those who would be required to implement the Panel's findings and determinations.

In their search of the literature, the Panel identified a total of about 100,000 studies since 1966, and another 15,000 published prior to this time. Because of the large volume of studies, the Panel selected only experimental and quasi-experimental studies for their review, and of these, only those that met rigorous scientific standards in reaching their conclusions.

On the basis of their review of this research evidence, the Panel reached the following conclusions:

Teaching children explicitly and systematically to manipulate phonemes significantly improves children's reading and spelling abilities (an overall effect size of .86 on measures of phonemic awareness outcomes, an overall effect size of .53 on reading outcomes, and an overall effect size of .59 on spelling outcomes, based on a total of 96 comparisons from 52 studies); the Panel's conclusion was that the evidence on this was so clear-cut that this method should be an important component of classroom reading instruction.

Systematic phonics instruction (as compared with nonsystematic phonics instruction or no phonics instruction) produces significant benefits for children from kindergarten to Grade 6, and for children having difficulties in learning to read (overall effect size of .44, based on 66 comparisons derived from 38 studies); the greatest improvements in reading are associated with synthetic phonics instruction (effect size of .45), as compared with programs based on analysis and blending of larger units (effect size of .34) or programs using other systematic approaches or where the specific nature of the approach was not specified (effect size of .27); it was also noted that the effects of systematic phonics teaching were greater at Kindergarten and Grade 1 (.56 and .54) than in Grades 2 to 6 (.27), and greater for children from low SES.

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5 Synthetic phonics involves teaching students explicitly to convert letters into phonemes and to blend phonemes to form words
6 Such as clusters of letters forming a subpart of the word, as in onsets, rimes, phonograms, and spelling patterns

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backgrounds (.66) as compared with children from high SES backgrounds (.44); effects were also greater for children identified as ‘at risk’ (.58 at Kindergarten level and .74 at Grade 1 level), as compared with children identified as ‘reading disabled’ or where low achievement was associated with other cognitive difficulties (.32 and .15); systematic phonics instruction also had a stronger effect on spelling for children in Kindergarten and Grade 1 (.67) than for children in Grade 2 to Grade 6 (.09); the Panel’s conclusion was that the evidence relating to the effectiveness of phonics instruction in improving reading outcomes was sufficiently strong to indicate that systematic phonics instruction should be a part of routine classroom instruction; it was however noted that because children vary in the skills they bring to the classroom, no single approach to teaching phonics can be used in all cases, and that teachers require training in different approaches to the teaching of phonics and how these approaches can be tailored to meet the needs of particular groups of students.

Guided oral reading (that is, reading aloud to the teacher, parent, or a fellow student) is important for developing reading fluency (average weighted effect size of .41); the highest impact was on reading accuracy (mean effect size of .55), followed by reading fluency (mean effect size of .44) and reading comprehension (mean effect size of .35); however, there was substantial variation in the effect sizes reported for these studies (from .05 to 1.48), as well as substantial variation in the sample sizes; because of the great range in the nature and design of the studies examining the effects of guided reading, and in many cases the lack of either transfer or control data, only fourteen studies were found to be appropriate for inclusion in the meta-analysis from which the average weighted effect size was calculated.

The panel was unable to determine whether reading silently to oneself helped to improve reading fluency; while hundreds of studies have demonstrated that better readers do more silent reading than poor readers, these studies are unable to determine whether independent silent reading improves reading skills or whether good readers simply prefer to do more silent reading than poor readers; while not discouraging the practice of silent reading as a classroom technique, the Panel recommended that this be done in combination with other types of reading instruction such as guided oral reading.

While the Panel was unable to identify the best method for teaching vocabulary, they concluded that vocabulary should be taught both directly and indirectly, that repetition and multiple exposure to words, as well as computer technology, will assist vocabulary development, and that instruction should be based not on a single method but on a combination of methods.

In relation to the comprehension of text, the Panel found that reading comprehension is best facilitated by teaching students a variety of techniques and systematic strategies to assist in recall of information, question generation, and summarising of information; it also found that teachers must be provided with appropriate and intensive training to ensure that they know when and how to teach specific strategies.

With respect to teacher training, the panel noted that existing studies showed that training both new and established teachers generally produced higher student achievement, but that the research is inadequate to draw clear conclusions about what makes training most effective;
more quality research on teacher training was one of the major research needs identified by the Panel.

With respect to computer technology, the Panel noted that there are too few definitive studies to draw firm conclusions, but the available information indicates that it is possible to use computer technology for reading instruction; the use of hypertext highlighted text that links to definitions or related text was noted as one possible teaching strategy; it was also noted that the use of computers as word processors might help students learn to read, as reading instruction is most effective when combined with writing instruction.

This 800 page report of the National Reading Panel is the most comprehensive review yet of the research evidence relating to the factors underlying the acquisition of reading and the effectiveness of different approaches to the teaching of reading. The Panel did not address all the issues associated with learning to read, including social and home background factors as well as broader school factors such as class size and grouping and the role of assessment and reporting in the improvement of student outcomes. However, it provides a convincing case for the importance of direct instruction, and particularly instruction in phonics, as providing the basis for learning to read. The impact of this report is already evident in the United States, where under the new No Child Left Behind Act of 2001, one billion dollars has been allocated to Reading First, a program designed to improve reading achievement through the adoption of effective teaching practices based on scientific research, as documented in the Report of the National Reading Panel.

**Australian Research on Effects of Phonics versus Whole Language Instruction**

The overseas evidence regarding the essential role of phonics in learning to read appears to have had little impact on approaches to the teaching of reading in Australia, where the whole language philosophy continues to dominate teaching practice and teacher views. As noted by the House of Representatives Committee on Employment Education and Training (1992), whole language has Australia-wide support and virtually all curriculum guidelines on primary school literacy teaching are based on this approach. It has also provided the theoretical basis for the literacy instruction of teachers in both their preservice and inservice training, including the influential Early Literacy Inservice Course (ELIC), which, as noted in the House of Representatives Report, was undertaken by virtually all teachers of early literacy throughout Australia.\(^7\)

There have been few Australian studies which have been designed specifically to look at the effectiveness of a phonics-based versus a whole language approach to the teaching of early reading. Some relatively small school-based studies of the effects of direct instruction programs that include specific teaching of phonics have been reported, but these have generally been based on very small samples, and results are generally reported in terms of actual gains versus expected gains based on norm-referenced measures, without any control to serve as a comparison group (Lockery and Maggs, 1982). However, some data relating to the effectiveness of more structured programs including some explicit teaching of phonics is available from the ACER research-based evaluation of the Victorian pilot project on multiage grouping (de Lemos, 1999), while a longitudinal study of the effectiveness of training in phonemic awareness at the preschool level

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\(^7\) A more detailed analysis of the philosophy and practice of whole language teaching in Australia and New Zealand is provided by Hempenstall (1996), and Tunmer and Chapman (2002).
has been reported by Byrne and Fielding-Barnsley (Byrne, 1998; Byrne and Fielding-Barnsley, 1991a, 1991b, 1993, 1995; Byrne, Fielding-Barnsley and Ashley, 2000). Further information on the effectiveness of a program which includes specific instruction in sound/symbol correspondences and phonemic awareness is also provided by the evaluation of the Schoolwide Early Language and Literacy Program (SWELL), which was developed by a group of Macquarie University researchers in collaboration with researchers at the John Hopkins University in the United States (Center et al, 1998, 2001a; 2001b). The results of these studies support the overseas evidence regarding the greater effectiveness of phonics-based programs in teaching children to read, and the importance of phonemic awareness and phonological processing in the early stages of reading.\(^8\)

**Relevance of Research Findings for Teaching Practice**

This paper has focused specifically on the research findings relating to the processes underlying the acquisition of reading and the evidence of instructional practices that are effective in improving reading outcomes. It has not addressed a range of other factors that are associated with literacy development.

This focus has been adopted for two main reasons. First, it is seen as providing a balance to the prevailing Australian literature on literacy development, in which the dominant emphasis has been on the social and cultural factors associated with literacy development. And second, it is based on the view that improving reading instruction provides a more immediate and more effective strategy to improve reading outcomes than relying on changes in home background and parental attitudes that can only occur over a longer time span, and in conjunction with other social and economic changes.

While home background factors clearly play an important part in literacy development and in preparing children for more formal learning in the school situation, the evidence relating to the effectiveness of strategies directed at producing changes in home background and parental involvement in children’s early learning and reading achievement is at best inconclusive. As noted by Cairney et al (1995) in their review of family literacy programs in Australia, the UK and North America, evidence of significant outcomes is difficult to find, and the evidence that is available indicates that any gains reported are generally either modest or inconsistent.

A further argument in support of the focus on identifying effective strategies of initial reading instruction is that this provides a basis for the development of more cost-effective approaches to improving reading outcomes than alternative strategies such as reduction of class sizes or one-to-one intervention programs such as Reading Recovery, which are much more costly to implement. In examining the research evidence relating to the effectiveness of different instructional practices on learning outcomes, it is of interest to note that the effect sizes associated with effective instruction in initial reading are in general higher than the effect sizes associated with the reduction of class size,\(^9\) while the long term effectiveness of one-to-one intervention programs

\(^8\) A more detailed review of these studies is provided in de Lemos (2002)

\(^9\) See, for example, Slavin (1989) and Goldstein and Blatchford (1997), whose analyses of the evidence on class size indicate that effect sizes associated with smaller class size range from 0 to .18.
such as Reading Recovery has yet to be established on the basis of well designed studies meeting rigorous scientific criteria.\(^\text{10}\)

From this point of view, the research evidence relating to the extent to which the introduction of effective instructional practices can improve students’ reading skills is encouraging, indicating that the adoption of effective teaching strategies in the early years of school can have a significant impact on subsequent literacy outcomes.

The Way Forward
There is increasing recognition in the educational community that it is time to move away from policies and practices based on philosophical beliefs about what should work, to evidence-based policies and practices based on the research evidence as to what does work (see, for example, Masters, 1999).

In the area of reading, there appears to be a discrepancy between the research evidence as to ‘what works’, and the teaching strategies that form the basis of most current teaching programs.

In order to move closer toward the adoption of teaching strategies that work, it is necessary for a major rethink of current approaches to the teaching of reading in Australia. Teachers need to be trained in the use of practices and strategies that have been shown to be effective, as well as to understand why they are effective. This requires a greater emphasis in both pre-service and inservice teacher training courses on providing teachers with a broader view of different approaches to the teaching of reading, and the theoretical rationale underlying these different approaches. This in turn requires teacher educators who are eclectic in their approach, and encourage their students to develop a critical and scientific attitude in their study of different theories of the reading process, and their evaluation of the research evidence relating to effective teaching strategies and practices. It also requires education authorities and education administrators who are prepared to look critically at their current programs and initiatives, and support the necessary research that is required to evaluate the effectiveness of these programs, using soundly based research designs and valid and reliable research tools.

In this way, it will be possible to move forward, so that more effective policies and practices relating to the teaching of reading are developed on the basis of empirical research as to what works, and a theoretical understanding of why it works.

References


\(^\text{10}\) See, for example, Shanahan and Barr (1995), Hiebert (1994) and Grossen and Coulter (undated) for reviews of the effectiveness of Reading Recovery and an analysis of its costs and benefits.


Overview
Reading accuracy, the fluent reading of individual words, singly and in connected text, is the central skill supporting reading comprehension and all advanced literacy development. It is also the common point of failure in students with weak phonological awareness and working memory, students with English as a second language, and students with limited print experience on school entry. This paper emphasises building teacher levels of pedagogical content knowledge of reading accuracy and phonological recoding. It summarises authoritative research findings on the area, using principles of instruction for phonological recoding, and uses a model of Core Literacy instruction to support teacher decision-making to achieve effective instruction matched to individual students’ instructional needs.

The power relationships between reading accuracy and reading comprehension in early literacy instruction are in a state of flux. For centuries, reading accuracy reigned supreme and unquestioned: lessons focussed on building skills in correct reading and writing of words, sentences and larger passages, with lesser attention paid to comprehension awareness. Instruction was ‘bottom-up’, teaching children to read the letters and words, with a tacit assumption that the singular path to comprehension lay in reading the words then understanding the message contained therein. When ‘Whole Language’ emphases ushered in a new era in the 1970’s, teachers realised the importance of the knowledge and experiences children bring to reading tasks. Unfortunately, rather than achieving balance, instructional emphases changed dramatically to ‘top-down.’ Reading comprehension was strongly foregrounded, with readers considered to merely sample text to confirm the predictions made from background knowledge, rather than actively engaging in reading the words. The similarities of oral and written expression were emphasised: children master speaking and listening through exposure to meaningful speech and language experiences, and early literacy instruction involving children ‘saturated’ in meaningful print experiences would thus provide the path to literacy mastery. The reign of reading accuracy ended as the reign of reading comprehension began.
Whereas explicit instruction was removed from all areas of literacy instruction in the early years of Whole Language, over time it returned to instruction of handwriting, spelling, reading comprehension, genre, grammar and written expression. This return to skills development was not ascendancy, replacing Whole Language emphasis on authentic full-tasks, but instead the building of a harmonious balance of skill building and meaningful authentic full-tasks. This same balance has not been achieved for reading accuracy and reading comprehension, despite vast amounts of reading research evidence placing reading accuracy and reading comprehension as vitally important independent and interdependent skills, with separate instructional consideration of reading accuracy considered vital, particularly for students at risk of delayed development.

In Australia at the current time, it is common for reading comprehension to be strongly foregrounded and for little attention to be paid to systematic instruction in reading accuracy other than in embedded contexts, usually the reading of full-texts in ‘shared, guided and independent’ reading. In preservice and inservice training in recent decades, reading accuracy has been treated as a poor relation to reading comprehension, with little attention paid to developing optimal levels of teacher pedagogical content knowledge of reading accuracy instruction (de Lemos, 2002; Queensland Board of Teacher Registration, 2001). This backgrounding of reading accuracy instruction apart from full-text reading is also very evident in school and state departmental curricula, including Western Australia’s and Queensland’s use of First Steps (Education Department of Western Australia, 1997a, 1997b), Victoria’s Keys to Literacy (Department of Education, 1999), and the controversial but widely used Reading Recovery (Clay, 1993). Similar backgrounding is also evident in professional texts supporting literacy instruction (Allington, 2001, Winch, Ross Johnston, Holliday, Ljungdahl, & March, 2001).

While the lack of systematic instruction of reading accuracy in narrower instructional contexts such as the reading of isolated single words may have little impact on higher achieving students who successfully negotiate the intricacies of word attack skills in the broad contexts of full-text reading, it has major impact on students at risk of literacy delay. These children are frequently unable to crack the codes of English in full-text reading: their inability is seen generally in failure to develop effective independent reading skills, and specifically in failure to master phonological recoding, the reading of unfamiliar words through decoding letters and word parts to their sounds.

This paper will discuss reading accuracy and its role in successful literacy acquisition, establishing the importance of specific instruction to develop skilled phonological recoding, then consider instruction of phonological recoding using the writer’s model of Core Literacy instruction.

The role of reading accuracy in effective literacy mastery
Reading accuracy is the ability to read single words in isolation and/or connected text. International research on reading accuracy has been intense in recent decades, with many highly regarded summaries of research findings now available (including Adams, 1990; Armbuster, Lehr, & Osborn, 2001; National Research Council, 1998; Simmons & Kameenui, 1998). These resources are worthy additions to every academic and school library, as is, on the Australian scene, de Lemos’ (2002) recent seminal work analysing local and international research and practice, parts of which are abridged in this book. Findings on reading accuracy accepted as well-
established facts due to the large amounts of consistent research findings supporting them include the ten principles summarised in Figure 1 and discussed below.

**Figure 3.1. Principles guiding instruction of phonological recoding.**

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Reading accuracy is the core skill of literacy development.</td>
</tr>
<tr>
<td>2)</td>
<td>Instruction in single word reading accuracy leads to efficient reading comprehension.</td>
</tr>
<tr>
<td>3)</td>
<td>Reading accuracy develops in key stages: Logographic, Alphabetic then Orthographic.</td>
</tr>
</tbody>
</table>
| 4)        | Phonological recoding should be students' primary word-attack strategy:  
|           | a) Over-reliance on context is inefficient.  
|           | b) Continued Logographic reading is inefficient. |
| 5)        | Phonological recoding is essential because English is phonological:  
|           | a) The rich diverse heritage of English makes it complex.  
|           | b) Its complexity makes for higher failure rates.  
|           | c) It is manageable through being phonological.  
|           | d) All words contain phonological cues for phonological recoding. |
| 6)        | Phonological recoding is Alphabetic then Orthographic:  
|           | a) Alphabetic recoding: recoding letters to sounds then words using the alphabetic principle.  
|           | b) Orthographic recoding: Students recode word parts. |
| 7)        | Phonological awareness and letter-sound knowledge undergird phonological recoding. |
| 8)        | Cognitive load strongly affects reading progress:  
|           | a) Cognitive load mustn't overload processing capacity.  
|           | b) Complex new tasks have high cognitive load.  
|           | c) Narrower instructional contexts offer reduced cognitive load. |
| 9)        | Phonological recoding is the common point of literacy failure:  
|           | a) This weakness lies in low phonological skills and lack of automaticity.  
|           | b) Low reading accuracy causes low reading experience that creates widespread language deficits.  
|           | c) Early reading failure strongly predicts continued failure. |
| 10)       | High teacher levels of pedagogical content knowledge about reading accuracy and phonological recoding are vital for effective reading instruction. |

**Principle 1. Reading accuracy is the core skill of literacy development.**

Reading accuracy is the core component of literacy development because of its direct relationship to reading comprehension, reading fluency, quantity of independent reading, vocabulary growth, written expression, spelling and other language and literacy components. Whilst effective sophisticated reading comprehension is the ultimate goal of all reading instruction, efficient reading accuracy is vital to achieve this goal. In addition to its components of single word reading and phonological recoding, reading accuracy can also be thought of as including the skills in reading vocabulary, words recognised and understood, and reading fluency. Both of these areas are significantly empowered by single-word reading skills and indeed, the instructional tool of repeated readings of full-texts is only fully effective if students use phonological recoding while reading (Chard, Simmons, & Kameenui, 1998a, 1998b)
Principle 2. *Instruction in single word reading accuracy leads to efficient reading comprehension.*

Reading comprehension has two core components, described in Hoover and Gough's (1990)'simple model' as Reading Comprehension = Language Comprehension × Reading Accuracy. Language comprehension, the second component, includes skills of vocabulary; literal language comprehension skills; higher-level language comprehension skills, including logical reasoning, social comprehension, sociocultural awareness, and skill with subtlety, colloquialisms and humour. Single word reading of real words and nonwords (pseudowords equivalent in many ways to unfamiliar words) contributes almost twice the variance of reading comprehension that language comprehension does: far more children fail in early literacy because of reading accuracy weakness than though weakness in comprehension (Shankweiler, Lundquist, Katz, Stuebing, & Fletcher, 1999). Hyperlexia, high reading accuracy with low comprehension skills, sometimes called 'word calling' or 'barking at print', is rare in comparison to reading difficulties characterised by weakness in reading accuracy or weakness in both accuracy and comprehension.

Principle 3. *Reading accuracy develops in key stages: Logographic, Alphabetic then Orthographic.*

The steplike nature of reading development is represented at macro-level in the three stages of the writer’s model of Core Literacy Instruction (discussed later, see Figure 3 and Table 2) and at micro-level in Frith’s (1985) model of stages of reading development, whereby students move through Logographic (sight word), Alphabetic (phonological recoding: regular word), then Orthographic (phonological recoding: spelling pattern/irregular word) stages (See Table 1 and Figure 2).
Table 3.1. Features of Frith's (1985) stages of development of single word reading and writing (from Galletly, 2001, in press).

<table>
<thead>
<tr>
<th>Efficient early stage</th>
<th>Efficient advanced stage</th>
<th>Inefficient development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Logographic Stage:</strong> the sight word, visual cue stage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Acquiring first words as sight words, possibly before knowing letters and sounds.</td>
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<tr>
<td>2. Strong use of context in full-text reading.</td>
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<tr>
<td>Merging logographic and alphabetic skills e.g. using sound of first letter.</td>
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<tr>
<td>Major difficulties in learning sight words combined with difficulties in letter-sound knowledge, phonological awareness, working memory and long-term memory effectiveness.</td>
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<td></td>
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<tr>
<td><strong>Alphabetic Stage:</strong> the regular word, phonological-recoding stage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Slow laborious phonological recoding with large cognitive load.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Spelling approximations begin.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Rapid reading of familiar regular words and rapid decoding of unfamiliar regular words with little or no evidence of sounding out.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Sophisticated spelling approximations, e.g. atenshun, stor</td>
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<tr>
<td>Many students block in early phonological recoding, perhaps sounding-out extensively but failing to develop automaticity.</td>
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<tr>
<td>2. New words are learned Logographically, with reading superior to spelling, due to spelling's higher Logographic demands.</td>
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<td></td>
</tr>
<tr>
<td><strong>Orthographic Stage:</strong> the less-regular word, spelling-pattern, advanced phonological-recoding stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Noticing/learning different patterns of English, e.g. ‘igh’, ‘tion’, ‘ough’, and building skill at reading words containing them.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Focussing on word parts, not letter sounds.</td>
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<td></td>
</tr>
<tr>
<td>High levels of skill in advanced phonological awareness, and in reading and writing regular and irregular words, singly and in connected text.</td>
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<td></td>
</tr>
<tr>
<td>Failure to master the Alphabetic stage blocks progress through the Orthographic stage, resulting in students functioning partially and inefficiently, using aspects of all three stages.</td>
<td></td>
<td></td>
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</tbody>
</table>
Principle 4. **Phonological recoding should be students’ primary word-attack strategy**

In reading unfamiliar words in full-texts, letter-sound and spelling-pattern cues are vastly more powerful than semantic and syntactic cues, and students should be supported to use phonological recoding as their primary tool to work out unfamiliar words.

Over-reliance on context is inefficient. Whilst use of contextual clues is a powerful support to comprehension and word identification, predicting words from context as a primary word-attack strategy is extremely inappropriate, given its low effectiveness in comparison to phonological recoding. Students should use familiar letter-sounds and spelling patterns as their primary strategy, and contextual (grammatical and semantic) cues as confirmatory secondary strategies.

Continued Logographic reading is inefficient. While use of Logographic (visual) cues is highly desirable when learning initial sight vocabulary, continued primary use of Logographic strategies is extremely inefficient: Logographic readers become skilled reading words they know but must develop Alphabetic reading if they are to effectively read unfamiliar words.
Principle 5. Phonological recoding is essential because English is phonological.
The need for phonological recoding and self-teaching is due to the complexities of English’s phonological orthography:

1. **The rich diverse heritage of English makes it complex.**
   English has its roots in many different languages due to the many nations inhabiting early England. This makes it complex: it uses 40 common sounds, represented by 25 letters in well over 1000 different spelling patterns. It also has more words than other languages, including innumerable synonyms.

2. **Its complexity makes for higher failure rates.**
   Lack of successful literacy mastery occurs much more frequently for speakers of English than speakers of languages which are more phonemically regular, e.g. Italian, which has 25 letters, 25 sounds, and approximately 33 spelling patterns. Italian’s extremely transparent orthography contrasts significantly with the relatively opaque orthography of English, with 25 letters, 40 sounds and over 1200 spelling patterns. Transparency supports literacy progress thus Italian children master phonemic awareness and phonological recoding far more quickly than English readers, and far more students successfully develop fluent literacy skills (Goswami, 2002). English is a complex and challenging code, necessitating significant amounts of word level instruction and high levels of teacher pedagogical content knowledge on English orthography.

3. **It is manageable through being phonological.**
   Despite this complexity, its phonological/Alphabetic basis makes English literacy vastly more manageable than literacy of Logographic languages: high school students of alphabetic orthographies master 20,000 to 30,000 words in the same time that Chinese students master only 2000 Chinese pictographs.

4. **All words contain phonological cues for phonological recoding.**
   In students with fluent phonological awareness skills who master phonological recoding, knowledge of the spelling-to-sound patterns of alphabetic writing systems allows new words to be mastered with relative ease. This includes irregularly spelled words, none of which are completely 'phonemically opaque' (Tunmer, 1999).
Principle 6. Phonological recoding is Alphabetic then Orthographic:
Whereas Italian students need only to master phonological recoding at Alphabetic level, the complexity of English orthography means students need to master phonological recoding at Alphabetic then Orthographic levels.

1. Alphabetic recoding: recoding letters to sounds then words using the alphabetic principle.
Phonological recoding, reading unfamiliar words through recoding letters and word parts to their sounds to form words, involves mastering the alphabetic principle:

   a. Letters have individual sounds;
   b. Recoding letters in a word into sounds (sounding-out) then into the word made by those sounds helps you read an unfamiliar word;
   c. Recoding a spoken word into its list of sounds then into the letters that make those sounds helps you write an unfamiliar word.

Whilst not as powerful as Italian where high regularity means students get strong feedback from all words read, phonological recoding of regular English words is nonetheless a very powerful self-teaching mechanism, enabling students to independently support their own reading progress, and high levels of appropriate feedback can be achieved by providing ample reading practice with regular words.

2. Orthographic recoding: Students recode word parts.
In early phonological recoding, students sound out the individual sounds of single letters and letter pairs. In advanced phonological recoding, students focus on word parts such as syllables and spelling patterns. Phonological recoding thus involves both Alphabetic and Orthographic stages of development, often in the following sequence:

   a. Alphabetic stage mastery: Reading and writing of highly regular words
      i. Single syllable words containing single consonants and one letter vowels, then
      ii. Single syllable words using common two letter vowels, and consonant blends and digraphs, e.g. ‘th’, and
      iii. Highly regular multisyllabic words.
   b. Orthographic stage mastery: Reading and writing of less regular words through awareness of spelling patterns.

The sequence of skills learned varies with instructional sequencing and resources used. Resources such the writer’s Literacy Plus modules (Galletly, 1999, 2000, 2001) introduce vowel digraphs sequentially, whilst others such as Jolly Phonics (Lloyd, 1992) present them collectively, early in instruction. In effectively implementing authoritative research conclusions on phonological recoding, both systems work very effectively and indeed are highly compatible.

Young children think in whole words, not word parts. Learning to read words, with a focus on word parts, letters and sounds, is not a natural process and requires the integration of several complex skills. Phonological recoding has two prerequisites:

1. Fluent early phonological awareness skills which support proficiency in manipulating word parts and mastery of phonological recoding, include:
   a. Isolating sounds at the beginning/end/middle of words,
   b. Blending lists of sounds to make words,
   c. Listing sounds in words, and
   d. Rhyming.

2. Skills with letters and sounds, the building blocks of English print, include:
   a. For reading: saying the sound of each letter or word part in a word, and
   b. For writing and spelling: selecting the letters representing the sounds heard in a word.

These two subskills are key aspects of reading readiness and the strongest predictors in young children of later success in reading comprehension and reading accuracy.


1. Cognitive load mustn’t overload processing capacity.
   Early literacy success is strongly impacted by the instructional balance of student working-memory processing resources and the high cognitive load of early phonological recoding. As skills become automatic they are stored more effectively as long-term memories and use less working memory. Working memory is maximised by comfort, ease and familiarity of tasks, and reduced by stress and anxiety.

2. Complex new tasks have high cognitive load.
   Early reading development is characterised less by smooth steady growth in fluency and word recognition and more by advances and seeming drops in performance as different aspects of reading accuracy skill develop. These changes reflect the interplay of student working memory and the cognitive load of reading subskills. The early stages of phonological recoding involve large cognitive load, such that working memory capacity is a key factor in successful mastery of phonological recoding.

3. Narrower instructional contexts produce different cognitive loads.
   Isolated, embedded and broad contexts can be considered as on a continuum showing increasing breadth of context. Narrower contexts, allowing full focus on the specifics of skill development, provide opportunities for strategically reduced cognitive load, and effective balancing of working memory capacity and the cognitive load of the skill being learned. Broad-context tasks such as learning recoding through full-text reading have higher cognitive load due to the accompanying cognitive demands of reading comprehension.
Principle 9. Phonological recoding is the common point of literacy failure.
Phonological recoding and Alphabetic stage mastery are the common point of failure for groups of at-risk students whose other features seem to have little in common, e.g. students with English as a second language, children with weak phonological awareness skills and students with limited print experience on school entry, due to:

1. The high cognitive load of early phonological recoding,

2. Students already having reduced working memory due to cognitive or environmental factors, e.g. inherited weakness, nervousness in class,

3. The resultant needs of these students for carefully managed instruction by teachers with high levels of pedagogical content knowledge in relation to reading and reading accuracy.
All students benefit from structured, systematic, explicit instruction in reading accuracy, but for at-risk groups, such instruction is not just beneficial, it is critical (Westwood, 2001).

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1. This weakness lies in low phonological skills and lack of automaticity. Most children who become poor readers show difficulties with phonological awareness, phonological recoding and automaticity (words read correctly, quickly and easily), and researchers are proposing that phonological awareness and automaticity are separate components of literacy success with students having weakness in either or both areas (Fawcett & Nicholson, 2001; Wolf & Bowers, 2000). Phonological awareness weakness and lack of automaticity both contribute to very high cognitive load.

2. Low reading accuracy causes low reading experience that creates widespread language deficits. Failure to develop rapid efficient phonological recoding and reading accuracy results in students engaging in significantly lower levels of independent reading and exposure to texts and content. This leads to widespread generalised language and learning delays, commonly termed ‘the Matthew effects’ (Stanovich, 1986): these expand exponentially over time.

3. Early reading failure strongly predicts continued failure. Children who don’t achieve effective reading accuracy skills in their initial school years usually don’t catch up, such that reading accuracy level after 2 or 3 academic years is strongly predictive of academic progress in high school, and employment and income level in adulthood.

Principle 10. High teacher levels of pedagogical content knowledge about reading accuracy are vital for effective reading instruction.
The most significant impact of highly effective teachers as opposed to less effective teachers is considerably higher progress in lower achieving students (Pressley, Allington, Wharton-McDonald, Collins Block, & Mandel Morrow, 2001). Pressley and associates found effective Year 1 teachers to be working a balanced approach to literacy instruction combining key aspects of Whole Language and skills instruction guided by student needs for (a) systematic explicit reading-accuracy instruction at single word level, and (b) immersion in extensive reading of real
literature and writing. These teachers’ classrooms were characterized by high expectations, classrooms filled with print and literate experiences, in-class libraries, daily reading to students, students as active readers and writers, and daily explicit instruction on phonological recoding, vocabulary, comprehension strategies, and critical thinking skills. Their students achieved significantly higher in reading, writing, self-regulation and engagement. Teachers conveyed the importance of literacy, created risk-free classrooms of interest and excitement, and encouraged ‘I can read, I can write’ attitudes. They had thorough awareness of each child’s current literacy levels and worked carefully from those individual starting points, explaining goals, providing appropriate scaffolding and feedback, and achieving both balanced individualised instruction and instructional density: students spending more time on academic tasks. They found that teachers of lower achieving classes were unable to ‘integrate skills instruction and holistic experiences’ with the same level of expertise, with instruction in these classrooms being disjointed and of far lower density. They emphasise the importance of high levels of teacher pedagogical content knowledge and comment on the complexity of all early childhood classrooms and the significantly higher levels of complexity of excellent early childhood classrooms:

“Effective curriculum balance can be thought of as juggling hundreds of balls in the air, each carefully coordinated with the others - the particular balance of the ‘balls’ varying from child to child and from situation to situation during the school day.” (p. 39)

**Considering phonological recoding using a model of Core Literacy instruction**

Torgesen (1998) sums up the critical elements of effective instruction as: (a) the right kind and quality of instruction delivered with the (b) right level of intensity and duration to the (c) right children at the (d) right time. The writer’s model of Core Literacy instruction has been developed as a tool for teachers considering these variables when aiming for instruction optimally matched to individual student needs. The model considers the following aspects of literacy instruction

1. Features of Core and Continuing Literacy, and 3 main stages of literacy development, particularly the second stage, Core Mastery (See Table 2).
2. Aspects impacting students’ mastery of this stage:
   a. Instructional aspects, including teacher levels of pedagogical content knowledge, literacy skills development contexts and intensity of instructional focus.
   b. Student aspects, including background factors (sociocultural, developmental and academic profiles), literacy achievement profiles, and literacy processing skill levels.

Only those aspects of the model impacting instruction of phonological recoding will be discussed here.

**Core Literacy, Continuing Literacy and three stages of literacy development**

The model depicts literacy as a broad construct with two components: Core Literacy and Continuing Literacy. Core Literacy is defined as the ability to fluently and effortlessly read and write words as single words and in connected text. It involves those developmentally early, more technical reading and writing skills, and early less sophisticated reading comprehension skills. Core literacy skills empower one to advance in wider literacy frames, referred to as Continuing Literacy, which relate more to topics, content and meaning. Advanced Continuing Literacy competencies build steadily on a base of fluency in Core Literacy. Continuing Literacy skills
develop from birth to old age and require a strong instructional emphasis in all school years, whilst Core Literacy skills are focused on extensively only until they are mastered: for most students, instructional emphasis on this area reduces significantly in middle to upper primary school (See Figure 3). As seen in Figure 3 and summarised below in Table 2, there are three stages of literacy development to be considered:

1. Stage 1, Early Continuing Literacy, with working memory freely available for Continuing Literacy activities,
2. Stage 2, Core Mastery, the stage of mastering the skills of Core Literacy, with working memory frequently overloaded, and Continuing Literacy task excellence compromised by cognitive overload until Core Literacy skills become more automatic.
3. Stage 3, Advanced Continuing Literacy, with working memory again freed for Continuing Literacy task excellence, this time because Core Literacy skills are automatic and require little conscious thought.

**Figure 3.3.** Proportions of instructional emphasis allocated to Core Literacy and Continuing Literacy over time as influenced by instructional decision making.
Table 3.2. Cognitive load aspects of the three stages of Core and Continuing Literacy development.

<table>
<thead>
<tr>
<th>Core Literacy features</th>
<th>Stage 1: Early Continuing Literacy</th>
<th>Stage 2: Core Mastery</th>
<th>Stage 3: Advanced Continuing Literacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Core Mastery</td>
<td>Core Mastery</td>
<td>Post-Core Mastery</td>
<td></td>
</tr>
<tr>
<td>Early Continuing Literacy</td>
<td>Compromised Continuing Literacy</td>
<td>Advanced Continuing Literacy</td>
<td></td>
</tr>
<tr>
<td>Freed due to Core skills not being emphasised</td>
<td>Compromised due to high processing demands of early Core Literacy skills</td>
<td>Freed due to Core skills now being mastered.</td>
<td></td>
</tr>
</tbody>
</table>

Core Literacy and Continuing Literacy and their developmental stages provide a frame for considering student learning and the appropriateness of instructional and assessment practices and tools. The writer feels there would be value in establishing a criterion for the boundary of Stages 2 and 3, and wonders if it might prove to be reading and writing ages of approximately 7.5 to 8.5 years. Stage 2, Core Mastery, is the primary point of literacy success and failure: mastery of Alphabetic and early Orthographic reading and phonological recoding occur in this stage.

The model is both generative and remedial, supporting understanding of successful and unsuccessful literacy acquisition. Successful students begin Stage 3 at chronological age equal or below their literacy achievement age; lower literacy achievers may be years delayed in commencing Stage 3, with many never completely achieving this stage.

**Literacy processing skill levels**

Student literacy processing skills relating strongly to instructional needs include phonological awareness, working memory and skill automatisation, long-term memory storage and retrieval, and metacognitive strategic thinking. In the model, student combinations of levels of the different literacy processing skills are considered as combining to create each student’s level of competence as a self-learner, an indication of the student’s ability to contribute consciously or unconsciously to continued self-learning from what he or she has been taught, and to effectively master new skills and to generalise that learning to different contexts. Students can be thought of as being on a continuum from ‘Naive Self-Learners’ (students with very low total levels of literacy processing skills) at one end to ‘Optimal Self-Learners’ (students with very high levels of literacy processing skills) at the other (See Table 4, later).

Highly optimal self-learners process new literacy learning effectively and efficiently and are able to use that information in many different contexts and applications. Naive self-learners need support to be metacognitive: to notice relevant information, draw on appropriate skills, process tasks effectively and apply skills in broad contexts.

Highly naive self-learners require highly systematic instruction, with significant levels of further demonstration and practice at phonological recoding in isolated skill development contexts before moving into embedded and broad contexts. They may have difficulties making permanent effective memories of newly learned phonological concepts such as the range of
common vowels, and need ‘memory stretching (Galletly 1999, 2001)’: systematic review over strategically lengthened review periods.

**Literacy Skill Development Contexts**

The model strongly foregrounds consideration of isolated, embedded and broad instructional contexts, three highly compatible instructional options for teachers to draw upon during planning to select contexts most appropriate to students’ instructional needs. Each offers its own unique instructional opportunities:

1. **Isolated skill development contexts**, narrow instructional contexts for direct explicit instruction and practice of isolated skills, are ideal for early phonological recoding which may use student’s entire processing capacity,

2. **Embedded skill development contexts**, wider contexts building effective use of new skills in more complex situations, create bridges from skills-focussed isolated contexts to authentic-tasks broad contexts, and are powerful tools once skills are developing smoothly,

3. **Broad (authentic full-task) contexts**, very wide contexts in which the emphasis is on connected texts, meaning making and independent skill usage, are excellent contexts for generalisation of skill usage once early mastery is complete.

Figure 4 depicts use of these contexts in building the reading of single syllable consonant-vowel-consonant (c-v-c) words using the single vowels ‘a, e, i, o, u’. Later instruction for advanced phonological recoding would build skill with multisyllabic words and common two letter vowels.
### Figure 3.4. Use of increasingly broad contexts in instruction for reading of unfamiliar regular consonant-vowel-consonant (c-v-c) words with single vowels (a,e,i,o,u).

<table>
<thead>
<tr>
<th>Isolated skill contexts</th>
<th>Systematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities with isolated vowels and single-vowel c-v-c words</td>
<td>Match levels of scaffolding (initially large then systematically reduced) and practice to student needs, using games and activities with single syllable words to build mastery of</td>
</tr>
<tr>
<td><strong>Eclectic</strong> As opportunities arise:</td>
<td>1. Names and sounds of common consonants and 1-5 vowels (aeiou) in labelling (What does this one say?) and listening (Which one says ___?).</td>
</tr>
<tr>
<td>1. Notice/refer to text words as 'tricky' and 'regular'.</td>
<td>2. Reading of single c-v-c words: say the vowel sound first, list the sounds (v-e-t), then blend the sounds to work out the word (vet).</td>
</tr>
<tr>
<td>2. Model phonological recoding as a primary strategy for reading unfamiliar regular words.</td>
<td>3. Awareness that some words are regular and can be sounded out, whilst others are 'tricky' and learned Logographically as sight words. (NB The number of tricky words diminishes as reading skills develop, eg 'now' may be 'tricky' now but will become regular when the vowel 'ow' is known.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Embedded contexts</th>
<th><strong>Eclectic</strong> As opportunities arise:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities with</td>
<td>1. Support correct reading of single-vowel c-v-c words by prompting beginning sound of word, saying the vowel sound, or saying 'You can read/sound-out that one.'</td>
</tr>
<tr>
<td>1. Lists of words,</td>
<td>2. Notice/read/discuss a few regular words prior to guided/shared reading.</td>
</tr>
<tr>
<td>2. Sentences and longer texts selected because of high frequency of single-vowel c-v-c words,</td>
<td>3. Give feedback and encouragement on recoding.</td>
</tr>
<tr>
<td>a. Noticing/reading/discussing regular words before starting</td>
<td><strong>Systematic</strong> Systematically:</td>
</tr>
<tr>
<td>b. Giving feedback on use of recoding, e.g. 'Great sounding-out!', and</td>
<td>Include appropriate frequencies of single-vowel c-v-c words in written instructions in all subject areas. Include located or created readers containing many of these words in class libraries.</td>
</tr>
<tr>
<td>c. Supporting errors or hesitancies by prompting beginning sound of word, saying the vowel sound, or saying 'You can read/sound-out that one.'</td>
<td>Use words that are progressively more similar e.g. (eg hat, hut, hit, hot, set, sat, sit).</td>
</tr>
<tr>
<td></td>
<td>Build the number of words read at one time, e.g. lists, sentences.</td>
</tr>
<tr>
<td></td>
<td>Build accuracy then automaticity (Correct, fast, supereasy).</td>
</tr>
<tr>
<td></td>
<td>Use repeated reading of full-texts, using phonological recoding as a primary strategy.</td>
</tr>
<tr>
<td></td>
<td>As mastery builds, move from familiar contexts to new contexts.</td>
</tr>
<tr>
<td></td>
<td>Build student metacognition of phonological recoding and individual progress and performance.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Broad contexts</th>
<th><strong>Eclectic</strong> As opportunities arise:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent reading of full-texts with no specific instructional emphasis:</td>
<td>1. Support correct reading of single-vowel c-v-c words by prompting beginning sound of word, saying the vowel sound, or saying 'You can read/sound-out that one.'</td>
</tr>
<tr>
<td>Monitor skill with single-vowel c-v-c words in full-text reading.</td>
<td>2. Notice/read/discuss a few regular words prior to guided/shared reading.</td>
</tr>
<tr>
<td>Move back temporarily to embedded or isolated skill tasks if needed.</td>
<td>3. Give feedback and encouragement on recoding.</td>
</tr>
</tbody>
</table>
Interpreting the model

The model of Core literacy has significant power in empowering planning, assessment and instruction of Stage 2 learners through its flexible portrayal of student instructional needs. Figure 5 shows use of the model in an instructional instance. Student background factors and teacher instructional variables, strong influences on student engagement and motivation, are positioned outside the instructional decision-making ‘inner core’: teacher variables surround student variables as excellent instruction aims to match instruction to student needs, taking advantage of strengths and compensating for potential weaknesses. All students have strong needs for broad authentic Whole Language tasks and contexts so ‘Broad Contexts’ is depicted by a further concentric ring. The width of these three outer rings varies according to the emphasis placed on each.

The inner core supports decision making to balance (a) student levels of self-learning (naïve to optimal) and associated needs for instructional intensity and specificity, with (b) the cognitive load of the skill learning involved. It is considered that as students’ literacy processing skill levels increase, from naïve self-learners with low levels to optimal self-learners with high levels, their needs for instruction in isolated and embedded skill development contexts decrease. These two aspects, student literacy processing levels and student needs for systematic instruction in isolated and embedded skill development contexts, are placed at the centre of Figure 5, being strongly foregrounded components of the model. The lines between their sectors are movable, depicting the inverse relationship between them: as literacy processing skill levels increase, needs for isolated and embedded skill development contexts decrease.

Figure 3.5. Aspects of instruction for Core Literacy.
**Intensity and ‘systematicity’ of instruction**

Consideration of instructional intensity and instructional contexts is also included in the model:

Four levels of intensity relating to the level of explicit instruction and the amount of skill practice, from level 1 (minimal) to 4 (intense), and

- Five levels of depth of context (See Tables 3 and 4):
  - Broad, authentic full-task contexts;
  - Embedded contexts - eclectic use
  - Embedded contexts - systematic use
  - Isolated skills contexts - eclectic use
  - Isolated skills contexts - systematic use.

Use of these levels adds power to the model as a tool for mapping student instructional needs, for planning instruction mapped to these needs, for selection and design of assessments taking into account depth of context and intensity of instruction, and for assessing effectiveness of current and proposed literacy initiatives, as seen in the examples in Table 3 and 4.

### Table 3.3. Consideration of curricula and student assessment using criteria of instructional intensity and depth of context.

<table>
<thead>
<tr>
<th>Depth of Context</th>
<th>Instructional emphases of 2 professional texts and 2 Australian literacy curricula #</th>
<th>John's reading of 10 single-vowel c-v-c words. #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad</td>
<td>Reading Accuracy &lt;2&gt; Reading Comprehension &lt;4&gt;</td>
<td>10%</td>
</tr>
<tr>
<td>Eclectic embedded</td>
<td>Reading Accuracy &lt;2&gt; Reading Comprehension &lt;4&gt;</td>
<td>10%</td>
</tr>
<tr>
<td>Systematic embedded</td>
<td>Reading Accuracy &lt;2&gt; Reading Comprehension &lt;4&gt;</td>
<td>30%</td>
</tr>
<tr>
<td>Eclectic isolated</td>
<td>Reading Accuracy &lt;1&gt; Reading Comprehension &lt;3&gt;</td>
<td>n/a</td>
</tr>
<tr>
<td>Systematic isolated</td>
<td>Reading Accuracy &lt;1&gt; Reading Comprehension &lt;3&gt;</td>
<td>70%</td>
</tr>
</tbody>
</table>

[Intensity of Focus: <1> Minimal, <2> Mild, <3> Strong, <4> Intense]

# Reading curricula:

# Professional texts:
The power of the model

The model is intended for use by teachers and other practitioners in their planning, assessing and instructing of students in Stage 2, Core Mastery, both regular and delayed achievers. Through consideration of students' background characteristics and literacy achievement profiles, one is able to make decisions as to the logical next steps for their literacy learning and select the types of activities most likely to achieve student engagement and skill development. Consideration of students' levels of literacy information processing skills allows decision making as to their levels of capacity for self-learning, (naïve, midrange or optimal). This allows decision making as to depth of context (isolated, embedded or broad contexts) and strength of instructional focus to be applied (minimal to intense). As instructional aims change over time when mapped to student progress, it is likely that instruction in all contexts and at all levels of intensity will be used at various times. The power of this model lies in empowering practitioners to confidently make decisions relating to issues such as the following:

- What aspect of learning am I focusing on? (mastery/maintenance/generalisation)
- What student/s am I thinking about? (naïve/midrange/optimal self-learners)
- What instructional context best suits this aspect of the student/s’ learning? (isolated skill/embedded/broad contexts)
- How systematic do I need to be? (eclectic/systematic)
- How strong should my instructional intensity be? (minimal/mild/strong/intense)

Consideration of these instructional aspects to develop mastery of phonological recoding in different students is depicted in Table 4.
Figure 3.6. Intensity of instructional focus applied at different contextual levels for students at different levels of self-learning to master phonological recoding.

Literacy processing skill levels continuum

Active Self-Learner

High levels of student literacy processing skills. Strongly empowered by systematic isolated and embedded skill development initially. Need little practice in isolated and embedded contexts. Move smoothly into recoding in independent reading.

Midrange Self-Learner

Medium levels of literacy processing skills. Moderately high needs for consideration of balance of cognitive load and processing capacity. Need moderate levels of systematic skill development and practice activities in isolated and embedded contexts, and moderate levels of scaffolding to move into independent reading.

Naïve Self-Learner

Low levels of student literacy processing skills. Very high needs for balancing cognitive load and processing capacity. Very high needs for explicit instruction, careful scaffolding and ample practice in isolated and embedded contexts, then ample scaffolding to use recoding in independent reading, monitoring of long-term efficiency and memory stretching strategies (Galletly, 1999).

<table>
<thead>
<tr>
<th>Broad tasks</th>
<th>Embedded tasks</th>
<th>Isolated skill tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4&gt;</td>
<td>&lt;1 to 2&gt;</td>
<td>&lt;1 to 2&gt;</td>
</tr>
<tr>
<td>Eclectic&lt;2&gt;</td>
<td>Systematic&lt;2&gt;</td>
<td>Eclectic&lt;1&gt;</td>
</tr>
<tr>
<td>Isolated skill tasks &lt;1 to 2&gt;</td>
<td>Isolated skill tasks &lt;3&gt;</td>
<td>Isolated skill tasks &lt;4&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Broad tasks</th>
<th>Embedded tasks</th>
<th>Isolated skill tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4&gt;</td>
<td>&lt;1 to 2&gt;</td>
<td>&lt;1 to 2&gt;</td>
</tr>
<tr>
<td>Eclectic&lt;3&gt;</td>
<td>Systematic&lt;3&gt;</td>
<td>Eclectic&lt;2&gt;</td>
</tr>
<tr>
<td>Isolated skill tasks &lt;3&gt;</td>
<td>Isolated skill tasks &lt;4&gt;</td>
<td>Isolated skill tasks &lt;4&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Broad tasks</th>
<th>Embedded tasks</th>
<th>Isolated skill tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4&gt;</td>
<td>&lt;1 to 2&gt;</td>
<td>&lt;1 to 2&gt;</td>
</tr>
<tr>
<td>Eclectic&lt;4&gt;</td>
<td>Systematic&lt;4&gt;</td>
<td>Eclectic&lt;2&gt;</td>
</tr>
<tr>
<td>Isolated skill tasks &lt;4&gt;</td>
<td>Isolated skill tasks &lt;4&gt;</td>
<td>Isolated skill tasks &lt;4&gt;</td>
</tr>
</tbody>
</table>
Conclusion
Reading comprehension and reading accuracy are two extremely important aspects of literacy development which are highly dependent on each other. Particularly for at-risk learners, it is vital that both areas receive explicit emphasis in planning, assessment and instruction. At the current time, reading accuracy instruction is significantly underemphasized in Australia in preservice and inservice training, curriculum documents, academic texts, and teacher resources. This is likely to have created widespread low levels of teacher pedagogical content knowledge in relation to reading accuracy instruction. If we are to significantly increase the proportion of students who successfully master literacy, it is vital that instruction of phonological recoding and reading accuracy receives vastly more attention than it does at the current time. Effective efficient teaching by teachers with high levels of pedagogical content knowledge can ensure that at-risk students are optimally supported into efficient phonological recoding and reading accuracy, and drastically reduce the likelihood of their being instructionally disabled through teaching which fails to match their instructional needs.

References


Armbuster, B. B., Lehr, F., & Osborn, J. (2001). Put reading first: The research building blocks for teaching children to read: Kindergarten through Grade 3 Centre for the Improvement of Early Reading Achievement.


The Overlooked Role of Phonological Processing Abilities for Successful Reading Recovery Program Outcomes

Jenine Fogarty & Daryl Greaves
The University of Melbourne

Overview
There are two parts to this Chapter. The first part shows changes in phonological processes observed in a group of 29 students who were sent to Reading Recovery lessons. The second part identifies the most powerful predictors of success in a Reading Recovery intervention from the phonological processing measures employed in the study.

Introduction
Marie Clay has been credited as one of the pioneers of an early intervention approach for overcoming literacy difficulties (Shanahan & Barr, 1995). Her Program, Reading Recovery, is designed to accelerate the performance of the lowest Year 1 readers to average levels commensurate with each child’s particular setting. The program aims to have the student reaching the appropriate reading band within a maximum of twenty weeks (Clay, 1993a). Clay (1993a) recommends that students be referred to other sources of support if they have not reached the appropriate reading band during the Reading Recovery intervention.

Clay’s (1991) model of reading is based on one initially developed by Goodman where word analysis skills are taught in context and minimal word-level information is used to confirm language predictions (Iversen & Tunmer, 1993). The context is promoted as the primary means of word identification with the Elkonin technique being used for the teaching of phonological awareness in spelling (Center, Wheldall, Freeman, Outhred, & McNaught, 1995). The focus is on the development of a self-extending system of reading strategies to enable ongoing, independent interaction with the text (Clay, 1993b).

Reviews of Reading Recovery generally report favourable outcomes with the Program being acknowledged for providing ‘early dramatic improvements in oral reading rates for some, but not all, of the targeted children’ (Chan & Dally, 2000, p. 218). Placement in the Program is determined by teacher judgment and administration of a battery of emergent literacy measures.
found in the Clay Observation Survey (Clay, 1993b). Improvement, or the efficacy of a Reading Recovery intervention, is in part, measured by changes in performance when the Clay Observation Survey is readministered (Clay, 1993b). The second measure of improvement is progress through 'book levels'.

The Clay Observation Survey (Clay, 1993b), administered individually to students, comprises the following tasks: letter identification, word identification, concepts about print, writing vocabulary, hearing and recording sounds in written words (dictation), with the main emphasis being placed on the students' running record of text reading. No other measures are used to test for the generalisation of reading skills (Center et al., 1995).

Reading Recovery lessons typically take place for approximately 30 minutes and comprise seven components, usually presented in the following order (Clay, 1993a): (a) rereading of familiar books; (b) independent re-reading of a book that was introduced the previous day while the teacher takes a running record to monitor the child's strategies; (c) letter and/or word identification using plastic letters on a magnetic board; (d) writing a story (including hearing sounds in words); (e) reassembling the cut-up story; (f) introduction of a new book; and (g) reading the new book. Although lessons generally adhere to this framework, each child's lesson is individualised, based on their own strengths and strategies, as observed and analysed by the Reading Recovery teacher (Pinnell, 1989; Schwartz & Klein, 1997; Spiegel, 1995; Wasik & Slavin, 1993).

Research by Center et al. (1995), Iversen and Tunmer (1993), Chapman, Tunmer, and Prochnow (1999), and Fletcher-Flinn, White, and Nicholson (1998) showed that most of the children selected for Reading Recovery displayed very low phonological processing skills. A deficit in phonological processing has been identified as a characteristic predictive of reading failure or a reading disability (Liberman & Shankweiler, 1985; Siegel, 1993; Wagner & Torgesen, 1987).

Phonological processing refers to 'the use of phonological information (the sounds of one's language) in processing written and oral language' (Vandervelden & Siegel, 1995, p. 854). Phonological processing, whilst being relatively independent of general cognitive ability, is probably the core deficit of reading disability, with the deficit persisting into adulthood (Siegel, 1993; Stanovich, 1988). Phonological processing deficits are related to problems with word recognition, oral reading, and reading comprehension (Catts, 1989). Tunmer (1994) noted that beginning readers with phonological processing deficits can eventually learn to read, albeit at a slower rate. However, without targeted intervention these children will 'rely increasingly on compensatory visual strategies guided by contextual cues' (p. 151).

In the current study, two aspects of the phonological processing construct were measured: phonological awareness and phonological recoding. Phonological awareness 'involves the ability to reflect on and manipulate the phonic segments of speech' (Chapman & Tunmer, 1991, p. 64) while phonological recoding skill is 'the ability to translate letters and letter patterns into phonological forms' (Chapman & Tunmer, 1991, p. 64).

There are a large number of studies attesting to the relationship between phonological awareness and reading ability, and the reciprocal nature of this relationship (Catts, 1989). Children with limited phonological awareness often struggle when learning to read. Their low
level phonological awareness restricts their reading practice further slowing development of this knowledge. Conversely, those children with well-developed phonological awareness often excel at reading (Catts, 1989). Thus, phonological awareness ‘can be both a cause and consequence of reading difficulties’ (Chan & Dally, 2000, p. 164). It is also necessary for the acquisition of phonological recoding (Chapman & Tunmer, 1991; Iversen & Tunmer, 1993).

Research evidence attesting to the importance of phonological recoding in learning to read is available mainly from studies which employed a pseudoword reading task (Vandervelden & Siegel, 1995). Pseudowords are “synthetic” words that adhere to the rules of English orthography. Research has shown pseudoword naming to be one of the tasks that most clearly distinguishes between good and poor comprehenders of text (Iversen & Tunmer, 1993).

Phonological recoding skill empowers children with the ability to decode previously unencountered words through the application of grapheme-phoneme correspondences (Chapman & Tunmer, 1991). This understanding, referred to as the alphabetic principle (Byrne & Fielding-Barnsley, 1993), enables children to acquire a new reading vocabulary without instruction (Vandervelden & Siegel, 1995). Knowledge of the alphabetic principle is necessary for automaticity in reading (Center et al., 1995). Phonological recoding skill also acts as a back-up mechanism when word identification by the visual memory route fails (Jorm, Share, MacLean, & Matthews, 1984).

A measure of phonological recoding skill does not currently comprise part of the Clay Observation Survey as Clay (1991, p. 8) contends that, ‘decoding nonsense words cannot be used as the ultimate test for the final explanation of reading’. Congruently, systematic instruction in phonological recoding is not emphasised during Reading Recovery lessons (Center et al., 1995; Iversen & Tunmer, 1993). Clay (1991) contends that phonics instruction may be unnecessary once children attain and apply a sound sequence strategy such as the Elkonin technique (Center et al., 1995):

\[ A \text{ strategy of analysing spoken words into sounds and then going from sounds to letters may be a precursor of ability to utilise the heuristic tricks of phonics. And many children may not need phonic instruction once they acquire and use a sound sequence analysis strategy. (p. 85) } \]

Previous research regarding the efficacy of Reading Recovery identified most of the candidates, prior to commencing the Program, were particularly deficient in phonological processing skills and that success in the program was closely related to the development of these skills (Center et al., 1995; Fletcher-Flinn et al., 1998; Iversen & Tunmer, 1993; Tunmer, Chapman, Ryan, & Prochnow, 1998). In addition, approximately 30% of participants have failed to benefit from participating in the Program (Shanahan & Barr, 1995; Wasik & Slavin, 1993). Indeed, one Australian study undertaken by Center et al. (1995) found Reading Recovery to be effective for only one in three participants. It will be remembered that the Reading Recovery Program promotes the context as the primary means of word identification (Clay, 1991).

Iversen and Tunmer (1993) argue that Clay’s (1991) view of skilled reading has been rejected by the scientific community, citing a large body of research in support of their contention (see p.113). This research has consistently shown that the efficient word recognition skill of skilled
readers largely negates the need for reliance on context. This contrasts with the slow and inaccurate word recognition skill of poor readers that results in a far greater reliance on contextual cues (Chan & Dally, 2000; Nicholson, 1991; Stanovich, 1986).

The Context of the Current Study
In the current study, changes in two aspects of phonological processing, phonological awareness and phonological recoding, were assessed using the following instruments. Change in phonological awareness was measured by the Yopp-Singer Test of Phoneme Segmentation (Yopp, 1988) and Bruce’s Word Analysis Test (1964, as cited in Yopp, 1988). Both phonological awareness and phonological recoding were assessed by the Sutherland Phonological Awareness Test (SPAT) (Neilson, 1995). The Non-Word Reading subtest of the SPAT (Neilson, 1995) assessed the ability to use phonological recoding to read pseudowords while the Non-Word Spelling subtest measured the ability to use phonological recoding to spell pseudowords.

The current study took place in six schools with seven Reading Recovery teachers who had varying degrees of expertise, qualifications, and years of teaching experience. Due to these factors, it is acknowledged that there was likely to be some variation in implementing the Program’s procedures and practices.

The current study did not have a control group. Finding a control group would be difficult as each of the schools chose students for Reading Recovery. It will be remembered that students are selected on the basis of their performance on the Clay Observation Survey together with teacher judgement. Consequently, a student chosen for Reading Recovery in one school would not be eligible in another school. There was no common standard for entry into Reading Recovery across the schools as the notion of “at-risk” is a relative one.

As the students were independently identified by their respective schools for inclusion in Reading Recovery, the sample was not randomly selected. Whilst the cohort was not representative of a normal population per se it was typical of a group of Year One students referred for Reading Recovery. The data from the current study provides a useful starting point for a following study where a control group could be used to determine whether the changes observed in some of the phonological subtests can be related to the Reading Recovery intervention.

Rationale for Study
**PART 1**
One focus of the current study was to measure change in the phonological processing skills of 29 students participating in a Reading Recovery intervention. Phonological processing is crucial for the development of skilled, fluent reading. Given that Reading Recovery is resource intensive, with one-to-one teaching being the most expensive form of remediation, it is desirable to know whether changes occurred in the phonological processing skills of the cohort from pretest to posttest during the Reading Recovery intervention.

**PART 2**
A finer-grained analysis was undertaken on the pretest phonological processing data to identify the most powerful predictor variable(s) of recovery as indicated by a Book Level of 17-28 upon discontinuation from the Program. Identification of the phonological processing variable(s) that
best predicted recovery for this cohort of 29 was considered important to assist with predicting the recovery of prospective Reading Recovery candidates.

**Method**

The study used a pretest – posttest design with the experimental group being used as its own control. The participants were independently selected by their school for the Reading Recovery Program. The cohort comprised 29 students who were attending six Catholic Primary Schools in the Northeastern suburbs of Melbourne. All students were in Year 1 with a mean age of 6 years, 9 months.

Careful consideration was given to the selection of instruments for use in the current study. The Yopp-Singer Test of Phoneme Segmentation (Yopp, 1988) was selected on the basis of Yopp’s (1988) study of the reliability and validity of 10 phonemic awareness measures administered to 96 kindergarten students. The Yopp-Singer Test of Phoneme Segmentation was identified as the most reliable measure of Simple Phonemic Awareness, that is, tasks that only require one operation (e.g., segmentation or blending) followed by a response. The student was required to pronounce each of the phonemes in the correct order of the sounds in a word. Demonstration of the task was provided by the examiner using the word old and segmenting it into /o/-/l/-/d/. Three practice exercises were given to the student using the words, ride, go, and man. Testing was discontinued if the student was unable to respond correctly to at least one of the practice items or if he/she responded incorrectly or gave no response to ten consecutive items. The maximum possible score was 20 and raw scores were used in all analyses.

The SPAT (Neilson, 1995) was selected for use in this study because it was designed to test a range of phonological awareness and phonological recoding skills. All thirteen subtests were administered so as to follow the developmental sequence of the instrument. The thirteen subtests, grouped into four levels, are displayed in Table 1. Raw scores for each subtest were used in all analyses.

**Table 4.1: An Overview of the SPAT**

|-----------------------------------|--------------------|--------------------|---------------------------|
The Bruce Word Analysis Test (1964, as cited in Yopp, 1988) was identified by Yopp (1988) as the most reliable measure of Compound Phonemic Awareness. These tasks are distinguishable from Simple Phonemic Awareness tasks because they demand a greater strain on memory due to an increased number of steps for completion. For example, The Bruce Word Analysis Test required the student to delete one sound from the beginning, middle, or end of a word (as per a Simple Phonemic Awareness task), but then also required the student to recall the remaining sounds, blend them together, and articulate the resulting word (Yopp, 1988). The test comprised thirty, one to three syllable words, drawn from the first five hundred items in Burrough's (1957, as cited in Yopp, 1988) vocabulary count for children aged five to six and a half.

Bruce (1964, as cited in Yopp, 1988) recommended that prior to commencing the test students be supplied with a number of practice items although he did not provide any specific examples. The examiner presented the student with five practice items, three of which were used by Yopp (1988) – cat /k/, bright /r/, and cried /d/. An additional two practice examples were included, camp /m/ and flat /l/ thereby providing practice in deleting phonemes from a variety of positions. Corrective feedback was provided on practice items only. Items were presented in the following format: 'What word would be left if /k/ was taken away from the beginning of cat?' In this way both the sound and its position were highlighted. Testing was discontinued when students failed to answer at least one of the practice items correctly, or following ten consecutive incorrect responses, or when there was no response to ten items.

The author administered the pretest and posttest measures to each student individually. Pretest data was collected whilst students were completing Roaming Around the Known, a precursor to formal Reading Recovery lessons where the teacher and student undertake reading and writing activities together to assist with relationship building and to enable the teacher to develop a more informed picture regarding the child's knowledge and skills (Wasik & Slavin, 1993).

Posttest data was collected during Week Fifteen of each child's Reading Recovery Program, identified by Center et al. (1995) as the average time before discontinuation. Note that some students had already been discontinued from the Program by this time however, the majority of students were still participating in the Program. At Week 15 posttesting the phonological processing tests were readministered to participants. Students who gained full credit on any of the subtests of the SPAT (Neilson, 1995), The Yopp-Singer Test of Phoneme Segmentation (Yopp, 1988), or Bruce's Word Analysis Test (Bruce, 1964) were not retested on those subtest items at posttesting.

PART 2
Analysis of the Reading Recovery discontinuation data revealed Level 17 as the median Book Level. This Level was then selected as an arbitrary cutoff point to distinguish between the recovered (Level 17-28) and unrecovered (Level 6-16) students. This action effectively created
two groups whose progress in Reading Recovery could be compared and contrasted: the unrecovered group (N = 7) and the recovered group (N = 20).

Data analysis consisted of a discriminant analysis, using the stepwise method, to identify the most powerful pretest predictor(s) from the phonological processing measures employed in the study. Identification of the predictor variable(s) that best discriminated between the two groups was integral to predicting the group membership of prospective Reading Recovery candidates and whether or not they would be recovered or unrecovered.

**Results**

**PART I**

To determine if there were any differences on subscales of the SPAT, the Yopp-Singer Test of Phoneme Segmentation, and Bruce's Word Analysis Test as a result of participation in Reading Recovery t test scores were calculated for the differences between all the mean pretest scores and the mean posttest scores (see Table 2) for all 29 students.

Results for the SPAT, Yopp-Singer Test of Phoneme Segmentation, and Bruce's Word Analysis Test are presented according to the developmental sequence of the SPAT. Subtests are grouped under the following levels:

- **Level 1** Syllabic and Subsyllabic Level (S) *Phonological Awareness*
- **Level 2** Phonemic Level (CVC) *Phonological Awareness*
- **Level 3** Phonemic Level (Blends) (B) *Phonological Awareness*
- **Level 4** Grapheme-Phoneme (G/P) *Phonological Recoding*

As the Yopp-Singer Test of Phoneme Segmentation (Yopp, 1988) generally measured segmentation of CVC words, the pretest and posttest means were included with the SPAT CVC data set (see Table 2). As the Bruce Word Analysis Test generally measured phoneme deletion from words containing blends, the pretest and posttest means were included with the SPAT Blends data set (see Table 2).
Table 4.2: Tests for Significant Differences Between Means on Pretest and Posttest Phonological Processing Measures

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pretest M</th>
<th>Pretest SD</th>
<th>Posttest M</th>
<th>Posttest SD</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYLLABIC &amp; SUBSYLLABIC LEVEL (S)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPAT: Syllable Counting (S)</td>
<td>2.93</td>
<td>1.33</td>
<td>3.29</td>
<td>1.18</td>
<td>ns</td>
</tr>
<tr>
<td>SPAT: Rhyme Detection (S)</td>
<td>3.68</td>
<td>0.72</td>
<td>4.00</td>
<td>0.000</td>
<td>.03*</td>
</tr>
<tr>
<td>SPAT: Rhyme Production (S)</td>
<td>3.25</td>
<td>1.18</td>
<td>3.79</td>
<td>0.69</td>
<td>.02*</td>
</tr>
<tr>
<td>SPAT: Identification of Onset (S)</td>
<td>3.86</td>
<td>0.45</td>
<td>3.86</td>
<td>0.76</td>
<td>ns</td>
</tr>
<tr>
<td>CONSONANT-VOWEL-CONSONANT LEVEL (CVC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPAT: Identification of Final Phoneme (CVC)</td>
<td>3.86</td>
<td>0.45</td>
<td>3.93</td>
<td>0.38</td>
<td>ns</td>
</tr>
<tr>
<td>SPAT: Segmentation (1) (CVC)</td>
<td>3.07</td>
<td>1.36</td>
<td>3.50</td>
<td>0.92</td>
<td>ns</td>
</tr>
<tr>
<td>SPAT: Blending (CVC)</td>
<td>3.36</td>
<td>0.95</td>
<td>3.82</td>
<td>0.48</td>
<td>.02*</td>
</tr>
<tr>
<td>SPAT: Deletion of Initial Phoneme (CVC)</td>
<td>2.29</td>
<td>1.65</td>
<td>3.21</td>
<td>1.32</td>
<td>.000***</td>
</tr>
<tr>
<td>Yopp-Singer Test of Phoneme Segmentation (CVC)</td>
<td>12.71</td>
<td>8.33</td>
<td>18.29</td>
<td>5.06</td>
<td>.000***</td>
</tr>
<tr>
<td>BLENDS LEVEL (B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPAT: Segmentation (2) (B)</td>
<td>1.36</td>
<td>1.66</td>
<td>2.21</td>
<td>1.64</td>
<td>.000***</td>
</tr>
<tr>
<td>SPAT: Delete First Phoneme (B)</td>
<td>1.32</td>
<td>1.42</td>
<td>2.11</td>
<td>1.55</td>
<td>.02*</td>
</tr>
<tr>
<td>SPAT: Delete Second Phoneme (B)</td>
<td>0.82</td>
<td>1.36</td>
<td>1.32</td>
<td>1.70</td>
<td>.02*</td>
</tr>
<tr>
<td>Bruce's Word Analysis Test (B)</td>
<td>6.21</td>
<td>7.12</td>
<td>13.11</td>
<td>8.55</td>
<td>.000***</td>
</tr>
<tr>
<td>GRAPHEME-PHONEME LEVEL (G/P)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPAT: Non-Word Reading (G/P)</td>
<td>1.71</td>
<td>1.46</td>
<td>2.89</td>
<td>1.77</td>
<td>.001***</td>
</tr>
<tr>
<td>SPAT: Non-Word Spelling (G/P)</td>
<td>2.57</td>
<td>1.71</td>
<td>4.21</td>
<td>1.87</td>
<td>.000***</td>
</tr>
</tbody>
</table>

* .05 > p > .01 ** .01 > p > .001  *** p < .001
A comparison of the pretest and posttest data showed significant differences on 11 of the 15 phonological processing measures. Four variables did not show a significant difference. These data showed a significant change in the overall development of phonological processing skills for the 29 students, that is, the posttest data confirmed there was a significant improvement in the level of phonological awareness and phonological recoding scores across the cohort (see Table 2).

At the Syllabic and Subsyllabic Level (S) a significant difference was noted for the SPAT: Rhyme Detection (S) and SPAT: Rhyme Production (S) subscales. There was no significant difference between the pretest and posttest mean scores for the SPAT: Syllable Counting (S) subscale. There was also no significant difference on the SPAT: Identification of Onset (S) subscale; the pretest mean score of 3.86 being very close to the total score of 4.

At the CVC Level significant differences were identified for the SPAT: Blending (CVC) and SPAT: Deletion of Initial Phoneme (CVC) subscales. Ceiling effects may have accounted for the lack of significant difference for the SPAT: Segmentation (1) (CVC) subscale with a pretest mean score of 3.07 and the SPAT: Identification of Final Phoneme (CVC) subscale with a pretest mean score of 3.86. On the Yopp-Singer Test of Phoneme Segmentation (CVC), a test of Simple Phonemic Awareness, there was a significant difference between the pretest and posttest means.

There were significant differences on all three SPAT subtests at the Blends (B) level: Segmentation (2) (B), Delete First Phoneme (B), and Delete Second Phoneme (B). There was also a significant difference for Bruce’s Word Analysis Test (B). At the Grapheme-Phoneme Correspondences (G/P) Level there were significant differences between the pretest mean scores and posttest mean scores for both of the subscales, SPAT: Non-Word Reading (G/P) and SPAT: Non-Word Spelling (G/P) which measure phonological recoding skill.

**PART 2**

Results for the discriminant analysis identified one factor from the set of predictor variables that maximally separated the two groups. Two subtests from the SPAT (Neilson, 1995), Identification of Final Phoneme (CVC) ($r = 0.77$) and Blending (CVC) ($r = 0.61$) made up this factor.

The next step in the discriminant analysis given that the SPAT Identification of Final Phoneme (CVC) and Blending (CVC) subtests were identified as the canonical function, how well did they classify the Reading Recovery cohort into recovered and unrecovered? The Classification Results in Table 3 display the degree of success of the classification for this sample of 29 students. Overall, 85.2% of the cases were classified correctly.

<table>
<thead>
<tr>
<th></th>
<th>Correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovered</td>
<td>90% (N=18)</td>
<td>10% (N=2)</td>
</tr>
<tr>
<td>Unrecovered</td>
<td>71.4% (N=5)</td>
<td>28.6% (N=2)</td>
</tr>
</tbody>
</table>
DISCUSSION

PART 1
Table 1 has been reconfigured to show the developmental sequence of the subtests according to their linguistic level. These developmental levels can be seen in the rows that are in the same sequence as Table 1. The columns also display a developmental sequence showing the subtests in terms of their item composition. Significant differences between pretest – posttest scores are recorded as SIG with non-significant differences shown as NS.

Table 4.4: Item Composition of the SPAT, the Yopp-Singer Test of Phoneme Segmentation, and the Bruce Word Analysis Test by Task and Level.

<table>
<thead>
<tr>
<th></th>
<th>Segmentation</th>
<th>Blending</th>
<th>Rhyme</th>
<th>Phoneme Isolation</th>
<th>Deletion</th>
<th>Pseudowords</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12. The Bruce Word Analysis Test (Bruce, 1964) SIG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
An overview of Table 4 shows that there are four developmental levels in children acquiring phonological processing skills as they relate to reading. At the first level, Syllabic and Subsyllabic, children learn to count syllables and identify rhyme. At the last developmental level, Grapheme-Phoneme Correspondences, this knowledge has been applied and is evident through the application of the alphabetic principle, that is, the sounds that were discriminated at the first level are now attached to letter strings.

The 29 students who were taken into the Reading Recovery Program were shown, on average, in Table 4 to have experienced difficulty at the first level in Rhyme Detection and Rhyme Production. It could be speculated that these candidates for Reading Recovery had particular difficulty in acquiring skills of Rhyme Detection and Rhyme Production. Given the replication of these results in further studies with a control group, it would be interesting to research whether or not programming should be implemented at the Prep level of schooling to target Rhyme Detection and Rhyme Production in an effort to facilitate the first steps towards the acquisition of the alphabetic principle.

The next developmental level shown in Table 4 is the Phonemic Level (CVC). At this level the students who entered Reading Recovery had particular difficulty with the Deletion of Final Phoneme and Blending tasks. Many teachers who work with Grade 1 children encounter students who are able to sound out words but have great difficulty in blending sounds together to make a word.

Given confirmation of the findings of this study, an option for students experiencing significant difficulty in learning to read, would be to implement a program targeting Rhyme Detection, Rhyme Production, Deletion of Initial Phoneme, and Blending. This could be constructed and trialled with such students to determine how well it facilitated their later grasp of the alphabetic principle.

Further examination of Table 4 reveals that for the 29 students at posttest there was an increase in the cohort’s ability to engage in tasks at the Blends Level. This result was not unexpected given that Reading Recovery incorporates a phonological awareness component in lessons, particularly through the Elkonin technique in spelling. It is probable that children’s experiences with deletion, addition, and substitution of sounds would have contributed to the change in this aspect of phonological processing.

Tasks at the Grapheme-Phoneme Correspondences Level (see Table 4) measured the degree to which students had attained the alphabetic principle through tests involving phonological recoding. Results for the SPAT: Non-Word Reading and SPAT: Non-Word Spelling subtest provided evidence that students were acquiring the alphabetic principle through incidental opportunities, in context, arising from the text, as Reading Recovery does not provide systematic instruction in phonological recoding. This was a most unexpected result for this cohort of 29 students given Clay’s opposition to systematic training in phonological recoding skills (Iversen & Tunmer, 1993). This outcome provided some support for Clay’s (1991) contention that the alphabetic principle is acquired incidentally, particularly in Reading Recovery lessons. These data lead to the hypothesis of: How much more powerful could Reading Recovery be if phonological processing was explicitly and systematically taught?
PART 2

The results for the discriminant analysis undertaken on the phonological processing measures identified one factor. This factor consisted of both the SPAT: Identification of Final Phoneme ($r = 0.77$) and SPAT: Blending ($R = 0.61$) subtests. Together, these two subtests were identified by the discriminant program as the most powerful phonological processing predictors of successful recovery in the Reading Recovery Program.

Previous research has indicated that up to approximately 30 percent of participants have failed to benefit from the Reading Recovery Program (Center et al., 1995; Fletcher-Flinn et al., 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993). Significantly, the Classification Results from the current study for the SPAT: Identification of Final Phoneme and Blending subtests showed a success rate of 85.2% for predicting recovery as measured by a Book Level of 17-28 upon discontinuation. This figure is higher than the 70% currently attributed to Reading Recovery. These data suggest that together, the SPAT: Identification of Final Phoneme (CVC) and Blending (CVC) subtests can be used as a fast, efficient, and relatively accurate screening device for use with potential Reading Recovery candidates. Further research is required to test this possibility.

CONCLUSION

Overall, at posttest there was a significant impact on the phonological processing skills of the whole cohort as measured by the SPAT (Neilson, 1995), the Yopp-Singer Test of Phoneme Segmentation (Yopp, 1988), and Bruce’s Word Analysis Test (1964, as cited in Yopp, 1988). On average, these students showed a significant difference at the Blends and Grapheme-Phoneme Level, and to a lesser degree at the Syllabic and Subsyllabic Level, and the CVC Level, perhaps due to the utilisation of the Elkonin technique.

Given the overwhelming body of evidence during the last ten to fifteen years of the relationship between phonological skills and reading (e.g., Catts, 1989; Siegel, 1993; Stanovich, 1986; Wagner & Torgesen, 1987), it is surprising that tests of phonological processing have not been included in the Clay Observation Survey (Clay, 1993b). Whilst this omission may be somewhat understandable given the life-span of the battery, originally referred to as the Diagnostic Survey (Clay, 1985), inclusion of tests of phonological processing have the potential to yield far more useful information than is currently available from the Clay Observation Survey as was demonstrated in the current study.

While Clay (1993a) claims that the program is individualised to target the weakest skills of each child, clearly, this is not always the case, as previous studies of Reading Recovery suggest that up to 30% of the cohort have failed to benefit from the intervention (Center et al., 1995; Fletcher-Flinn et al., 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993). From a Reading Recovery perspective, the current study has shown that pretest phonological processing data can be used to enhance the efficacy of each child’s intervention. Furthermore, success in Reading Recovery has been shown to be closely associated with the level of phonological processing skills upon entry to the intervention (Chapman, Tunmer, & Prochnow, 1999) as was found with the 29 students in this study.

In addition, a study conducted by Iversen and Tunmer (1993), whereby the modified Reading Recovery group received explicit instruction in letter-phoneme patterns, resulted in a
highly significant difference in the mean number of lessons to discontinuation with the standard Reading Recovery group taking 37% longer. This effectively represents a 37% saving in costs! A 100% discontinuation rate was also achieved. Thus, the incorporation of systematic instruction in phonological recoding has the potential to lift the recovery rate to beyond that of 70% whilst also providing the opportunity for an increased number of at-risk students to participate.

PART 2
The results from the discriminant analysis undertaken on the phonological processing measures suggest that it was the performance of the cohort on the SPAT: Identification of Final Phoneme and SPAT: Blending measures at pretest, which determined the Reading Recovery Book Level at discontinuation. On the basis of these results, it is recommended that the SPAT: Identification of Final Phoneme and Blending subtests be employed with potential Reading Recovery candidates at pretest, as a measure of their readiness to commence the program and also as an indicator of the likelihood of recovery as measured by a Book Level of 17-28.

From a resourcing perspective, poor performance on the SPAT: Identification of Final Phoneme and Blending subtests signal the need for explicit teaching prior to the commencement of Reading Recovery. With schools attempting to work within tight budgetary constraints whilst endeavouring to meet the needs of all at-risk students, grouping students with similar needs would appear to be a viable and economically efficient option. This would enable schools to reach many more children than is currently permissible in a one-to-one context. It also provides a realistic alternative for those students who are identified as being at-risk but for whom placement in the Program is delayed or unavailable due to Reading Recovery selection procedures (see Hiebert, 1994).

The preliminary evidence of this study and the wealth of prior research suggest that the efficacy of Reading Recovery may be increased with greater attention given to the critical importance of phonological processing skills. Specifically, the inclusion of tests of phonological processing in the Clay Observation Survey (Clay, 1993b) together with the incorporation of systematic and explicit teaching of phonological processing skills has the potential to yield far greater results than is currently being attained.

References


Teaching Strategies for Reading: How Can We Assist Students with Learning Difficulties?

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Schonell Special Education Research Centre
The University of Queensland

Overview
The first three sections of this chapter describe how views about the nature of reading and the nature of learning difficulties in reading influence reading instruction and assessment. The chapter then describes the roles of teachers and specialist teachers and identifies a number of principles upon which their support and intervention to assist students with learning difficulties in reading should be based.

As a consequence of the issues raised in the preceding sections, the chapter then reports some of the research related to teaching strategies for reading. The final section of the chapter then discusses some of the practices that should be adopted when implementing teaching strategies for reading.

Teaching Strategies for Reading: How Can We Assist Students with Learning Difficulties?
Students with learning difficulties are a heterogeneous group of learners who are often characterized as inactive (Torgesen, 1982) or passive learners with difficulties in processing and organizing written information (Bos & Vaughn, 1994). Many of them have problems with reading. Lyon (1995) has stated that 90% of students with learning difficulties have problems in this domain. For some students with learning difficulties their problems with reading may be a main characteristic. Often a problem emerges during the acquisition phase of reading and can continue throughout the students’ lives. Therefore, learning difficulties in reading are common among individuals at all levels of schooling, in tertiary education and training, and in employment, home and recreational contexts. In the school setting, these students need to have good teaching from the earliest years and provision needs to be made for both early instructional support and sustained on-going intervention.
The Nature of Reading

The way in which reading is understood by a teacher or a specialist (e.g., Support Teacher-Learning Difficulties) will influence which elements of reading are the focus of assessment, of “first wave” teaching (Louden et al., 2000), of instructional support and of intervention. Reading is always defined within a particular cultural context and such definitions change over time. Therefore, the nature of reading will be different in different settings (Christie & Misson, 1998; Meek, 1992). For example, those teachers who view reading largely as word recognition and decoding will focus their teaching (and assessment) on the alphabetic principle, phonological awareness, and word level skills.

Teachers who view reading as a meaning-making activity will focus on elements of comprehension. Those who view reading from a social-critical perspective will view reading as a social practice (Luke, 1993), and teach students to critically examine text and consider the author’s purpose and the influences that the purpose may have on the reader.

In Australia, the notion that literacy is a social practice has been widely promulgated with the use of the Four Resources Model (Freebody & Luke, 1990; Luke & Freebody, 1997, 1999). The model (which is more a model of literacy, than reading alone) suggests that there is an array of practices in which students engage when interacting with print, oral language and multimedia. These practices relate to being a code-breaker, a text-participant, a text-user and a text-analyst. The role of the code breaker refers to learning to work out what the text says. The role of the text-participant is to determine what the text means. The role of the text-user is to identify and use the social purposes of the text and the role of the text-analyst is to think analytically about the text and consider its underlying assumptions. This latter role involves examining how the reader ( listener or viewer) is positioned by the text and the degree to which the reader accepts or challenges that position. According to the authors of the Four Resources Model these practices are used simultaneously in an integrated way during reading (Freebody & Luke, 1990; Luke & Freebody, 1997, 1999).

The Nature of Learning Difficulties in Reading and the Elements of Reading

Learning difficulties in reading must also be considered from within the view or model of reading being used. Based on the Four Resources Model and the four roles of a reader suggested in this model some of the elements of reading with which children with learning difficulties may have problems are listed in Figure 1.
Figure 5.1 Elements of Reading
(Adapted from van Kraayenoord, 2002, p. 396)

| 1. Awareness of environmental print |
| 2. Prior knowledge |
| 3. Vocabulary, including subject-specific vocabulary |
| 4. Letter knowledge |
| 5. Concepts about print |
| 6. Phonological awareness |
| 7. The alphabetic principle |
| 8. Word recognition and identification |
| 9. Decoding |
| 10. Automaticity and fluency of reading |
| 11. Comprehension |
| 12. Metacognitive knowledge |
| 13. Reading strategies |
| 14. Knowledge and understanding of a variety of genres of written text (including the purposes and textual features of the genres) |
| 15. Awareness of context and history on text, author and user |
| 16. Awareness of social organization and power relations on text, author and user. |

An awareness by the classroom teacher and the specialist of the view of reading and the view of learning difficulties that they hold and the implications of these perspectives for assessment and instruction are important. Such awareness will lead to the development of particular understandings about the role and nature of assessment.

The Role and Nature of Assessment
Problems in one or more of the elements in reading (presented above) will typically be noticed by the teacher as he or she monitors students’ reading progress. Regular and ongoing monitoring of students’ reading progress in the classroom is essential if learning difficulties in reading are to be identified and if instruction is to be modified to meet the students’ needs (van Kraayenoord, 2003).

Often if a learning difficulty is suspected, a specialist such as a Support Teacher-Learning Difficulties or an educational psychologist might also assess a student. They undertake a detailed diagnostic analysis of the students’ strengths and weaknesses in reading in order to provide information for planning regular classroom reading instruction and/or to plan reading support and intervention. When the assessment information from the specialist is combined with that of the classroom teacher a detailed profile of the students’ literacy knowledge and skills can be developed.

To gather information about students’ reading progress classroom teachers and specialists should use a variety of assessment techniques. Informal assessment techniques may include observations, student interviews, checklists, analyses of samples of students’ oral reading
performance, measures of comprehension, and activities that demonstrate students’ use and analysis of text (van Kraayenoord, 2003; van Kraayenoord & Moni, 2003). Teachers and specialists might also assess the students’ reading by formal measures such as standardized tests. However, standardized assessment measures typically assess a narrow view of reading and tap a relatively small range of skills related primarily to the roles of a reader as a code-breaker and text-participant (van Kraayenoord, 1993). There are very few standardized tests that assess the text-user and text-analyst roles of the reader and therefore currently teachers in Australia must create informal assessments to obtain information about students’ performances in these areas. Nevertheless, both informal and formal assessment measures allow teachers and specialists to identify students’ strengths and weaknesses in reading and this information is then used to inform teaching.

**Teachers, Specialist Teachers and Teaching of Reading**

Classroom teachers should have the main responsibility for teaching reading to students with learning difficulties. Even if these students are receiving some form of additional support for reading, for example, from a Support Teacher-Learning Difficulties, the classroom teacher should have the main responsibility (Forlin, 1997; Friend & Bursack, 1999). Because classroom teachers and specialists often work together in providing instruction to students with learning difficulties in reading there is a need for a coordinated approach. Such an approach can be facilitated by adhering to some common principles of instruction. The literature indicates a number of principles upon which reading instruction, support and intervention should be based. These principles are identified and explained in Figure 2.
1. Instruction needs to be responsive to individual differences and thus differentiated, based on the students' reading performance (Ivey & Broadus, 2000; Kame'enui, Simmons & Coyne, 2000). This means that the ways in which the students engage with text and respond to tasks are monitored through the processes of assessment. Information from this monitoring is used to plan teaching that is targeted. Text is selected on the basis of students' achievement and the level of tasks is controlled. The strategies for teaching are selected based on the information about the student and the contexts of learning.

2. Instruction needs to take into account the requirements of the learning environment (Lebzelter & Nowacek, 1999). This means the teaching needs to have regard for the setting demands such as the nature of the tasks with which the students will be asked to engage and the types of responses to the tasks they will be required to make.

3. Instruction needs to be relevant and meaningful to the students' lives. This means that instruction should involve reading for authentic purposes, and be directed at audiences beyond that of only the teacher. Activities need to be related to the real world and connected to the students' own lives and experiences.

4. Instruction in reading should involve a variety of reading materials such as textbooks, tradebooks, newspapers, magazines and other common print materials found in the readers' environments.

5. Instruction needs to ensure that students have choice and challenge in the materials used and the activities in which they take part. Choice and challenge influence students' engagement which in turn enhances motivation and can influence learner outcomes (Turner, 1997).

Teaching Strategies for Reading
Alongside these principles of instruction, support and intervention every teacher should have a repertoire of teaching strategies. A number of strategies have been identified in the literature as effective for the development of reading for students with learning difficulties. In this chapter reference is made to direct instruction, strategy instruction, combined direct instruction and strategy instruction, small group instruction, peer tutoring, and cooperative learning. Classroom teachers and specialists should use these teaching strategies in a dynamic and flexible manner. An observation of a typical Australian classroom would reveal that usually more than one of these teaching strategies is used within a lesson (Louden et al., 2000; van Kraayenoord, Elkins, Palmer, Rickards & Colbert, 2000).

Direct or Explicit Instruction
Direct instruction refers to teacher-directed lecture, discussion and learning from print materials (Swanson, 1999). During direct instruction the teacher teaches skill(s) and subskill(s) in a step-by-step or hierarchical sequence. For example, in reading such a sequence might be used to teach...
word analysis skills. Most often the skills and subskills are taught in isolation with teaching proceeding from part to whole. The teacher models the skill and then the student is encouraged to produce and use the skill through guided practice. The teacher works to develop the student’s understanding through the use of questions of various types as he or she tries at each point to determine how adequately the child can use the skill. Frequent feedback is supplied on the basis of the student’s responses. Such feedback includes statements about the accuracy of the responses. The use of the IRE pattern (Initiation-Reply-Evaluation) is common in the interactions between the teacher and the student. Feedback during the teaching is typically provided on a daily basis. Direct instruction also comprises many opportunities to practice to overlearning. Initially the practice is guided by the teacher and then later independent practice is promoted. Daily or weekly reviews of the skills and subskills occur and learning is established on the basis of mastery. Criteria for mastery are identified and the student is informed that this is his or her goal. Direct instruction most often occurs in small groups or through individual one-on-one tutoring.

There is a substantial body of evidence related to the use of direct instruction in the acquisition and development of phonemic awareness and word recognition (Adams, 1990; Christensen, 1997; Ehri, 1997; Snow, Burns, & Griffin, 1998; Torgesen, 1999; Treiman, 1998). There is also evidence related to the use of direct instruction in the teaching of comprehension. For example, accumulating research has examined the teaching of text structure and the use of organizational devices, such as story maps, to teach comprehension (Dimino, Gersten, Carnine & Blake, 1990; Gardill & Jitendra, 1999; Idol & Croll, 1987; Vallecorsa & deBettencourt, 1997). Positive effects of direct instruction approaches for students with learning disabilities have been found in research investigating instruction in special education programs, including resource rooms (Forness, Kavale, Blum, & Lloyd, 1997). However, there are a number of concerns about direct instruction. These concerns centre around the fact that such instruction may promote passive learning and may not engage and motivate students (Silliman, Bahr, Beasman, & Wilkinson, 2000).

**Strategy Instruction**

Swanson (2001) has suggested that there is considerable overlap between a direct instruction approach to teaching and intervention and that of strategy instruction. Similarities lie in their attention to the use of a sequence of steps, the use of guided and independent practice (which means there are many opportunities for the students to practice their new learning), the goal of overlearning, and the teaching of the skills and subskills to mastery criteria. Swanson contends that the main differences between the two approaches are ones of focus and the processing perspective. Specifically, with reference to focus, while the direct instruction model is concerned with the acquisition and retention of specific skills, strategy instruction is concerned with more generic or global skills (Swanson). With reference to processing, direct instruction involves a bottom-up processing approach, whereas strategy instruction involves a top-down approach (Swanson).

One of the main aims of strategy instruction is to develop students’ metacognitive awareness and self-regulation. In teaching reading, such instruction involves the teacher describing the strategy, explaining why the strategy should be used, discussing how the strategy should be applied, and providing examples of the circumstances under which the strategy should be used (Paris & Winograd, 1990), involving the teacher demonstrating the use of the strategy, directly explaining what he or she is doing, and modelling his or her thinking aloud.
Such think-aloud modelling involves the teacher articulating his or her thought processes as he or she goes through each step of a strategy (in a form of problem-solving). Then the student tries the strategy while the teacher guides the learner. The teacher often reminds the student to use the strategy, employing cues to do so. The student is encouraged to think aloud during this time so that he or she becomes conscious of his or her own use of the cognitive processes. The teacher also directs the student to think about instances where the strategy might be used, ways in which he or she can remember to use that strategy, and how to evaluate if the strategy has been successful.

Thus, during strategy instruction a dialogue is created between the teacher and the student(s) (Chan & van Kraayenoord, 1998). Gradually as the teaching unfolds there is a decrease in teacher control and an increase in student control as the student gains independence with the use of the strategy (Graham & Wong, 1993).

There are many reading strategies that can be taught using strategy instruction. These include those suggested by Lebzelter and Nowacek (1999) for decoding such as DISSECT (Lenz & Hughes, 1990) and WIST adapted from Gaskins et al. (1988), for vocabulary teaching such as IT FITS (King-Sears, Mercer, & Sindelar, 1992) and LINCS (Ellis, 1992), and for comprehension such as ASK IT (Schumaker, Deshler, Nolan, & Alley, 1994) and RAP (Schumaker, Denton, & Deshler, 1984). Other authors have investigated the development of main idea comprehension strategy instruction for students with learning difficulties (Chan, 1991; Graves & Levin, 1989; Malone & Mastropieri, 1992; Jitendra, Hoppes, & Xin, 2000).

**Direct Instruction and Strategy Instruction Combined**

Swanson's (2001) extensive analysis of intervention studies for students with learning difficulties has indicated that “at a general level” a combination of direct instruction and strategy instruction is effective. Swanson argues that both bottom-up and top-down approaches are required as students develop both lower-order and higher-order skills.

Swanson’s (2001) study also found that the variables of explicit strategy instruction (comprising explicit practice, strategy cues and elaboration) and small-group instruction were highly predictive of improving the outcomes of students with learning difficulties. (Small group instruction is discussed in the next section.) Therefore, explicit strategy instruction and small-group instruction seem to be of particular relevance to the teaching of students with learning difficulties in reading and should be incorporated into instruction and intervention programs for them.

**Small Group Instruction**

Vaughn, Levy, Coleman, and Bos (2002) created a synthesis of observation studies undertaken during reading with students with learning difficulties and emotional disorders. These authors revealed that since the 1990s there have been more studies of group instruction than in earlier years. These authors also noted that in the past homogeneous (same ability) grouping was the most common form of grouping during reading instruction. However, in today's classrooms heterogeneous grouping is the main small-group instructional practice.
Elbaum, Vaughn, Hughes, and Moody (1999) have conducted a meta-analysis of various grouping formats on students with learning difficulties and emotional disorders. They found that small group instruction may improve reading achievement, although their investigation was limited by the small number of studies. Despite this limitation, Elbaum et al. (1999) recommended the use of multiple grouping formats combined with instruction that is intensive in nature. They suggest the use of multiple grouping formats may be one way of providing instruction that meets the needs of students at different reading ability levels.

Grouping arrangements must also be flexible with teachers rearranging the groups of students depending on the topics, tasks, and the prior knowledge, skills and interests of the students. Vaughn, Hughes, Moody, and Elbaum (2001) have also suggested that flexible grouping might be especially important for students with learning difficulties who need intensive instruction in reading as well as opportunities to work together with their peers who are more able readers. Vaughn et al. (2002) have recommended that group instruction be differentiated. Differentiation allows the individual students' needs to be addressed during group work.

Finally, the research indicates that instruction in groups should involve a small number of students. Kame'enui et al. (2000) have argued that when working with "intensive students"—those who are most seriously at-risk based on extremely low performance—group size should be limited to no more than five students. Similarly, Swanson (1999) has recommended that instructional groups should not have more than five members.

**Peer Tutoring**

Peer tutoring and cooperative learning are both types of peer-assisted instruction. Peer tutoring most commonly involves a more capable student helping a less able student. A student with learning difficulties (the tutee) may be, for example, assisted by a more able student (the tutor) to complete an oral reading task. In a typical peer tutoring situation, when miscues are made during oral reading, the tutor prompts the tutee to adopt a specific strategy(ies) to solve the problem and provides feedback by way of praise and strategy reinforcement.

In order to provide such support the tutor needs to have received training in what to teach and in how to teach and give feedback. Such training is essential for the successful application of peer tutoring (Fuchs, Fuchs, Bentz, Phillips, & Hamlett, 1994).

Peer tutoring has a positive impact on reading (Elbaum et al., 1999; Klinger, Vaughn, Hughes, & Arguelles, 1999; Scruggs, Mastopieri, & Richter, 1985). In particular, models of peer tutoring such as Classwide Peer Tutoring (CWPT) (Maheady, Sacca, & Harper, 1988) and Peer-Assisted Learning Strategies (PALS) (Fuchs & Fuchs, 1997) have been shown to improve the reading of students with learning difficulties. Think-Pair-Share by McTighe and Lyman (1988) has also been suggested as a peer-tutoring activity by Vaughn et al. (2001).

Vaughn et al. (2001) have indicated that teachers should capitalize on the high motivation that students with learning difficulties have when they work with and are assisted by their peers.
Cooperative Learning

Another form of peer-assisted instruction is cooperative learning. Cooperative learning involves students working together in small groups to achieve a common goal or complete a shared task. In cooperative learning students are required to complete their own task and to ensure that the material to be learned is also learned successfully by other members of the group (Johnson & Johnson, 1999). Thus the students in the group depend on one another to successfully accomplish the goal or complete the task.

In planning to develop cooperative learning the classroom teacher or specialist must prepare the students to work in this way. This involves developing the tasks so that the interactions in which the students engage are structured. Training the students in the use of interpersonal and small-group skills so that they can communicate effectively with each other is essential. Gillies (2002) has suggested a number of guidelines for teachers to follow so that students with learning difficulties can be included into cooperative group activities.

Cooperative learning as a strategy for teaching reading has been described in the work of Vaughn and Klinger (1999) who have developed Collaborative Strategic Reading. This approach focuses on the development of four comprehension strategies: previewing and predicting (Preview), monitoring for understanding and vocabulary knowledge (Click and Clunk), main idea (Get the Gist), and self-questioning and passage understanding (Wrap-up). In this approach the strategies are first taught to the students until they have demonstrated expertise in their use. Then the students implement the comprehension strategies in cooperative groups. The authors have reported that the teachers they have worked with use Collaborative Strategic Reading with students of diverse abilities, including those with learning difficulties.

The Implementation of Teaching Strategies for Reading

The adoption by teachers of teaching strategies for reading in instructional support and intervention can be facilitated by a number of practices in schools. These are discussed in the following section.

A Whole School Approach

Schools need to have a coordinated whole school approach to reading instruction, instructional support and intervention. There are now a number of models of school-wide reform that advocate a whole school approach (Felner et al., 2001; Hill & Crevola, 1999; Lee, 2001; Lingard, 2000). In Australia, the work of Hill and Crevola has been influential in fostering the goal of school change as one way of improving student performance. Hill and Crevola argue that the type of reform they advocate is based on changing the whole school ecology so that every thing and every one in the school is directed to meeting high standards. Their work in the Early Literacy Research Project has pointed to the components they believe to be essential for standards-based improvement in reading performance.

There are many different ingredients which have been proposed as important in bringing about a whole school approach to improving student achievement. One of the concepts is the idea of "transformational leadership" (Leithwood & Jantzi, 2000) which aims to foster capacity development and higher levels of personal commitment amongst the school staff to the organizational goals of both the school and the educational system.
Another concept is that of building a learning community. A learning community is a professional community within a school in which the teachers and specialists are engaged in learning for themselves about curricula, pedagogy and assessment (Ailwood & Capeness, 2001; Haycock, 2002). The teachers work on solving the problems of their own classroom and school. With respect to literacy, a learning community may comprise teacher networks or study groups participating collectively in activities aimed at learning about improving their students' literacy learning. These networks or groups might involve teachers in the same grade or in a cluster of grades (e.g., middle school), or in the same subject or across subjects. (See Ailwood & Capeness, 2001; Lingard, 2000; Lingard, Mills, & Hayes, 2000 for discussions about school reform and learning communities which have emerged from findings of the School Reform Longitudinal Study in Queensland, Australia.)

One feature of a learning community is ownership. As part of creating ownership teachers identify their shared norms. They identify and use their personal and group strengths in terms of knowledge and skills (Lewis, 2002). They also engage in “professional conversations” (Lingard, Mills, & Hayes, 2000). Professional conversations are substantive discussions about the community in which the school sits, the school culture, and their teaching and assessment practices. (See also Lee, 2001 for a discussion of factors that supported and hindered the development of school change in literacy in one school.)

Another important feature of the learning community is the concept of collaborative work. Teacher collaboration involves teachers working together to plan and adapt lessons in order to make sure that the teaching strategies used in reading instruction, support and intervention are aligned. Whether the students with learning difficulties are taught in their classroom by their regular classroom teacher and in a pull-out arrangement with the specialist, or whether the regular teacher and the specialist work together in the classroom in a co-teaching arrangement, collaboration is essential. Schmidt, Rozendal, and Greenman (2002) have pointed to the work of Villa and Nevin (1994) who found that successful collaborations are the result of high levels of support for planning time and staff development. Specifically, the research of Villa and Nevin suggests that without these two ingredients there is little chance of improved student outcomes.

**Professional Development Through the Use of Outside Expertise**

While learning communities are one form of professional development, one other vehicle through which teachers may become familiar with a new and wider repertoire of teaching strategies for reading is professional development through the use of outside expertise.

Researchers have found that teachers' teaching practices are influenced by their backgrounds, previous teaching experiences, and the educational policies (Anstey & Bull, 1996; Freebody, Ludwig, & Gunn, 1995). Similarly, support teachers and other specialists are influenced by their beliefs and former experiences (McGill-Franzen, 2000). Thus it is important that teachers have recent knowledge about, and experience of, the most effective teaching strategies for reading. Specifically, Vaughn et al. (2002) have pointed to the literature that suggests that classroom teachers need better preparation in organizing and implementing reading instruction. In order to achieve this goal schools may also have to call on outside-school expertise, for example, schools might call on the staff in universities and/or professional organizations.
There are a number of elements derived from the literature which are thought to be important in creating successful professional development of this type. Some of these include: involving teachers and specialists in designing the programs and participating in the determination of content, using critical analysis to examine teaching principles, having field experiences which involve the observation of other teachers, creating opportunities for collaboration and co-teaching, integrating technology and developing a supportive environment (van Kraayenoord & Elkins, 2000).

**Sustained Use of Teaching Strategies for Reading**

It is one thing for teachers to learn and adopt particular research-based teaching strategies as part of a learning community or professional development, but it is quite something else to continue to use the teaching strategies which they have learned over the long-term. However, for education systems and administrators who put significant amounts of money into training their staff and for the participants themselves, who put time and effort into learning the teaching strategies, it is important that the use of the teaching strategies is sustained. Only then can there be an accrual of benefit and enduring improvement. Gersten, Chard, and Baker (2000) have undertaken an extensive review of the literature in order to identify the factors that contribute to sustaining research-based instructional practices in the classroom. A shortened version of their list of practices and principles is recorded in Figure 3.

**Figure 5.3. Sustainability Factors and Issues**

(Abbreviated from Gersten, Chard, & Baker, 2000, p. 457)

1. Is there a deliberate plan to promote sustained use (e.g., training of trainer models, coaching, model lessons developed and videotaped)?

2. Are plans and expectations for change in teacher practice (i.e., observed teaching behaviour) realistic?

3. Are teachers provided with opportunities to understand and think through the instructional approach and how it can be used for their students, including those with learning problems, and how it best fits their local curricula and standards?

4. Are systems to enhance teacher efficacy, such as peer networks and support, knowledgeable coaching and joint examination of student data, in place?

5. Is there sufficient administrative support to promote sustained practice?

6. Is there an explicit attempt to link the change process with student performance data?
Conclusion

Students with learning difficulties often have problems in reading. In order to combat learning difficulties in reading early instructional support is required. Many students with learning difficulties also need ongoing intervention. In responding to students with learning difficulties in reading, teachers and specialists should adopt the principles of reading instruction, support and intervention which ensure that the teaching is cohesive and coordinated across individuals and locations. Whether support or intervention occurs in the regular classroom and/or in pull-out programs the main goal of classroom teachers and specialists in assisting students with learning difficulties should be to promote learning that is active. In order to create engaged and strategic readers teachers and specialists need to adopt teaching strategies that change the ways in which they interact with their students and the way the students interact with each other.

With reference to the literature, a number of teaching strategies for reading which have these goals have been discussed in this chapter. They are: direct instruction, strategy instruction, combined direct instruction and strategy instruction, small group instruction, peer tutoring, and cooperative learning. Direct instruction and strategy instruction both focus on making explicit what is being learned. A technique such as small group instruction capitalizes on the attribute of size by increasing the opportunity for teacher-student instructional time and increasing the amount of student-to-student interaction. A small number of students working in a group provides many opportunities for the students to actively participate in the lesson or task. Peer tutoring has the benefits of providing additional one-to-one instruction and individual responding and feedback to improve a student’s performance, while cooperative learning uses group interactions involving discussions, explanations and feedback to facilitate learning.

This chapter has also suggested that classroom teachers and specialist teachers are more likely to adopt and use the teaching strategies for reading if a whole school approach is taken. Features of such an approach comprise transformational leadership, the development of a learning community and teacher collaboration. Professional development through the use of outside expertise may also support the teachers’ and specialists’ acquisition of new strategies for teaching. There must be both a willingness and the conditions to ensure that the use of the teaching strategies for reading is sustained.

Finally, the development of reading is fundamental to the lives of all students. Those with learning difficulties in reading deserve instruction, support and intervention that utilizes the very best that we know about teaching strategies for reading.

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References


CHAPTER 6

Using Imagery as a Strategy to Enhance Students’ Comprehension of Read Text

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Overview
The main focus of this chapter is on the use of imagery as a strategy to improve students’ comprehension of read text. The chapter is in two parts, the first section reports on the literature review and theoretical foundation of using imagery as a teaching tool to enhance readers’ comprehension. The second section reports on a classroom teaching strategy that uses imagery to enhance readers’ comprehension of read text.

Introduction
In the 1970’s it was discovered that reading comprehension was rarely taught in the classrooms (Durkin, 1978; Snow, 2002; Vaughn, et al., 2000,). Dolores Durkin’s (1978) research had made the embarrassing observation that there was much comprehension testing and questioning after the reading of text passages in American classrooms but there was very little comprehension instruction having taken place. Out of the 4000 minutes of observation in her study there was a total of 11 minutes of actual comprehension instruction. Since then there has been a great body of research investigating the teaching of comprehension. Even with the large volume of information gathered in the past 30 years the situation has changed little (Pressley, 2002; Snow, 2002). Teachers appear to be mentioning a skill to students and handing it over to them rather than employing effective instructional practices supported by research has been shown to improve students’ understanding and recall of read text (Institute of Child Health and Human Development, 2000; Pressley, 2002). The National Reading Panel (Institute of Child Health and Human Development, 2000) reported that when informed and professional teachers applied research based explicit strategy instruction in the classroom there was an improvement in comprehension even when the instruction was not ideal.
Reading comprehension enhancement is based on the cognitive premise that the more elaborate the encoding process the easier it is for students to recall the information from their long term memory (Hay, 2000). Students’ ability to remember and understand the text is improved when the teacher takes the time to explain the vocabulary and the different concepts imbedded in the context and engages the readers in guided and independent practice. The more concrete, familiar and meaningful the text is to the reader the better is the encoding into and retrieve from the readers’ long term memory (Cooney & Hay, 2002; Hay, 2002).

Skilled reading involves more than fluent word recognition, it involves comprehension. Good comprehenders engage in the reading task using a variety of strategies in an articulated fashion as they read challenging text. They actively skim the text and make predictions. They relate ideas in text to their prior knowledge, they construct images, generate questions and summaries (Duke & Pearson, 2002; Hay 1991; Pressley, 2002; Snow, 2002). Imaging has been mentioned as an effective comprehension strategy but teachers rarely teach the strategy.

The claim is that mental imagery training can be incorporated into the classroom to improve students’ memory for passages read and their comprehension of read text (Harris & Pressley, 1991; Truscott, Walker, & Gambrell, 1995; Woolley & Hay, 1999). Visualising strategies have been demonstrated to be effective with both regular and poor readers (Woolley & Hay, 1999). Mental imaging is a technique that links imaging with verbal processes and it is a method whereby the recall of information is strengthened by utilizing both the verbal and visual modes of students’ cognitive processing. Therefore, the main focus of this chapter is on the use of imagery as a strategy to improve students’ comprehension of read text. The chapter is in two parts, the first section reports on the literature review and theoretical foundation of using imagery as a teaching tool to enhance readers’ comprehension. The second section reports on a classroom teaching strategy that uses imagery to enhance readers’ comprehension of read text.

**Imagery**

The notion that imagery can assist students in the encoding and recall of information is not new as it was used in one form or another in ancient times. For example, Aristotle, the Greek philosopher, was the first person to propound the theory of association in memory. He proposed that ideas in memory are made up of smaller ideas, which have been linked in some way. As a result, memory was thought to be primarily concerned with the association of ideas, words or concepts rather than images (Searleman & Hermann, 1994). To remember an event, an individual would need to collect and associate a series of recalled ideas. This process would be referred to as a recollection.

Morris (1994) described the Greek play that is supposed to have inspired the poet Simonides to invent the loci system, a mnemonic technique, that combined both the Aristotle’s verbal associations and Plato’s visual mental imagery. It was so effective that it was adopted and used for the remembering of speeches by some of the noted orators of ancient Athens. Simonides was at a banquet when a message came for him to meet two men outside the banquet hall. The building collapsed while he was outside crushing all those inside beyond recognition. Simonides was able to identify each of the victims by remembering their location from where he was sitting at the banquet table. This tragedy inspired Simonides to develop the mnemonic visual method, whereby memory could be improved by selecting places within a recollected scene and placing the visualised items in each of the imagined locations (Higbee, 1996).
Educators' and psychologists' modern view of memory and cognition is influenced by the traditions of Western thought. Inventions such as the printing press and the computer have also helped to shape our understanding of the world. It has provided us with convenient models that help to convey an understanding of the way we comprehend, think and remember. Recently human memory functions have been influenced by the analogy of the digital computer with its multi-store memory architecture and a central processor. These models are based on the idea that people process information in two distinct forms, in serial as well as parallel mechanisms (Baddely, 1990). Paivio's (1969) “dual coding” theory is another model of cognition that reinforces the notion of the two ancient aspects of memory, the verbal associative and the visual wholistic. In this model the two cognitive processes function as alternative coding systems or modes of symbolic representation. For example, a concrete object or an event may invoke a perceptual trace, or a verbal label (Paivio, 1969). These are not separate functions of cognition but they operate interdependently and in such a way that they complement one another.

Many mnemonic techniques have been devised to utilize the visual and verbal aspects of cognitive functioning. Although mnemonic memory techniques have a limited and novel application there are a number of elements that they have in common. These elements may apply to good teaching practice in fostering comprehension and recall strategies. Most mnemonic techniques utilize visualizing and verbal association strategies together with focus of attention, organization and meaning enhancing strategies (Baddeley, 1990; Duke & Pearson, 2002).

**Visualising**

Earlier this century an emphasis on behavioural science in psychology saw less research conducted on imagery and cognition. Mental imagery once again became a serious topic of scientific study during the seventies as the limitations of behaviourism became more apparent (Pressley, 2002; Sadoski, 1983). Over the last 30 years cognitive psychology has had a significant impact on the study of learning and the reading process (Kosslyn, Behrmann & Jeanerod, 1995). Recent constructivist models of cognition view learning as an active mental process that occurs when sensory data are attended to and understandings are constructed using established meaning and visual frameworks from prior knowledge (Hay; 1995; Kroll, 1999). Reading comprehension can be viewed as the interaction of the cognitive ideas of the reader and the sensory perception of the printed text message.

Readers when they comprehend text, contribute conceptual information from their own store of knowledge and from the text information. Conceptually driven processing requires the integration of background knowledge and understanding of themes whereas text information processing focuses attention to the surface features of the printed text (Idol, 1988; Lindsay & Norman, 1977). Reading comprehension is a balance of cognitive processes, it is neither totally conceptually driven nor text driven. Information is integrated in a series of closer and closer approximations to the perceived meaning. As the comprehender gathers more sensory information and links are formed with existing mental structures the closer and closer that reader comes to a reasonable understanding of the text. The resulting mental constructions may be visual and/or verbal and may be linked together by various thought processes. Thus, it is important for any model of text comprehension to be able to access both sources of information simultaneously.
Conceptually driven information is largely constructed from prior knowledge structures, these constructs may often be in the form of mental imagery. The formation of mental imagery during reading is an ongoing process (Lindsay & Norman, 1977; Pressley, 1976). It may be continually constructed from prior knowledge and held in working memory as new text driven information is assimilated. Images are especially efficient for assimilating spatial, sensory and/or emotive information (Paivio, 1986). Images also make it possible to match information in a parallel or simultaneous fashion in contrast with verbally encoded information that is coded sequentially (Long, Winograd & Bridge, 1989). Imagery is not static but it may include representations of active sequences and also representations of relationships between objects and events. Verbal memory accesses information differently, it recalls information in a serial fixed order (Bell, 1991; Paivio, 1986).

As memory constructs mental images tend to be holistic rather than linear. Sadoski (1983) claimed that the functional use of imagery may be in a reciprocal relationship with the linear verbal processing of information. Visual and verbal cognitive structures are complementary and when linked together they enhance the understanding and recall of sensory information. The construction of mental imagery using both modes enables the reader to form more in-depth mental models that can be dynamically linked to text ideas. The combination of verbal and imaginable information in human cognition allows students to economize on effort by maintaining a larger amount of material in working memory. For example, Harris and Pressley (1991) instructed students to read a passage first and then image. They were given practice on texts of increasing length and received feedback. The experimental reading group, that used mental imagery, answered more factual-content questions and had better comprehension of the passages than did the same-aged readers in the non-image instruction control group.

Investigating the type of text that is easier to encode and recall into long-term memory, Sadoski, Goetz, and Avila (1995) contended that concrete language text is easier to comprehend and remember because it can be more readily imaged and associated with prior knowledge. In addition, Juel and Holmes (1981) noted that abstract sentences took significantly longer to be read and the students were more likely to produce comprehension errors than when reading concrete sentences. Concrete phrases (e.g., yellow flower) are remembered as integrated images, whereas abstract phrases (e.g., liberty) are remembered as separated words (Paivio, Walsh, & Bons, 1994).

The mental image generation during reading gives poorer comprehenders a mechanism for integrating information derived from the text. It may also encourage them to make inferences that they may not normally make (Yuill & Oakhill, 1991). In many books illustrations are provided for this very reason. However, there is some evidence that visualisation still occurs even when pictures are present and that this may be an effective tool in comprehension. Gambrell and Jawitz’s (1993) research supports this premise, for when readers generate mental imagery and attend to illustrations their comprehension showed a greater improvement, compared to when imagery and illustrations were activated alone.
**Attention**

Good comprehenders are able to focus their attention more on the important aspects of the text (Duke & Pearson, 2002). Focus attention refers to the ability to perceive text information related to the task demands. The memorability of a sentence depends on how readers processed the sentence initially. Instruction may direct the reader’s attention and play a key role in deciding what is to be remembered. Instruction designed to assist the reader may help to determine the importance of processing as well as the depth of processing. By directing the focus on particular features of a sentence - for example, its surface structure and/or its meaning - students will remember the sentence differently. Recall is best when readers already know the meaning of a sentence. Recall is influenced by fluency of word recognition and understanding the vocabulary (Clark & Clark, 1977; Duke & Pearson, 2002; Spencer & Hay 1998).

Imagery seems to be generated spontaneously by good and to a lesser extent by poor readers. Long et al. (1989) maintained that a reader’s comprehension of sentences, paragraphs, and passages is increased with imagery instruction. Imagery instruction is particularly helpful in facilitating recall for meaning rather than verbatim recall. The most effective mental images are those that serve to tie together two or more objects by having them interact in some way. The vividness of a reader’s mental imagery will also positively influence the processing of text. Vividness of mental imagery has been reported to be associated with deeper levels of meaning and increased levels of reading enjoyment (Sadoski, 1983).

**Association**

One of the most important ways that imagery aids students’ memory is when it is used in conjunction with verbal coding (Kosslyn, et al., 1995; Woolley & Hay, 1999). Visual imagery has a role to play in making the encoding and retrieval of information from long-term memory more efficient (Gambrell & Jawitz, 1993). Imagery increases the capacity of working memory by assimilating information into chunks that are held as reading proceeds (Long et al., 1989). The utilization of both visual and verbal information as part the reading process is an effective tool for comprehension. Thus imagery can be viewed as a sensory link with incoming language (Bell, 1991). Imagery connects prior knowledge and background experiences to verbal processing as well as assisting with the establishment of new vocabulary. It aids the storage of information in long-term and short-term memory by establishing more elaborate links in memory. As the reader acquires new experiences sensory information is manipulated and accommodated into newer structures with new information (Bell, 1991; Piaget, 1966). Although, children with adequate vocabulary skills benefit more from imagery instruction than those with inadequate vocabulary skills (Levin, 1973).

Imagery can be used in reasoning tasks and in language comprehension such as comprehending verbal descriptions. Imagery is directly involved in making comparisons or analogies - that is, in matching meaning and textual information. Imagery can also assist the reader in making inferences (Long et al., 1989). For example, to evaluate the qualities of the main character of a story, students may use mental imagery to make inferences by comparing and contrasting. The resulting mental constructs are then tested and adjusted so that an approximate match is made and an understanding of the main character is constructed. Verbal units are more adept in representing abstract information, contributing logic and organisation of thought (Kosslyn, 1988; Kosslyn, Behrmann & Jeannerod, 1995; Truscott et al., 1995). Gambrell and
Jawitz (1993) identified that teaching children to construct mental images as they read enhanced their abilities to form inferences and enabled them to make predictions. They were better able to recall what had been read in narrative texts. A number of studies have shown that the insertion of image-building features can also increase the comprehension and recall of expository texts (Long et al., 1989).

**Organisation**

Imagery is involved in the organisation and storage of information (Gambrell & Jawitz, 1993; Long, et al., 1989). Imagery generation is linked to short term memory capacity and children who have greater short-term memory capacity are better at visualising than those with less capacity. However, effective imagery generation may even increase the capacity of working memory during reading by assimilating details and propositions into chunks. These chunks take up less space in working memory and are carried along during reading. Recalled images may, for example, represent an organised chunk of thematic meaning. Whereas ongoing imagery during reading may represent elements of that chunk and is therefore more helpful in facilitating meaning rather than verbal recall (Baddeley, 1990; Long et al., 1989).

Images are regarded as symbolic processes that are linked developmentally to associative experiences involving concrete objects and events (Paivio, 1969). In memory, they are organised to represent the environment spatially and are helpful for meaning rather than verbatim recall. In the case of verbal memory items are retrieved in a fixed order (Bell, 1991; Paivio, 1969, 1986).

Paivio's (1986) dual coding theory provides an insight into how the verbal and nonverbal systems interact. Sadoki et al. (1991) believed that verbal items in long-term memory were organised in a linear hierarchical fashion whereas units of memory in the nonverbal system are organised in holistic nested clusters. Each of these nested clusters are like Russian baboushka dolls. When taken apart the first doll reveals another doll inside. Inside the second doll is a third one. The analogy to the nonverbal system differs in the respect that there is more than one doll side by side in each successive doll. For example, eyes, noses or mouths can be perceived separately, but are generally perceived as parts of a face, faces as part of heads, heads as part of bodies, and so on. The concept of face in the verbal memory system may have referential connections. It is associated with a mental image of a face with its nested images, such as eyes with each of their respective nested sets such as eyelids and pupils. The mouth is also another nested set with other images such as lips, teeth and tongue.

**Meaningfulness**

The ancient Greeks identified that one’s memory for a set of objects can be greatly enhanced if one visualises them interacting (Kosslyn et al., 1995). For example, if one visualises oneself going through the motions of a series of errands the entire sequence could be encoded as an image that could be recalled later. Imagery may be instrumental in the reading process by relating incoming information to prior knowledge. Such information may be encoded in a story like framework that helps to relate affective experiential components of memory. This may increase the involvement and enjoyment of reading (Pressley, 2002).

From their research, Long et al. (1989) reported that mental imagery was related to the human perceptual system and to emotion or affect. For example, people remember vividly an event in their personal lives or an event that is significant to a group of people together with the associated
circumstances. These vivid and enduring memories or 'flashbulb' mechanisms seem to be initiated by an event that has a high novelty or unexpected shock value coupled with it (Neisser, 1982). Flashbulb memories are an example of the powerful influence on feeling that imagery can have. If an individual looks at memories for significant events from one's own experience the images are often vivid. Important visual information and events are encoded with the emotion associated with the hearing the news, for example, the September 11, 2001, attack on the New York twin towers is often recalled with the feeling of shock that was encoded at the time of viewing.

When children read books they can use imagery to gain the emotion of the story. When they do this, the book is said to come alive because the imagery enables them to engage with the emotions of the text. The degree of involvement, enjoyment, and interest in reading are thus enhanced by the generation of images. Sadoski, Goetz, and Kangiser (1988) maintained that imagery facilitates affective associations. This is an element, which could be said to elicit "imagination" in reading stories - that part of reading, which is said to make stories come alive. The affect involvement in the story provides an added dimension to encoding information. The amount of imagery generated during reading can be affected by the language features of the text (Long et al., 1989).

Emery (1996) believed that understanding a character's perspective was also essential for comprehending the story as a whole. Personal involvement in reading may be facilitated by the use of imagery that is related to an understanding of a character's perspective. Smith (1978) postulated that the meaning that readers derive from text relates to what they already know and what they want to know. Thus, by making mental images of characters that they have known and applying it to the new situation readers can develop a more meaningful understanding of the dynamics of the story character.

**Imagery Instruction**

The readers' level of meaning from the text is influenced by their ability to form visual images of the changing text (Sadoski, 1999). In addition, Paivio and Goetz (1991) reported that readers, for example, who identified with a fictional waterskier, imagined the scene as though it were through the skier's eyes. They recalled the skier's actions as if they themselves had been performing them. They were also able to imagine the boat driver's actions from the point of view of an outside observer.

A study involving eight year olds demonstrated that mental imagery training can be easily taught in the classroom and it improves children's memory for text read (Kosslyn, 1976; Pressley, 1976; Romeo, 2002). Poor readers, in particular, have been shown to greatly improve their comprehension using imagery instruction (Pressley, 1976). Imagery also benefits those students with adequate reading skills but in need of organisational strategies (Paivio, 1971). Generally poor readers are helped more by imagery instruction than good readers, because good readers may already use imagery effectively (Duke & Pearson, 2002; Long et al., 1989). Yuill and OakHill (1991) noted that when poor readers were given imagery instruction they performed as well as good comprehenders.

Long et al. (1989) also reported that students' level of imagery during and after the reading differed markedly. Gambrell et al. (1987) identified two types of strategies: - text processing and
text reorganizing as characteristic of skilled readers. Text processing strategies enabled the reader to focus on the emerging meaning and to focus on what is being read. Imagery generation during reading is a text processing strategy that may be used as a mental “peg” for holding thematic meaning. As a result the process of imaging may involve greater processing depth (Sadoski, 1983). Text reorganization strategies, on the other hand, are reflective strategies used to clarify the meaning and facilitate the recall of information. For example, questioning children about character motives while generating imagery is a type of text reorganization strategy. It helps students improve their ability to make inferences. Students who discuss character perspectives are better able to identify the story’s central problem (Emery, 1996).

For visualisation to be effective students must be able to know how to analyze a task and to understand what aspects of imagery are required to perform that task. Images are actively constructed and the way in which readers organise a complex image has dramatic effects on the time taken to image it. The effectiveness of a specific imagery technique also depends on the nature of the problem being solved and on the effectiveness of the various imagery components for a given person. It requires effort to maintain imagined items in consciousness, this notion together with the efficiency of visualising strategies (see second part of this chapter), has an impact on the comprehension tasks (Kosslyn, 1988; Woolley & Hay, 1999).

Students with reading problems need to be able to integrate text information through their own efforts, using their own self-generated visualisation strategies (Pressley, 2002; Yuill & OakHill, 1991). Teacher modeling, guided practice and independent practice are strategies that lead to improved reading comprehension and independent use of visualization strategies (Cooney & Hay, 2002; Gambrell et al., 1987; Gordon, 1985; Woolley & Hay, 1999).

Summary
Students’ reading comprehension is strengthened by using verbal and mental imagery techniques. When students’ visual and auditory cognitive systems are activated students’ short-term memory capacity is improved along with the encoding of information into and recall of information from the readers’ long-term memory.

Recall is most effective when reader can decode the words, have an understanding of the vocabulary and the meaning of the sentence, and use imagery as a comprehension strategy. Imagery enhances memory when it is combined with verbal coding. Effective imagery generation increases the capacity of working memory during reading by organising details and propositions into chunks, which are carried along during reading. The degree of involvement, enjoyment, and interest in reading are also enhanced by the generation of meaningful images.
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Section two

Explicit Classroom Teaching Strategies: Focusing on Imagery to Enhance Readers’ Comprehension of Text

“Imaging Strategy” combines story structure with mental imagery (Gambrell et al., 1987; Romeo, 2001). Teachers are encouraged to read texts that are high in imagery to the children. At relevant stages during the reading the teacher stops and asks the children to visualise the story events and then share their images with the group. It is expected that the children will eventually image during reading without prompting.

Children practice the technique by first visualising a word and then describing the mental image to a friend.

Key concepts in the approach are:-

- Teacher explanation
- Teacher modelling
- Scaffolding through guided practice
- Independent practice
- Explicit instruction

Specific skills developed are:-

- Elaboration of imagery
- Self-questioning
- Student self-regulation
- Cooperative learning
- Visualisation strategies
- Use of the WH questions to elaborate imagery
- Verbalisation of visual imagery
- Evaluation and goal setting

The basic steps in the process are:-

1. Explain

The teacher introduces the imaging strategy and explains the use of the strategy.

Example: “Grade 6, You may have heard someone say that the book was better than the movie. What do they mean? They mean that when they were reading the book they could imagine scenes and actions that were like a movie. They could make pictures like a movie director in their heads. Today we are going to make pictures in our heads as we read together. This strategy is called imaging and it will help you comprehend what you read.”
2. Discover and Model

The teacher models the imaging strategy by using think aloud talk. The teacher describes in detail images that are formed to share with the students. The teacher asks the students what the name of the strategy is and how it will help with the reading.

Example: After giving the children practice at imaging the word 'cat' and 'beach' the children discuss their images with the class or with each other.

"Now I am going to read a short passage (for example, 'The Lion, the Witch and the Wardrobe' (Lewis, 1968) - where Aslan comes back to life and Nania changes from Winter to Spring) and then I will tell you how I imaged the scene using the chart to prompt me."

Pointing to the word - Who on the chart. "I could see the dead Aslan laying like a floppy rug on the huge cold stone table. He looked ......."

The teacher goes on pointing to each of the WH prompts (who, what, when, where, why) and models using think alouds in the same way as before.

3: Goal setting and Guided practice

The teacher shows the Developing Vivid Mental Imagery chart and asks the students to recall and explain the use of the strategy. The teacher asks the children how they think they might use the strategy during the reading. The teacher reads a story to the children with the children reading along silently. The teacher stops at strategic points in the story and asks the students to use the chart as a guide to help develop their own image. The teacher asks children to volunteer their image.

Example: The teacher shows the Developing Vivid Mental Imagery chart. "How might we use this chart to help us comprehend the story that we are about to read?" The teacher reads a story, for example, 'The Giant Under the Snow' (Gordon, 1986) with the children reading along silently. The teacher stops at relevant points in the story. "Now I want you to image this scene. Use the chart to guide your image in your head."

4: Independent practice

The students are encouraged to work independently without prompting on the rest of the passage.

Example: "Do you think that you can image without assistance? Now I want you to image as we read together (or as you read the rest of the passage yourself) without me prompting."

5: Evaluate and Extend

Talk about how they imagined the main character/s and actions in the story. Ask Why questions. Discuss by comparing and contrasting with the childrens' own similar experiences. Share feelings by asking how they would have felt if they were the main character/s. Ask, what would they do now if they were the central character/s. Students set goals for how they can improve the strategy and how imaging can help them in the future.
Example: “I want you to once again remember the scene that you imaged when Jonk was confronted by the dog. **Why** did Jonk let go of the tree when the huge dog attacked her? How do you think she felt? What do you think you would have done if you were Jonk? Why would you have done that?” What helped you image scenes in the story? How do you think that imaging can help you in the future?”

**Variation: Cooperative practice**

The students form pairs or small groups to discuss, write about, draw or act out their imagery. The children compare and contrast their images. They set goals for how they can improve the strategy and how imagery can help them in the future.

**Developing Vivid Mental Imagery**

**Text Processing Strategy (during the reading)**

Attend to detail through discussion by focusing on **WH** questions.

- **Who**
  - describe
    - relationship to one another
    - mood
  
- **What**
  - action or movement

- **Where**- **setting**
  - background
    - midground
    - foreground
  - sounds
  - touch
  - taste

- **When**
  - time of day

**Text Reorganisation Strategy (after the reading)**

- **Why**
  - focus on action and character perspectives.
  - relate to prior knowledge and feelings.

Keep the following three points in mind:

- Develop vivid imagery by discussing detail.
- Depict relationships.
- Denote objects and actions.
Notes

The WH Questions
The who, what, where and when questions are used to model and develop detail to intensify the mental imagery. The more vivid the images are the more effective they will be as a tool in aiding recall of story content and sequence during the retelling phase. It is important to model the questions so students will eventually internalise them as a self-questioning technique.

Discussing Detail.
The questioning will tend to relate verbal mental processes to the visual imagery. This is an important part of the process because it combines the visual and verbal elements of working memory. The discussion between the students and the teacher should help the students form inferential links with visual and verbal items in memory. In developing detailed mental images through questioning and discussion the teacher should try and assist the students to make associations with their own background knowledge as much as possible.

Depicting Relationships.
The most important aspect of the narrative is the relationship of the characters to one another and their relationship to the environment. By discussing who, what, where and when, those relationships can be established and developed.

Who questions should direct students to visualise the nature of the character. Would the character be old or young? Would he or she be wearing old clothes or new clothes? Does he or she have.........? Do you know someone who is like this character?

Do the main characters know one another? How do you know this? Do the main characters like each other? Why do you think this? Are they..........? How do they feel about one another?

Are they happy, angry, excited or ......?
The scene is important to the narrative and it may affect or emphasise the mood.

Denoting objects and actions.

What questions tend to develop inferences that are related to actions. When students learn to form images that incorporate movement, more associative connections are made in working memory. The more connections and the stronger those connections are, the more effective the recall is.

The where questions are concerned with objects, their surroundings and their relationship to the main characters. It is important to draw from familiar scenes and to build on what the child has experienced. For example, a student may be reading a story about a train tunnel but he or she may never have experienced being in a tunnel before, but they may have had a similar experience such as being in a cave or a very dark room. Analogies may generated by comparing and contrasting the student’s own background knowledge of similar situations with those suggested in the narrative.
Why questions focus on causal relationships and are concerned with actions. Character perspectives are also important to the understanding of causal relations and can be interpreted in the light of actions. Asking questions relating to how students would feel in a similar situation as a character in the story helps to create an understanding of character perspectives. This also tends to help the students comprehend motives and actions. How do you think would have felt? How would you have felt if that had happened to you? Have you ever felt like that? How was it the same and how was it different?

Section 2 adapted from “Comprehension of the Narrative” (Woolley, 1999).

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Overview
The issue of whether students with language learning disabilities (dyslexia) should learn a second language has elicited strong opinions both in Australia and overseas. Some educators and parents have believed that there was little reason to burden their children and students with additional unsuccessful experiences. On the other hand, others have argued that most students had much to gain from learning a second language. However, some researchers have cautioned that if students with dyslexia were to successfully learn a second language they would need curriculum differentiations and accommodations. Additionally, one of the more contentious considerations has been whether substitutions and exclusions should be allowed.

Introduction
In many states of Australia and America, and across the United Kingdom, the learning of a second language is a mandated (or soon to be) part of the school curriculum. Ganschow, Sparks & Javorsky (1998), Landmark College (2002), Scott (2002), Moore (1995), Cline, Ganschow & Reason (2000), Crombie (1997) and Wilcox (2002) maintain that in a global and multicultural economy the learning of a second language is an essential goal. Reasons given for this imperative are that it is crucial to compete in a global economy by allowing for wider and more successful access to employment and travel opportunities, that it broadens access to different cultures and that language contact across borders is expanding rapidly. However, LeLoup & Ponterio (1997) emphasise that the relevance of learning a second language must be made evident to students and their families. A broader view taken by Marcos (2002) claims that when students learn a second language their country enhances its competitiveness abroad while maintaining its political and security interests. Crombie (2000), speaking from a Scottish viewpoint, believes such learning would enhance her country’s identity and place within the European Community.

For students with dyslexia to be able to successfully participate and compete in an increasingly global economy it would appear that there are equity issues needing to be addressed by education systems and the schools who enact those policies. With schools in many countries providing the International Baccalaureate (IB) as an alternative education pathway, the requirement of a second
language for successful completion of the IB places demands on schools to assist students with dyslexia who wish to achieve this accreditation.

**Factors affecting the learning of a second language**

Ganschow, Sparks & Schneider (1995), Freed (1987), Schneider (1996), Scott (2002), Dyslexic.com (2002) and the British Dyslexia Association (2000) believe that students with dyslexia may find learning a second language more difficult than their not-at-risk peers. It is suggested that, because they have difficulties in their native language with attention, auditory and visual sequential memory, phonology/orthography, spelling, vocabulary retention, syntax and speed of processing, these problems will exacerbate their facility to learn a second language. Linked with this concern has been the question of when the learning of a second language should begin. Crombie (2000), Schwarz (1997) and the British Dyslexia Association (2000) believe that many students with dyslexia are expected to learn a second language well before they have proficiency in their native language and that lack of skills explains their difficulties with second language learning. However, Schneider (1996), Crombie (2000), Freed (1987), Landmark College (2002), Sparks, Ganschow, Kenneweg & Miller (1991) and the British Dyslexia Association (2000) maintain that a student more at risk is the one who has not yet been identified with dyslexia because their difficulty has been so subtle, it has been compensated for, or it has only become evident in later years of schooling when academic demands have increased. This, they believe, would lead to issues of low self-esteem and poor motivation rather than the other way around: that is, problems with unsuccessful second language learning lead to low self esteem and motivation. In support of this claim, Kahn-Horwitz, Roffman & Teitelbaum (1998) and Stanovich (1988), cited in Sparks (1995), believe that most students get by in primary school but are overwhelmed in secondary school by the demands and pace of the course, and the fact that they are expected to work independently. Landmark College (2002) adds another consideration when they state that many students with dyslexia have executive function difficulties with planning, prioritizing and time management and it is these aspects that may affect their capacity to learn a second language.

It would appear though that the most important variable is the degree of acquisition or proficiency in the native language. Ganschow, Sparks & Javorsky (1998), Bos & Vaughn (1998), Spolsky (1989) cited in Ganschow & Sparks (2000) and Sparks & Javorsky (1999) state that problems with learning a second language should not be viewed as an intrinsic element of having dyslexia, though Simon (2000) believes that a student with dyslexia would always have a gap between what they know and what they can do. In support of this belief, Sparks, Ganschow, Artzer & Patton (1997) argue that students with dyslexia would achieve lower levels of proficiency because of their weak native language skills. Stanovich (1988), cited in Sparks and Ganschow (1993), speaking of the ‘Matthew Effect’, suggests that poor reading skills and lack of reading experience would deter growth in the skills needed for learning a second language.
School policies and procedures

One of the primary considerations in determining school policies and procedures has been having a shared understanding of what learning a second language means. Internationally, the curriculum emphasis has been on understanding language and understanding culture and communication (Crombie 2000, Sparks & Javorsky 1999, EDWA 1999, Tasmania Education Department 2002, Roffman & Teitelbaum 1993 and Kahn-Horwitz et al. 1998). The challenge for schools then is to support their system with a formal, written policy about beliefs and practices that would provide an inclusive curriculum for students with dyslexia in all the required learning areas. Moore (1995, p5) believes that “schools with no clear policy ... must face the issue and formulate coherent, fair and legal policies.” One principal consideration for schools is what language/s to offer. Crombie (2000) and Miles (1999) maintain that some languages should be selected because they are more transparent and easier to learn. Because languages such as Spanish and Italian are phonetic, they would provide students with a more predictable phonological and orthographic structure. Wilcox (2002) believes that if second language learning is about values, world-views and culture, then sign language fits. The author maintains that the deaf community has a rich cultural life that is recognized and studied by anthropologists, ethnographers and folklorists. The Tasmanian Education Department (2002) and a number of states in America legitimate the use of sign language as a second language. Another significant factor is the consistency of access to the same language across levels of schooling. These guaranteed pathways would assist students with dyslexia to consolidate and build on their existing skills rather than have to change languages at points of transition (Tasmania Education Department 2002). Linked with this is the school timetable in which decisions about frequency and length of lessons may impact on their potential success. Students with dyslexia, where attention and auditory and visual sequential memory are a major factor, would be advantaged when offered more lessons in shorter time frames (Schneider, 1996, Roffman & Teitelbaum, 1993).

If language lessons were to be provided as part of an educator’s non-instructional time, there would be less opportunity for the language to be integrated into the class teacher’s general program. The British Dyslexia Association (2000) emphasises that schools need to recognise that learning a second language is a different type of learning from that of learning a native language because it is rarely by immersion, so progress would be slow. Additionally, the class teacher and the second language teacher would need to have time to share information so that the student with dyslexia would not be expected to use skills that were currently beyond their native language skills.

Substitutions and exclusions

One alternative exercised by some schools for students with dyslexia has been that of substitution or exclusion from learning a second language. A parent believing that, with limited literacy proficiency in the native language, there seemed little advantage in learning another language, could initiate this request. Alternatively, educators have suggested substitution or exclusion on the basis that the student should spend more time undertaking literacy remediation. Moore (1995) argues that substitution may frequently be worse than second language lessons if they make heavy demands on academic skills. The British Dyslexia Association (2000) caution that considerable thought should be undertaken before these decisions are made because, if students were withdrawn for a period of time there would not be an easy way to reintegrate later. Landmark College (2002) which undertook a three-year study to explore this issue, recommended that students could make significant improvements in their native language skills by learning a second
language. Therefore, exclusion might lock them out of the very instruction that could be beneficial in the remediation of their native language skills. In support of this claim are Kahn-Horwitz et al. (1998) who state that educators should not pull students out of second language lessons as they consequently miss out on the give and take of classroom routines that can create a gap that is very difficult to bridge. Crombie (2000) believes that exclusion of difficult-to-teach students does not encourage educators to be innovative in their teaching approaches. Additionally, Yates (1998) reminds educators that students should not be allowed to feel inevitably excluded because of their dyslexia. Crombie (1997) does stress that if teachers are going to pursue substitution or exclusion, they must provide careful and informed advice. This would entail considering the legal ramifications of enacting such a process.

The potential implications of exclusion are significant. It has been promulgated that if schools allowed exclusions across a number of years (given that learning a second language is often a mandated and required learning area) that education departments could be culpable because they had allowed the exclusion to continue. If parents had initiated the exclusion, then schools should have organised a written waiver outlining the potential negative outcomes for their child. The parents would sign this waiver and a copy be permanently kept in the school student record folder. The major issue appears to be the problem with informal, verbal agreements as they have no status, and potentially place the educator at personal legal risk. Exclusions in Great Britain are for Statemented students where full consultation and documentation has occurred, while in some states of America, where it has been tested in the courts, it is illegal to exclude a student with dyslexia from learning a second language (British Dyslexia Association 2000, Sparks & Javorsky 1999).

Supportive teaching approaches
Given that learning a second language is often a required area of study in many countries, the challenge for educators is to utilise respectful and considered methodologies that acknowledge the language learning difficulties of students with dyslexia, while not watering down the content. Overwhelmingly, researchers state that the most successful approach for these students is one that uses a balanced approach combining direct instruction with realistic communication experiences. (Simon 2000, Schneider 1996). Supportive lessons would have the educator stating the intended outcomes, relating new information to prior knowledge, providing structure, multi-sensory activities, explicitness, high levels of repetition, a slower pace, and regular reviews (Ganschow et al 1995, Sparks et al 1997, Freed 1987, Landmark College 2002, Schneider 1996, Jameson 1999, Roffman & Teitelbaum 1993, Crombie 2000, Barr 2002, RCLD 2002, Marcos 2002, Root, 1994). Additionally, with an emphasis on the development of metacognitive strategies, researchers argue that most students with dyslexia would be well placed to have successful learning experiences. An outcome of action research by Sparks, Arzt, Miller, Hondubay & Welsh (1998), Sparks & Miller (2000), Schneider (1996), Landmark College (2002) and Schwarz (1997) was the belief that implementation of the Orton-Gillingham method, and practices that encouraged the use of multiple intelligences, would provide a sound and successful second language learning experience.

This strong emphasis on the use of an explicit teaching cycle has implications for educators who use only an immersion approach. RCLD (2002, p 1) state that a 'naturalistic approach is unlikely to work' while Ganschow et al. (1998) claim there is no evidence that natural
communication methodologies are more effective in teaching the written and oral aspects of a second language. Sparks & Ganschow (1993), Yates (1998), Ganschow & Schneider (1999), Landmark College (2002), Schneider & Ganschow (2000) and the British Dyslexia Association (2000) support this claim on the grounds that students with dyslexia find it difficult to intuit the language patterns without explicit instruction and therefore the use of exposure only, of the oral and written code, puts them at risk. Yates (1998) and Landmark College (2002) also maintain that while ideologically the educator might want to teach the entire lesson in the target language, this is not advisable as the educator needs to use English for explanations because students with dyslexia have difficulties with auditory sequencing that would make it difficult to follow a ‘torrent of words that they can’t identify or understand’ (Yates 1998, p13). It would appear then, that teachers who provide language lessons based on incidents as they arise, would not be establishing a supportive learning environment for those students with dyslexia in their class.

Implications for teachers

LeLoup & Ponterio (1997, p2) believe that, with the move to inclusion, ‘there’s a radical change in student populations in schools and that second language teachers are ill prepared to fulfill their needs,’ while Sparks and Ganschow (1993) argue that very few second language educators adapt curriculum for students with dyslexia. Landmark College (2002, p. 6) comment that “many classroom procedures are the true impediments of learning” and that the onus for change must be on the educators and institutions rather than the students. If these students are to successfully engage with second language learning they need educators who will make the learning of a second language as appealing as possible. Crombie (2000), Roffman & Teitelbaum (1993) and Root (1994) believe that this could best be achieved by teaching in themes.

While differentiations could be deemed to be just good teaching practice, Landmark College (2002) and Moore (1995) suggest that teachers of a second language have indicated they do not feel qualified to teach these students. Recognising that this is a significant issue, Quantrell (2000) and Crombie (2000) state that it is not enough for educators to battle on in isolation and that it is essential for them to have access to professional development within and outside the classroom. This professional development could be by way of face-to-face conferences, networks, mentoring or through the use of technology. While the focus of professional development might be on specific methodologies, there are other factors that can impact on the educator’s potential success. Firstly, they need to provide an environment that is non-threatening where students are willing to take risks. Secondly, they need to control their speed of speech (Jameson 1999), extend their wait time after asking a question and recognise that on some days students with dyslexia just cannot do it (Barr 2002, Bos & Vaughn 1998). Simon (2000, p167) challenges employers of second language educators when it is suggested ‘students with dyslexia have great difficulties comprehending the speech of teachers who aren’t native language speakers of the second language.’ Essentially, educators need clear pedagogical and curriculum guidelines for working with these students, a focus on the provision of quality instruction and a transparent and differentiated process to assess the success of their program (Landmark College, 2002).

With a requirement to monitor learning growth through the collection of data, Barr (2002) & Jameson (2002) argue that differentiated assessment processes must reflect the achievement of students with dyslexia and not their disability. Moore (1995) and Yates (1998) argue that, in a testing situation, for these students to show what they know, it is important to use a range of processes such as the provision of extra time, alternative test formats and no penalty for spelling
errors. This is supported by Root (1994), Barr (2002), RCLD (2002), Ganschow & Schneider (1999), Simon (2000) and Freed (1987). Crombie (2000) believes that educators would need to provide varied levels of questioning and to select a range of information gathering options by observing processes and products within a contextualised framework. Bos and Vaughn (1998) emphasise the importance of responding to the message and not the correctness of the pronunciation or the grammar.

**Dyslexia, technology and second language learning**
The use of technology is considered to provide advantages for students with dyslexia as it alleviates demands placed on their auditory and visual processing skills. While Keates (1999) believes that there is not yet much dedicated software to support students with dyslexia who are learning a second language, he suggests that educators need to think creatively and adapt current software. However, there are programs that read and vocalise texts in other languages word by word or by phrases, dictionaries that translate, foreign language spellcheckers, tape recorders with slow button options, captioned video materials and interactive CD ROMs (Crombie 2000, Jameson 2002, RCLD 2002, Simon 2000, Root, 1994, Landmark College 2002). The issue for use of technology with these students is their capacity to manage the speed of speech, to successfully read and follow instructions, and the cost and maintenance of the software.

**Considerations**
Students with dyslexia need high levels of perseverance and an acceptance of errors when learning a second language. Many are aware of their difficulties in their native language and may well anticipate failure. However, while some students may be unsuccessful, it would appear that most can learn a second language to some degree (Simon 2000, Ganschow & Schneider 1999). As with any learners, they may require a continuum of differentiations that counts them in, not out, of one of the mandated learning areas of their school curriculum. It should be a rare situation that a student with dyslexia would be excluded from their curriculum entitlement.

While some research has been undertaken, Ganschow & Sparks (2000, p 94) believe there should be possibilities for collaborative research on dyslexia and second language learning from a global and cross-cultural perspective and that ‘linguists and dyslexia educators need to work together to understand differences between languages in order to be able to diagnose problem areas in both languages.’

**References**


CHAPTER 8


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Overview
This chapter presents an overview of the practitioner research I am currently completing as part of my Doctorate in Education. This research is focusing on the challenge of diversity as it translates into implementing inclusive practices across two secondary school contexts. I have undertaken this research in my role as a Learning Support Teacher (LST) over a period of five years. A number of generalisable propositions are emerging from this research that inform the strategies I am using to challenge the development of an inclusive culture for all students that will cater for diverse learning needs within the regular classroom.

Introduction
Increasingly, schools are being asked to meet the challenges of providing inclusive classrooms for children with special needs (Putnam, Spiegel & Bruininks, 1995; Westwood, 1993). This has been in response to a world-wide acceptance of the philosophy of inclusion (UNESCO’s, Salamanca Statement, 1994) and research supporting the inclusive education position (Wills & Jackson, 2000). The question is no longer whether inclusion should be a practice, but how best to implement an inclusion model.

The definition of ‘special needs’ has been, and still is, undergoing change (Chan & Dally, 2001; Kraayenoord & Elkins, 1994; Slee, 1995). Special needs has been associated traditionally with students categorised as those with physical disabilities, behaviour and emotional problems (Westwood, 1993). In more recent times, special needs has come to include those students who are gifted and talented and those from culturally and linguistically diverse backgrounds (Lewis & Doorlag, 1995).
The move to cater for students with diverse learning needs in mixed ability classrooms has moved the focus from inclusion as being a special education issue to one involving ‘the broader context of school restructuring’ (Soodak, Podell & Lehman, 1998).

Part of this restructuring has come to include the provision of a differentiated curriculum to cater for the diversity of student learning needs (Westwood, 2001, p.5). This is an approach to teaching which provides students with a number of different options for learning. Westwood (2001) summarises what differentiation can look like; changing curriculum content, changing teaching and learning processes and changing the expectations for what students produce. Differentiating the curriculum does not necessarily mean one-to-one instruction but is in contrast to the ‘one size fits all’ curriculum. The processes for delivering a differentiated curriculum are learner focused. Placing the learner at the heart of learning also invites changes in the role of the classroom teacher and the Learning Support teacher (LST). Lipsky and Gartner (1987) suggested that ‘the teaching skills inherent in the concept of quality education are ones which are required by both general and special education teacher’ (p.71).

To achieve a differentiated curriculum within a secondary setting represents major efforts to change schools in fundamental ways. An under-researched area has been the process of implementation of inclusive curriculum within the context of complex school organizations (Fullan, 1991; Hargreaves, 1994; Trent; 1998). Trent (1998) explains ‘not only must researchers present success stories in their findings, but they must also tell stories about the failures experienced by implementers who attempted to serve students with and without learning disabilities across a range of settings’ (p.1).

This paper outlines my practitioner research across two secondary school settings. This research has identified factors that have both enhanced and impeded attempts to move beyond ‘cosmetic changes’ to improve instruction for all students. My practitioner research continues to articulate the contentious, complex and contextual nature of implementing inclusive practices within secondary school settings. A number of propositions are emerging from this research that inform the strategies I am using to challenge the development of inclusive cultures for all students in my teaching context and may be instructive for educators facing similar challenges.

‘Insider/Outsider’: Practitioner Research
Practitioner research has been described as simultaneously engaging in workplace practice and research-orientated practice (Brennan, 1998). The position of the researcher becomes one of both ‘insider’ and ‘outsider’ to the research context. Anderson and Herr (1999) suggest that from an ‘insider’ position a practitioner can contribute knowledge that may not be attainable from other ‘outsider’ research.

My practitioner research has involved linked studies of two secondary girls’ schools run by religious orders. Gummesson (2000, p.14) refers to the researcher’s number one challenge as having ‘access to reality’. My position as a LST in both school contexts gave me the opportunity of accessing real-world-data and as such I am undertaking this research as an ‘insider’. In addition, my enrolment in the professional Doctorate brings ‘outside’ practices to this research study.
School Settings
My practice as a LST in both school contexts involved issues of special needs and, in particular, issues relating to inclusion and inclusive classroom practices.

My LST position in School A spanned from the beginning of 1997 to the end of 1998. School A had a well-established Learning Support Department of five teachers, which included a Head of Department. A Policy of Special Needs had been written. There were approximately 200 students enrolled in the primary area and 500 students in the secondary area (Years 8-12). There were ascertained students in the areas of Intellectual Impairment, Speech and Language Impairment and Hearing Impairment as well as non-ascertained students with diverse learning needs.

My LST position in School B commenced in 1999. Prior to my appointment, School B had not previously employed a LST. School B caters for secondary students only and has a similar number of students in the secondary area as School A. There have been ascertained students in the area of Hearing Impairment and there are non-ascertained students with diverse learning needs.

Making sense of an uncertain situation: Action research
Action research has been used in many areas where an understanding of complex social situations has been sought. A definition of action research that resonates with my research study is that of Lomax (1990):

‘Action research is an intervention in our own practice intended to bring about improvements. The intervention is research based because it involves disciplined inquiry. The improvement encompasses our current practice, our understanding of it and the contexts in which it happens’ (p.11).

In both school contexts my initial response to understanding each context was to ask myself, ‘How does this system work?’ (Dick, 1997). There were issues and questions that were arising from an intuitive concern that the ideology informing my construction of disability was different to the one operating in both schools. I believed that by deconstructing the school’s construction of disability, my learning support practice and communication with teaching staff and Administration would be better informed.

I have used iterative cycles of action research consisting of planning, acting, observing, reflecting. I have drawn from several models to inform my action research: Bawden’s (1991) model of a learning system, the iterative cycles which are common place to action research expressed in the Kemmis and McTaggart’s (1988) model and I have used McNiff’s (1988) side spiral to similarly indicate the side spirals of my research. The emergence of this methodology has been in response to an uncertain situation involving changing definitions and difficulties in implementing inclusive practices.

Data, Data Collection and Data Analysis
Practitioner research involves professionals legitimating knowledge ‘produced out of their own lived realities (Anderson & Herr, 1999). The data for this study has been collected in the context of practitioner research (Bassey, 1999; Cole & Knowles, 2000; Holly, 1997; McNiff, Lomax & Whitehead, 1996). My teaching practice necessarily invites data drawn from direct observations of teacher practice, conversations with teachers and students and relevant documents (Bassey,
1999; Coles & Knowles, 2000; Connelly & Clandinin, 1999; Miles & Huberman, 1994). Published literature has also been used as data (Brown, 1994, p.6). I have engaged with literature as my research into practice progressed to affirm and/or critically reflect on the assumptions I was making about my particular situation. As such, literature can also be seen as data which affirmed or disconfirmed my study (Winter, Griffiths & Green, 2000, p.28).

The data collected was recorded in field notes. The field notes are a mixture of both records of the event and my reflections. The field notes were used to interpret and reconstruct events and these field notes appear, ‘processed’, as a reflective Journal Entry for a particular event (Miles & Huberman, 1994, p.9). The reflective research journal records events that occurred, my understandings of the situation, reflection and action plans, literature that guided action plans, direct observations, conversations, written documents and artefacts.

My journal writing provides evidence of my reflections on events and reveals a process of my own learning. These critical reflections on events have been analysed in the light of literature in the areas of special needs education, change management and technology. My research journal continues to be revisited as new literature emerges and as I continue in the Doctoral program.

The data collected is in a continuous process of being analysed on a number of different levels. These levels of data analysis have not necessarily been sequential. The levels of data analysis have included

- Analysis during data collection
- Communication of the Data
- Processing field notes into a reflective Journal Entry
- Critical reflection in the light of multiple bodies of literature and practice
- Cross-referencing and hypertext to identify connections, patterns and themes
- Identifying propositional judgements

This paper will focus on the emergent propositional judgements that I have found to impact on the implementation of an inclusive curriculum in two secondary school contexts.

**Emergent Propositional Judgements**

As the reflections on my Journals progressed, a number of tentative categories have emerged (Glaser & Strauss, 1967; Guba & Lincoln, 1994; Miles & Huberman, 1994) which helped me move from a tacit understanding of the categories to propositional judgements. I have called them emergent propositional judgements. They were ‘emergent’ because the analysis of the data is still incomplete and there is the possibility that other judgements may be identified. They were ‘propositional’ because the data is being drawn from two particular school contexts. I am not suggesting they are predictive for all school contexts. They were ‘judgements’ because these statements reflect current end points in my practitioner research and not an accumulation of facts.

---

1 Literature I have recently accessed has affirmed the propositional judgements outlined. This has included ‘The Queensland School Reform Longitudinal Study, 2001; Carrington, 2002 (a), 2002 (b).
that can be drawn on for the implementation of inclusive education in all school contexts. In this sense they are generative not generalisable.

My research suggests emergent propositional judgements that I have found to impact on the successful implementation of a whole-school inclusive curriculum in two secondary school contexts. These propositional judgements reflect both the success stories and the failures experienced as part of my practitioner research in moving towards an inclusive curriculum that would serve students with and without disabilities in two secondary school settings. In this paper I am not suggesting that a whole school inclusive curriculum has been achieved in each of the research contexts using these propositional judgements. There are currently seven emergent judgements that have guided my practice as a LST in moving two particular secondary school contexts towards a more inclusive culture.

1. **School communities need to share a common understanding of equity**
2. **The School Principal must provide overt leadership in moving towards an inclusive school culture.**
3. **A Whole-school Approach is needed to narrow the gap between ‘inclusion’ rhetoric and classroom practice.**
4. **Pedagogical reform is the most effective strategy for catering for diverse student learning needs.**
5. Differentiating curriculum is achieved when collaborative planning teams develop appropriate units of work.
6. **School communities need to make a commitment to gather, share and manage relevant information concerning students.**
7. **The Learning Support teacher needs to be repositioned within a curriculum planning team.**

**1. School communities need to share a common understanding of equity.**

The problem with the meaning of equity is that it has come to mean different things to different people. For example, in both research contexts there was evidence that the meaning of equity could be related to access, access plus resources, fairness, sameness or equal treatment. This view was particularly evident when it came to organising and administering special considerations for students with diverse needs in times of assessment. In both school contexts, special considerations were predominantly offered as extra time and an alternative setting for the particular assessment item. The test instrument and the reporting was the same for all students.

This view of equity resulted in a ‘one size fits all curriculum’, school being ‘just’ a place to be for some students for whom the curriculum was not suitable. To achieve a differentiated curriculum, this understanding needed to move towards accepting and understanding ‘difference’. Forlin, Douglas and Hattie (1996) suggested that ‘a movement towards greater promotion of human rights for children with a disability by inclusion in regular classrooms is not necessarily reflected by a more positive attitude and greater acceptance by educators’ (p.124).

Acceptance of students with disabilities has been closely linked with teachers’ attitudes to inclusion (Carrington, 1999; Carrington & Elkins, 2002; Forlin, Douglas & Hattie, 1996; Scruggs & Mastropieri, 1996). Matching inclusive policies and practices is impossible if the essential beliefs and attitudes of teachers are not supportive of principles of social justice and equity.
Teaching practice and school culture rests on personal views concerning social justice issues and will ultimately determine whether a school will become what Rosenholtz (1989) refers to as a ‘moving school’.

Literature and my practitioner research suggest a number of factors why teachers may be out of step with current principles of social justice and equity;

- Teachers lack the knowledge and understanding of how legislation is reflecting a changing construction of disability and difference (Idol, 1997; Scruggs and Mastropieri, 1996).
- Teachers may be aware of current constructions but believe they do not have the appropriate knowledge and skills to deal effectively with students with special needs in the classroom (Carrington, 1999; Dovey & Graham, 1987; Elkins, 1994; Munson, 1986; Schumm, Vaughter, Gordon & Rothlein, 1994).
- Teachers may have the knowledge of current social justice principles but their assumptions and values do not coincide with current thinking (Center & Ward, 1987; Forlin, Douglas & Hattie, 1996; Bender, Vail & Scott, 1995; Wilczenski, 1992).

Teacher attitudes contribute to not only different instructional strategies in the classroom but also different collaborative or consultative relationships with a LST. Negative attitudes towards inclusion can be directly linked to less frequent use of effective instructional strategies to facilitate inclusion (Bender, Vail & Scott, 1995). Clark and Peterson (1986) argue, ‘when implementing a significant curricula, organisational or instructional change, teachers’ belief systems can be ignored only at the innovator’s peril’. In one school context when a teacher was alerted to the fact that her class had a number of students with significant, diverse learning needs she was heard to say, ‘those people do nothing but lower the standards and continue to lower the standards the more time we have to spend on them and they contribute nothing’.

For a LST to support both teacher and students with diverse learning needs within the classroom, teachers need to share a common understanding that equity does not mean the same. To engender this shared, common understanding of equity, the LST needs significant involvement from the Principal.

2. The Principal must provide overt leadership in moving towards an inclusive school culture.
A principal must be seen to be open, visible and collaborative in defining a school's policy for inclusion. A school's policy should reflect a shared vision of both the Principal and teachers. A 'top-down' policy approach where policy 'gets done' to people will not move a school towards an inclusive culture if the underlying values, perceptions or assumptions of the policy writer are out of step with teachers' current understandings of inclusion. In context A, a Special Needs policy had been written by the Deputy of Curriculum who had a background in special needs. On reading the document, the preconditions for inclusive education were present; an awareness of relevant legislation and a commitment to catering for the needs of individual students. Working with teachers, it was apparent that teachers were not aware of the policy, current trends in inclusive education nor were they aware of the implications of ascertainment and accountability issues. This was an example of a 'top-down' policy approach that resulted in little change in teaching practices in the classroom. In Context B, there is currently no written policy but the Principal is aware of my position concerning catering for students with diverse learning needs as evidenced by my clear
position statement presented as part of the interview process for the position of LST. There was an assumption on my part that on receiving the LST position that this was a position also shared by the Principal. Sharing this position with teachers and eliciting the position of teachers has been problematic without a policy or an overt exposition by the Principal.

Educational leadership is ranked as the number one key variable associated with effective schools (Algozzine, Ysseldyke & Campbell, 1994; Van Horn, Burrello, DeClue, 1992) and the principal’s attitude toward special education influences the success in the provision for students with diverse learning needs (Burrello, Schrup & Barnett, 1992). Rosenholtz (1986) asserts that the "hallmark of any successful organization is a shared sense among its members about what they are trying to accomplish. Agreed upon goals and ways to attain them enhance the organisation's rationale for planning and action'. Without an articulated vision of inclusive education for the overall school, goal setting cannot commence.

My practitioner research identified a number of overt factors of a Principal’s leadership that can either facilitate or hinder the effectiveness of a LST in moving a school towards a more inclusive culture:

- LST’s are more effective if there is a clearly defined inclusion policy that addresses the core beliefs that all students can learn when instruction is relevant and appropriately paced and placed and that classroom teachers are responsible for all students’ learning.
- LST’s are more effective if the policy has been collaboratively written and that includes a clear articulation of the role of the LST.
- LST’s are more effective if they are positioned within a curriculum planning team
- LST’s are more effective when there is time-tabled collaboration time with support staff and class teachers for consultation and unit planning.

In order for schools to be receptive to catering for diverse learning needs, a Principal may need to transform an existing school culture. This may mean engaging teaching staff in direct and frequent communication about cultural norms, beliefs and values. 'When a school defines its philosophy on inclusion, it sets the parameters for determining its approach to curriculum, instruction, planning, teacher support in terms of budgeting for time, materials and communication with parents' (Vaidya, 1997). Without shared core beliefs as central to a whole-school approach, there will be a gap between inclusion rhetoric and classroom practice.

3. A Whole-school Approach is needed to narrow the gap between ‘inclusion’ rhetoric and classroom practice.

A whole-school approach is in contrast to the view that inclusion is a separate task that solely involves the LST. Learning support teachers frequently hear comments from other teachers that refer to, ‘one of your students’. It was heard in one school context that ‘we cater for the needs of the individual, we have a LST’.

From the position of ‘insider’ researcher in school contexts, there is the opportunity to gauge the gap between the rhetoric of inclusion that can be read in a school’s policy document and mission statement and the practice of inclusion within classrooms. In both school contexts, policy documents or mission statements clearly stated that a comprehensive range of educational programs would cater for the needs of the individual student, suggesting that a whole-school
approach was in place. Observing practices and discourses in both contexts suggested practices such as whole-class, teacher directed instruction dominated. Use of instructional practices that are characteristic of inclusive classrooms, such as flexible grouping, cooperative learning, peer support and activity-based learning were not present. Differentiation of instruction relevant to student needs was not evident nor the use of alternative curricula or adapted grading criteria. There was an absence of learning support teachers in the secondary classrooms and collaborative planning with teachers and support teachers.

The gap between ‘inclusion’ rhetoric based on social justice principles and the reality of school and classroom practice is demonstrated by such authors as Carrington and Elkins (2002); Clark, Dyson, Millward and Robson (1999), Slee (1996) and Vlachou (1997). This discrepancy places a LST in a position within a school environment where they have to 'feel around' for individual teachers who are like-minded in their attitudes and beliefs concerning students with diverse learning needs. My practitioner research suggests there are limitations to this model of learning support;

- In a secondary context a student may have as many as eight different teachers across a number of different subject areas. Some teachers may be willing to work collaboratively with the LST and some may not, leaving a student unsupported in some areas of the curriculum.
- If a school has only one LST in support of a large number of pupils, the LST can only provide a limited service to students or groups of students on an individual basis.

The success or failure of a whole-school approach will ultimately depend not only on the attitudes of each teacher within the school but also on the skills of each teacher (Ainscow & Florek, 1989).

4. Pedagogical reform is the most effective strategy for dealing with learning problems.
Research has and is generating reliable knowledge about effective instruction of students with disabilities and other diverse learning needs (Bulgren & Lenz, 1996; Tralli, Colombo, Deshler & Schumaker, 1996). Pedagogical reforms that have emerged from such research have included the need for:

- Scaffolded and focussed pedagogical strategies for specific groups of students (Education Queensland, 2000).
- Ongoing and continuous professional development in developing and using these repertoires within a whole-school program because the use of effective instructional practices is one of the most consistently cited conditions associated with successful inclusion (Lipsky & Gartner, 1996; Schaffner & Buswell, 1996).

In neither school context has there been a clearly articulated agenda of pedagogical reform.

Research (Montgomery, 1990; Westwood 1995) and my practitioner research confirm that the most important resource to improve learning outcomes in the classroom is the classroom teacher. This becomes problematic because literature and my practitioner research suggest that:
• Teachers may not believe their teaching methods and strategies significantly affect the learning outcomes of their students but believe students' success and failure in the classroom are to do with aspects beyond their control (Westwood, 1995).
• Classroom teachers have difficulty adapting curriculum and resources for varying student ability levels, even though they may acknowledge that changes are needed (Giocelli, 1995; Schumm & Vaughn, 1995; Wang, 1992; Westwood, 2001).
• Teachers feel their previous training and experience may not have prepared them for students with special needs (Gibbons, 1998).

Addressing these fears, anxieties and supporting skill development, so that catering for diverse learning needs in the classroom works for teachers too, can be facilitated by teachers collaboratively planning units of work that would more appropriately support students with diverse learning needs within the classroom.

5. Differentiating the curriculum is achieved when collaborative planning teams develop appropriate units of work.

To present a learner-focused, as opposed to a 'one-size fits all' curriculum, requires a teacher to differentiate curriculum for individuals or groups of individuals. This may include different ways to take in information, differing amounts of time to complete work, different levels of thinking, different assignments, different means to assess what has been learnt.

In a secondary context, this requires teachers to establish core elements that all students will cover and design a program that provide different options for learning. Effective differentiation draws on such frameworks as Cognitive Objectives, Bloom (1956); Multiple Intelligences, Gardner (1993) and Dimensions of Learning, Marzano, Brandt, Hughes, Jones, Presseisen & Rankin (1988).

In School Context A, a successful unit of work was collaboratively designed for a class of Year 9 Maths students. A number of students in the class had learning difficulties and a history of behaviour problems. A framework of Bloom and Gardner's Multiple Intelligences was used to design a unit in Statistics and Probability that included such teaching strategies as learning centres and self-paced group work. The emphasis was away from teacher directed learning and the tasks and activities emphasised real-life situations and data. While this was a success as an instance of collaboration and it did improve the behaviour of the class, it was seen by some members of the maths Department as an unnecessary use of in-school time. Their perception failed to acknowledge the importance of collaboration with the LST or the time needed in order to effectively collaborate.

Collaborative planning teams assist teachers and support staff to access and clarify information concerning students, share skills, expertise and creativity and establish responsibilities. There is no one way to operate but in order to devise learner centred strategies there needs to be available knowledge about those learners. As Young (1995) concludes: 'the more comprehensive the classroom package is, the more likely it will be to locate the best starting point for intervention' (p.10).
6. **School communities need to make a commitment to gather, share and manage relevant information concerning students.**

Secondary teachers can be teaching as many as six classes in one day across a range of subject and year levels. This has implications for a classroom teacher to meaningfully observe and evaluate a student’s performance in a number of situations using a number of different techniques and devices. For teachers to enhance student performance and move away from a ‘one size fits all’ curriculum, they need knowledge concerning a student’s level of skill, learning difficulty/disability, attitudes and interests. This information needs to be in a format that is not overwhelming in its detail or complexity but is sufficient for a teacher to use as a baseline to meaningfully guide the planning of a differentiated unit of work.

Recognising and articulating the diverse range of student needs that may be present within a particular classroom carries the risk for teachers of labelling and stigmatising students. Alternatively, a lack of information on the teacher’s part can contribute to the cause of incompatibility between teaching methods, curriculum and the characteristics of students. Accountability, litigation and the increasing trend towards inclusion suggests relevant information gathering and sharing is a ‘mandatory’ given in our current school contexts.

There are a range of strategies that a LST can use to share information with staff. These can include approaching staff individually concerning students or providing information to class teachers as students enter the secondary setting. These strategies become problematic for LST’s as student needs may change, students move from one year level to the next, from one teacher to the next especially where a school structure supports a unitised curriculum. Creating a file that teachers can access can overcome some of these difficulties but is time consuming to manage and update.

LST’s can efficiently share information using school computer networks. Information in this format can be readily accessed by all teachers when they require and the information can be easily updated. There are a number of factors that need to be present for the development of such a school-based information sharing system. The LST, in most school contexts, has access to the information that individual teachers need but may not necessarily technology literate. There needs to be a commitment from the Principal/Administration that there is a recognised need and structures to be put in place for the support of an Information sharing system. LST’s need the support of Technology personnel in setting up/creating/maintaining such a system. The use of technology for some teachers is a barrier to accessing the information.

In response to the reality that many schools may not have technology personnel or school network systems or learning support teachers with the relevant technology skills, my practitioner research led to the creation of a commercial CD that could be generic in its approach across school contexts and did not require advanced technology skills.

7. **The Learning Support teacher needs to repositioned within a curriculum planning team.**

The dilemma for the practice of learning support is to position so that the knowledge that they have can be accessed by different stakeholders in the school so as to work towards and provide a service delivery model of support that suits both the diversity of student needs and the skills and attitudes of teachers within a particular school context. A LST needs to be accessible to carry out
the processes of inclusion but the lack of a shared, common understanding of equity can place the LST amidst a number of tensions.

These tensions generate several equity questions that will inform my ongoing practitioner research:

- What is responsible inclusion?
- Keeping place in perspective for student, teacher and LST?
- Can difference and disability be acknowledged without labels?
- Where are the curriculum and pedagogical deficits within school practices?

The boundaries have changed in which a LST must now operate. The LST needs to function within a team which ideally involves the school counsellor, curriculum subject leaders and most importantly, school administrators. This interdisciplinary team approach would allow the LST a collegial authority that would facilitate the valuing of their ideas and opinions. This approach provides a collaborative venue for organising, implementing and evaluating support structures within a school. A team structure would allow a LST to have an effective voice in recognising, articulating, examining and guiding the nature of these tensions so as to move a school towards a shared understanding of equity that would enhance what Rosenholtz (1989) refers to as a ‘moving school’.

Slee (1996) concludes in his article, Inclusive schooling in Australia? Not yet! ‘that there might well be a future for inclusive schools, but they aren’t the ones we presently know and subscribe to’.

My practitioner research, as part of my Doctoral work, is proposing a set of generative judgements that should not be considered in isolation, but rather as a set of interrelated in the aggregate as part of a change process towards an inclusive school culture.

References


CHAPTER 9

Difficulties in Mathematics: Errors, Origins and Implications

George Booker
Griffith University

Overview
Students inevitably make many types of errors throughout their mathematical development as they struggle with new ways of thinking and generalisations of concepts and processes. Many of these are sourced in inadequately developed early concepts, the language used to talk about them, and the use of symbols without meaning. Topics taught in isolation frequently lead students to make inappropriate generalisations of thinking from one domain to another. In contrast, mathematical thinking which links a few powerful ideas across the whole content allows students control over the processes they apply and the ability to use their understanding in new and productive ways.

Difficulties in mathematics
Work with students experiencing difficulties in learning mathematics (Booker 1999a, 1999b, 1995; Ma 1999) has shown these have often been brought about by the teaching program the students have experienced rather than any innate mathematical learning difficulty. For example, an ability to visualise what is occurring may not be present because materials have not been used in the initial development of mathematical ideas or linked to the written and mental processes they are supposed to build up. Yet an understanding of place value and the way it is used in the computational processes for each operation is critical to success. Similarly, a language without any recourse to the mathematical thinking that is needed often accompanies procedures which then have no sense in themselves. Such an approach to teaching and learning mathematics, where there is a reliance on rules that have no backing in terms of place value or where the language cues detail what is to be done without linking to the underlying concepts, calls on only a 'pseudo-conceptual' understanding. For example, when several numbers are to be added

```
3 8 6
4 7 9
6 9 4
+ 5 7 8
```

instruction may focus on 'add column by column' and use words such as 'put down' and 'carry'.

There are many other 'rules' without intrinsic meaning that have contributed to difficulties in learning mathematics. For example, students are often told to multiply or divide numbers by a power of ten by 'moving the decimal point'. Yet a consideration of the underlying

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1 This chapter is reprinted with permission from the MAWA (Math Association of Western Australia).
process via a *number slide* shows that it is the digits which move as their value increases or decreases:

![Diagram showing number slide](image)

Difficulties like these occur as a result of what has been done at school so a student can hardly be held responsible and termed learning disabled. It needs to be acknowledged that many students have *learned difficulties* rather than learning difficulties. As Ma (1999) points out, the view of learning mathematics based on pseudo-conceptual understanding held by a teacher is a major contributor to students' lack of success in mathematics.

Ma 1999 p.23

In contrast, a language that grows out of the manipulation of materials and provides meaning at a student’s level gives direction to the processes and allows the student control over the symbols that are used in recording. This draws on conceptual understanding of the subject as a whole, linking concepts with basic fact strategies, using numeration ideas to direct the cycle of steps and build the extended facts (eg where $14 + 8$ is seen to be 10 more than $4 + 8$. It also requires the renaming of numbers, a concept that is often not discussed at all.

Place value is crucial to number understanding, so that 4 tens 8 ones is 48 or that 246 is seen as 2 hundreds 4 tens 6 ones. But numbers also need to be renamed so that number processes and problem solving can be carried out more directly. These alternative representations can be developed through the use of base 10 materials:
tens | ones
---|---
|| | . . . .
*or*
|| | . . . .

48 can also be viewed as 3 tens 18 ones or 48 ones

<table>
<thead>
<tr>
<th>hundreds</th>
<th>tens</th>
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</table>
| || | . . . .
*or*
| | | . . . .

or

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<tr>
<th>ones</th>
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<td>. . . .</td>
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or

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or

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248 can be interpreted as 1 hundred 14 tens 8 ones, 1 hundred 13 tens 18 ones, 24 tens 8 ones or 248 ones

Later, they can be consolidated with a number expander which can be unfolded to see the various ways in which a number can be renamed: It is particularly important that a number such as 208 can be renamed as 20 tens 8 ones.

For example, division with larger numbers is a process that has often been a source of difficulty for students and their teachers. Yet an analysis of what is required highlights that most of these concerns are really sourced in learning that has been assumed prior to the introduction of division.
Can you share 6 thousands among 9?
No – rename and share the hundreds
Can you share 63 hundreds among 9?
Yes – 7 each. 63 hundreds were shared out
Can you share 7 tens among 9?
No – 0 tens each. Rename and share the ones
Can you share 74 ones among 9? Yes – 8 ones each.
72 ones were shared out and 2 remain.

Division is fundamentally concerned with sharing – the largest place is shared first

A cycle of meaningful steps centres round the notion of sharing (Booker et al 1997). Numeration drives this process, sharing place by place and using an understanding of renaming when a place cannot be shared. The only other understanding that is needed is the use of the nearest multiplication fact:

```
Place value
Rename
Basic facts
```

An approach to teaching number understanding and computational processes, then, needs to focus on fundamental, connected ideas so as to minimise uncertainties in using and applying mathematics. Such a conceptual overview to the teaching and learning of mathematics has also been highlighted by Ma (1999). In contrast to the procedural view often seen in classrooms, it calls on a good structural understanding of the subject, and links the various concepts and ways of thinking to give a full understanding of the processes being developed. Above all, it is this conceptual overview on the part of their teachers that provides an explanation for the superior performance of many students:
On the other hand, it is still possible that some children will form misconceptions as a result of missing crucial steps in a developmental sequence despite appropriate and well-focused teaching. This can occur because of the inconsistencies inherent in and between the processes, due to students being absent at crucial times or because the underlying ideas are not present to be generalised to new topics. Consequently, there is a need to be aware of the patterns of errors that children are likely to make, possible reasons for them and means to overcome or avoid them.

Errors in mathematical thinking

The errors that students make usually follow particular patterns. Indeed, it is more likely that their errors are deliberate, in that they occur as a result of thinking that a student believes is likely to get a correct result, than careless where a one-off slip leads to an incorrect response. For example, a very common subtraction difficulty is:

\[
\begin{array}{c}
72 \\
-38 \\
\hline
46 \\
\end{array}
\]

Often this is described as a reversal error or it is said that the smaller number has been taken from the larger. Yet these are procedural descriptions, whereas a conceptual view is that the meaning of the subtraction situation has been ignored and no renaming has occurred. In other words, 72 has not been viewed as 6 tens 12 ones which would allow the subtraction to be carried out appropriately.

On the other hand, an example such as

\[
\begin{array}{c}
6702 \\
-368 \\
\hline
244 \\
\end{array}
\]

is not so readily detected. Clearly the answer is incorrect, but it may be necessary to pose a similar example such as

\[
\begin{array}{c}
603 \\
-359 \\
\hline
154 \\
\end{array}
\]
to see how the student has seen that 9 cannot be subtracted from 3, and then ‘borrowed’ 1 from
the 6 in the hundreds place to change 3 to 13, then ‘borrowed’ another 1 from the 5 in the
hundreds place to change 0 to 10, and finally to subtract 3 from 4 to leave only 1 hundred. This
reveals that the source of the difficulty lies with an incomplete lack of numeration understanding.
It is this that needs attention rather than simply attempting to rectify the particular example that
was first seen to be incorrect. Only when this underlying difficulty is addressed will it be possible
to build up the process needed for subtraction with larger numbers containing internal zeros.
Finally, when understanding of the process is secure, the student should be asked to re-examine
the original example which brought the error to a teacher’s attention. This approach to analysing
errors and overcoming difficulties can be summarised:

<table>
<thead>
<tr>
<th>Error</th>
<th>probe</th>
<th>Similar examples</th>
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<tr>
<td></td>
<td></td>
<td>Reveal source</td>
</tr>
<tr>
<td>Question About original</td>
<td></td>
<td>work on similar examples</td>
</tr>
<tr>
<td>Understands Process</td>
<td></td>
<td>Underlying difficulties</td>
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**Origins of errors**

Numeration, the understandings and skills needed to name, write, read, rename and process
numbers, has already been shown to be a major source of difficulties. Other errors result from a
confusion among procedures, over generalising from one process or situation to another, or from
obstacles to learning posed by earlier knowledge.

**Lack of numeration**

The patterns used for writing and reading numbers are not always apparent to learners. For
example, many students experience difficulties with the teen numbers because of the conflict
between the way they are said and the use of place value in writing them. Consider this example
from a boy in Year 4 who said: “It is 15 because it has one in the front.”

![Diagram]

Task from the Booker Profiles in Mathematics (ACER 1995).
The assessor has drawn a picture of the response the boy gave, putting out 1 one and 5 tens to show fifteen. While reversals with teen numbers are quite common amongst students of all ages, it is the reason given for this error which is most illuminating. The child has confused a teacher's 'helpful' hint (the teen numbers have a one in front) with his own knowledge of tens and ones based on the concept of place value and the use of materials. For the numbers 20 - 99 the way the numbers are written and read is identical. For most teen numbers, the ones digit is read first, followed by \textit{teen} for 1 ten. This error often follows through to older children who rename inappropriately when adding numbers

\begin{align*}
5 \\
56 \\
+ 89 \\
\hline
1
\end{align*}

and have difficulties when entering numbers such as seventeen (71 or 17?) or two hundred and sixteen on a calculator (261 or 216?)

The occurrence of zero in numbers, difficulties in reading larger numbers where a second place value needs to be built up,

\[
\begin{array}{ccccccc}
9 & 8 & 7 & 6 & 5 & 4 & 3 & 2 & 1 \\
9 & 8 & 7 & 6 & 5 & 4 & 3 & 2 & 1 \\
\end{array}
\]

and the processes of comparison and counting on and back which rely on well understood place value and renaming, are also the source of many errors in students' understanding of numbers. As Ma observes, this insecure foundation inevitably leads to difficulties with further mathematics:

\begin{quote}
Historically, arithmetic and geometry were the two main branches of the discipline of mathematics. Today, although the field of the discipline has been expanded, the foundational status of arithmetic and geometry in mathematics is still unchanged. None of the new branches, whether pure or applied, operates without the basic mathematical rules and computational skills established in arithmetic and geometry.
Ma (1999 p119)
\end{quote}

\textbf{Confusion with procedures}

While confusion among the computational processes is most prevalent, students also have difficulties with other processes such as finding averages or rounding. For example, a year 10 student assessed on his ability to round numbers responded:

\begin{quote}
Round 367 to the nearest ten 400
Round 3763 to the nearest hundred 4000
Round 5198 to the nearest ten 5000
\end{quote}

Rather than round to the value asked for, the student has focussed on the leading digit. Further probing revealed that this student used a 'rule' – consider the first digit, check the value of
the next digit, and then 'round up' when that digit is greater than 5 or 'round down' when the digit is less than 5 – and was also uncertain when the next digit was 5.

In contrast, numeration understanding via a 3 digit number board provides insight into rounding:

<table>
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<th>400</th>
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The symmetry of the number system shows that half the numbers are above the horizontal double line and round to the hundreds that they have, 4 hundreds or 400. The other half are below the horizontal double line and round to the next hundred, 5 hundreds or 500. Similarly, those numbers to the left of the horizontal double line round to the tens that they have, for example 440, 441, 442, 443 and 444 all have 44 tens and round to 44 tens or 440. This means that the five numbers 440, 441, 442, 443 and 444, all round to 44 tens or 440. Other numbers such as 449, 448, 447 and 446 round to the next ten, 45 tens or 450. The symmetry of the number system shows that for each multiple of ten, five numbers round to the tens that they have and five numbers round to the next ten. Place value understanding displaces the need for a ‘rule’ which has no meaning, clears any confusion for numbers with 5 in the ones place, and provides a way of thinking that can extend to the rounding of all numbers. Renaming a number to consider the number of tens, hundreds, or thousands that a number has is the key. Thus, 367 has 36 tens. It can round to 36 tens or 37 tens. 37 tens is closer so 367 rounds to 370. Similarly, 3763 has 37 hundreds. It can round to 37 hundreds or 38 hundreds. 38 hundreds is closer so 3763 rounds to 3800. Considering 5198 as 519 tens immediately shows that is rounded to the next ten, 520 tens or 5200. The use of renaming and place value gives control over the process and the rounded number that results.
Inappropriate generalisations
Many errors occur when thinking that had arisen or worked in one context is generalised to a new
situation to which it no longer applies. For instance, initial development of addition with
horizontal recording focuses on left to right processing and may lead to a similar way of thinking
for all addition:

\[
\begin{align*}
3 + 4 &= 7 \\
3 + 4 &= 4 + \underline{7} \quad \text{and} \quad 8 + 4 \\
7 + 6 &= 12 \\
\end{align*}
\]

\[
\begin{array}{c}
3 \text{ and } 4 \\
\end{array}
\]

\[
\begin{array}{c}
3 + 4 = 7 \\
\text{but to} \quad + 4\underline{8} \\
7 + 1 & 2
\end{array}
\]

Instead, what is needed is a similar cycle of steps to that used for division on page xx:

\[
\begin{align*}
1 & \\
3 + 4 & \text{add the ones: } 4 \text{ ones and } 8 \text{ ones are } 12 \text{ ones} \\
\underline{+ 4\underline{8}} & \text{rename: } 2 \text{ ones } 1 \text{ ten} \\
7 + 1 & 2 \text{ add the tens: } 4 \text{ tens and } 4 \text{ tens are } 8 \text{ tens}
\end{align*}
\]

Similarly, procedures which worked for addition may be extended to the multiplication
algorithm, especially when multiplication itself has no inherent meaning through a focus on the
word ‘times’ and a concept in terms of grouping rather than the more complete arrays concept.
Two common errors are:

\[
\begin{align*}
179 & \quad \text{and} \quad 179 \\
x 3 & 2 \\
2 4 & 8
\end{align*}
\]

Each has drawn on an earlier procedure for addition, where the ones column was
completed first, then the tens column

\[
\begin{align*}
1 & \\
3 + 4 & \text{rename: } 2 \text{ ones } 1 \text{ ten} \\
\underline{+ 4\underline{8}} & \text{add the tens: } 4 \text{ tens and } 4 \text{ tens are } 8 \text{ tens}
\end{align*}
\]

The first error has generalised from ‘adding down’ by using 9 twos are 18, then adding 1
to get 8 and multiplying 8 threes are 24. The second error has generalised from ‘adding up’ by
using 2 nines are 18 then 3 sevens are 21 and adding 1 to get 22.

What is needed is a similar cycle of steps to that used for addition:
Building a meaningful process for multiplication draws on place value and renaming, but demands an understanding that the process crosses places (hence the \( \times \) symbol) rather than proceed place by place as for addition and subtraction. It also needs an understanding that tens multiply with tens to give hundreds. This is also the thinking underpinning estimation with multiplication:

\[
\begin{array}{c}
79 \\
32 \\
\end{array}
\times 32
\]

\[
\begin{array}{c}
158 \\
2370 \\
2528 \\
\end{array}
\]

\[
\begin{array}{c}
multiply ones by ones: 2 nines are 18 \\
rename: 8 ones 1 ten \\
multiply ones by tens: 2 by 7 tens are 14 tens \\
rename: 14 tens and 1 ten are 15 tens \\
multiply tens by ones: 3 tens by 9 ones are 27 tens \\
rename: 8 ones 1 ten \\
multiply tens by tens: 3 tens by 7 tens are 21 hundreds \\
rename: 21 hundreds and 2 hundreds are 23 hundreds \\
add the partial products
\end{array}
\]

**Epistemological obstacles**

Others errors may be due to epistemological obstacles, where earlier ways of coming to know, whether personal or in the historical development of mathematics, impede the development of new concepts and processes. For example, seeing numbers in terms of objects may mean that zero is simply viewed as nothing and therefore of no significance.

\[
\begin{array}{c}
70 \\
-42 \\
\end{array}
\]

\[
\begin{array}{c}
32 \\
\end{array}
\]

When zero is termed a 'place holder', other ill-developed ways of thinking may emerge:

\[
\begin{array}{c}
1 \\
64 \\
\times 40 \\
00 \\
2560 \\
\end{array}
\]

\[
\begin{array}{c}
1 \\
64 \\
\times 40 \\
2560 \\
2560 \\
\end{array}
\]

When division is first met, \( 8 \div 72 \) may be read as 8 divided by 72 because of a tendency to read from left to right. When this is also recorded as \( 72 \div 8 \), confusion is even more likely. It is the first time that an operation has been recorded using two different symbols, and expressions using \( \div \) are read from left to right whereas the algorithm using \( \int \) is read from right to left.
While decimal fractions appear to be an easy extension of place value for whole numbers, many of the ways of reading and processing decimal fraction conflict with those that have been used for the earlier numbers. For example, 3.4683 is read as 3 and 4 thousand 6 hundred and 8ty 3, yet the 4 is the tenths place and the 8 is in the hundredths place. Even trying to explain this is problematic when 1 tenth has 10 hundredths whereas 1 hundred has 10 tens. When one whole number has more digits than another whole number, it will be the larger number, even though it is really place value that determines which number is larger. But for decimal fractions, the number of digits or places is irrelevant; 3.4683 is less than 3.5 because 3 and 5 tenths is greater than 3 and 4 tenths.

Other conventions and understandings from earlier work with whole numbers also impact on the learning and use of common fractions and algebra. Since 5 is greater than 4, students frequently assume that 1 fifth is larger than 1 fourth and experience difficulty in comparing and ordering fractions of the form $\frac{1}{5}$, $\frac{1}{4}$ and $\frac{4}{5}$. When expressions such as $3mn$ are met, earlier conventions from whole numbers might lead a student to look for digits such as 6 and 7 thinking that the expression refers to a number such as 367 where missing numbers have to be substituted in the same way as the linear equations with which algebra began. The additive nature of place value also lies behind the confusion of $3mn$ with $3 + m + n$ instead of $3 \times m \times n$.

The conventions of algebra itself can also be confusing. While $x$ may be called a variable, if it is used in an expression only once, it can have any value, but if it is used several times, it will always take the same value(s). When negative numbers are met, and $x$ is negative, it is very difficult for many students to appreciate that $-x$ is positive. It is these complexities with algebra that led Bertrand Russell to say:

*When it comes to algebra and we have to operate with $x$ and $y$, there is a natural desire to know what $x$ and $y$ really are. That, at least, was my feeling; I always thought the teacher knew what they were but wouldn't tell me.*

It is hardly surprising that many students find algebra difficult and seemingly beyond their abilities when they fail to understand that ‘it requires a different conceptual understanding of the usage made of letters to that demanded by an arithmetic with letter appendages’ (Polya 1945).

**Implications**

Difficulties in mathematics have many sources. Sometimes they may be brought about by the approaches taken in a teaching program or text, a way of teaching, or the emphases, sequences and omissions in a curriculum. But it is a focus on procedures learnt by rote which lead to most of the difficulties that students experience in mathematics. If materials are not used, students may not be able to visualise the significance of the steps in the processes they are attempting to complete. When the language used in mathematics does not relate to the underlying concepts and processes, students may be at the mercy of a large number of rules without meaning that they must somehow choose among and manipulate appropriately. This will often lead them to generalise from one procedure to another when a different way of thinking should be called on, or talk about ‘borrowing’, ‘bringing down’ and ‘carrying’ when a process of renaming is actually used with all computations.
In contrast, mathematical thinking which links a few powerful, conceptual ideas across the whole content allows students control over the processes they apply and the ability to use their understanding in new and productive ways. The rapidly changing, technological world in which our students are preparing to live demands no less.

References

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Overview
In this chapter I propose to discuss my support of Westwood’s (1999 p. 215) belief that a student’s difficulties in learning mathematics usually stems from a “complex interaction of factors associated with the learner, the method of instruction, the curriculum and the teacher”.

Introduction
There is something amiss when many of our primary school teachers can be heard to say “well I was no good at maths myself and I still don’t like it”, or to hear a group of adults discuss how they were “good at maths until…” or state “I was NEVER any good at maths”. Recently while teaching I asked a class of grade two students to put up their hand if they thought they were good at maths – surprisingly only half the students raised their hand. If half the students in this class, in only their third year of schooling, already “feel” they are not good at maths one has to beg the question why, and wonder what their attitude and success rate will be in future years of schooling in the area of mathematics.

Historically the teaching of reading has been viewed as more important to success in adult life than the teaching of mathematics, however maths deficits can be just as debilitating. As Garnett (1999) states the effect of maths failure throughout years of schooling coupled with maths illiteracy in adult life, can seriously handicap both daily living and vocational opportunities. While it is acknowledged the teaching of mathematics and thus maths difficulties has gained much attention in recent years, as Geary (2001) acknowledges, progress in the area is still slower than that made in the area of reading difficulties (RD) with a disproportionate amount of resources devoted to literacy.
The Learner

Students come to us on entry to school, invariably willing and often anxious to learn as much as they can as quickly as possible. They enter highly motivated and are often impatient, at the end of the day, to race home to share with members of their family their newfound knowledge. Most children arrive at school with some sense of number, acquired through their environment which is prerequisite to the acquisition of more advanced number concepts. There is however an enormous range in the sense of number that children bring with them to school and this is dependent upon such factors as home environment, kindergarten experience, and culture.

While the National Health and Medical Research Council (1990) figures indicate a range of 10 – 16% of students are thought to have general learning difficulties, Kosc (1974) and Badian (1983) estimate that approximately 6% of school-age children have significant maths deficits. The lack of more recent figures on children with specific maths difficulties gives some indication of the importance of the field to date. Developmental Dyscalculia, while seldom referred to in the literature, is the generally accepted term for a specific maths difficulty. Developmental Dyscalculia is defined as ‘a structural disorder of the specific abilities for mathematics without a simultaneous defect in general mental abilities’ Kosc, 1974 p.47). Developmental Dyscalculia in mathematics could be said to be the equivalent of Dyslexia in literacy- a disability which has a large impact on the individual but one which is little understood by classroom teachers.

As Miller (1999) states, although many students exhibit characteristics that predispose them to maths disabilities i.e. problems in memory, reading, language, reasoning and metacognition, their learning is compounded by ineffective instruction. Of greatest concern to most classroom teachers is not however the cause of the problem rather how best to teach the child given the problem. Without special instruction these children may develop what is termed ‘learned helplessness’. This occurs when children repeatedly fail to solve problems of which they have little or no understanding the result being that they lose confidence and rely on others to help them with every problem and become passive learners. Often, unwittingly, this is encouraged by teachers who set tasks which are beyond the skills of the child and continually help the child complete each problem. The result is that the child ‘learns’ to be helpless!

As stated, children with disabilities are not the only ones who have difficulty with mathematics. Many of our students enter school without a particular predisposition to maths difficulties yet still experience a good deal of difficulty with the subject. In some students difficulty with mathematics results in what has been labelled “maths anxiety”. Miller and Mercer (1997 p.7) citing Slavin (1991), refer to this is as “an emotional condition which is believed to stem from a fear of failure and low self-esteem and causes students to become so tense that their ability to solve, learn, or apply math is impaired”. Confused thinking, disorganization, avoidance behaviour, and math phobia are reported as common results (Conte, 1991; Zentall & Zentall, 1983; as cited in Miller & Mercer, 1997). Munro (1992) lists a number of ways to reduce maths anxiety in students which include: de-mystifying maths by showing the student how maths can be used to solve personal problems; allowing students to talk about their maths ideas; and helping students to see themselves as successful maths learners and to increase their self-concept and confidence in relation to maths. The young child entering school is unlikely to arrive suffering from anxiety nor is the anxiety likely to develop suddenly, it is more likely a condition which develops over time as a result of the interaction between himself the learner, the method of
instruction, the curriculum and the teacher (Westwood, 1999) or what Munro (1992) calls learning-teaching mismatch.

Learner characteristics such as lack of motivation and interest, which, like maths anxiety can lead to failure, result from a complex interaction of factors and may be remedied by modifying or adapting the instruction and/or the curriculum.

**Instruction**

Miller (1999) cites several authorities (Carnine, 1991; Kelly, Gersten & Carnine, 1990; and Sheid, 1990) who believe that poor or traditional instruction is a primary cause of maths problems for many students.

Poor instruction can include imposing mathematical concepts on a child too early and may lead to pseudo learning. Research quoted by Miller (1999 p.172) supports the belief that the “concrete to representational to abstract teaching sequence facilitates the acquisition and retention of math skills”. If the move from concrete to representational or representational to abstract occurs before the child is ready we set the child up for pseudo learning and/or failure. Many an Australian maths class is conducted without the use of concrete materials. Fuson (1992) reports that the far greater use of real world problems and concrete, manipulative objects in the Japanese and Taiwanese maths classroom in part accounts for their superiority in mathematical performance over their US counterparts.

The concept of pseudo-learning is one of many arguments against rote learning. For the purpose of this paper pseudo-learning occurs when for example a child appears to have the knowledge as evidenced perhaps by performance on a pen and paper test, or by the automatic response to a number fact, however when asked to explain the answer it becomes apparent the child has little or no understanding i.e. they have procedural but lack conceptual knowledge. While there exists a great deal of research to support rote learning in respect to its value in increasing automaticity and fluency, Isaacs and Carroll (1999) for example argue that it is only appropriate if the student understands the processes. Isaacs and Carroll (1999) also propose a link between the traditional/old-fashioned use of frequent drill and timed tests and premature demands for quick performance and anxiety.

Inconsistent language used by teachers in maths classes also often facilitates misunderstanding of maths concepts for students. For example as suggested by Booker (2002) the term zero actually refers to none of something. When zero is defined correctly it allows a proper understanding of a three digit number with a zero in the tens place e.g. 705. However a child who has learnt the zero symbol as being nought may in fact have difficulty with such three digit numbers. Not only does language need to be correct and consistent it also needs to “match the material and experiences provided and the language level of the learner” (Booker, 2002 p.14).
Some staggering results from research conducted by Pearn, Merrifield, Mihalic and Hunting (1995, as cited in Pearn, 1999 p.198) when interviewing Melbourne schoolchildren as part of the Mathematics Intervention program included the following:

Of 278 Grade 1 children interviewed

- 40% were unable to count backwards from 20 to 1 by ones.
- 23% were confused by “before” and “after”.
- 24% were only able to count things they could see, hear or feel.
- 14% could not count out exactly 14 counters.

Of 55 Grade 2 students interviewed

- 3% could not count backwards from 20 to 1.
- 15% could not count by twos from 2 to 24.
- 16% could not count by tens from 10 to 100.
- 3% had difficulty with the numerals 13, 31, 14, 41, 15, 51.
- 9% could only count things they could see, hear or feel.

These Grade two Students, at least if enrolled in a Victorian school, will be tackling CSF11 Level 2 (Board of Studies 2000 p.45) which in the number strand requires students to have, by the end of the school year, acquired the skills to “...read, write and say whole numbers up to 999.....count forwards and backwards up to 1000 in 1s, 10s and 100s starting from any whole number ....skip-count from zero up to 100 in 2s, 4s and 5s......”. It would not be unreasonable to assume that these students would be unlikely to put their hand up if asked if they thought they were good at maths. In Victorian classrooms according to the CSF 11(2000) these Grade 1 students would be expected to be moving from the concrete to the representational in maths while Grade 2 students will already working on abstract mathematical concepts. Because maths is hierarchical, students who lack the foundation skills, such as those above, will be in all likelihood already experiencing failure in maths. In most schools these students would be expected to succeed without differentiated instruction or additional support.

Any discussion of mathematics instruction would be lacking if it failed to include the controversial models for the learning of mathematics which Westwood (1999) refers to as the Constructivist and Transmission/Instructivist models.

Westwood (1999a) likens the constructivist approach to maths to the whole language approach in literacy. Constructivism is enquiry-based and as such students are expected to acquire basic numeracy skills incidentally through having to use skills to solve problems or record activities. Begg, 1995, and Eggen and Kauchak, 1997 (as cited in Westwood 1999 p. 177) argue for constructivism when they suggest “students need to develop meaning for themselves through their own activities and by drawing on their existing pool of knowledge and skills” In the constructivist classroom the teacher is the facilitator rather than the teller or provider of information and as such is responsible for guiding the enquiry and reflection to help students to gain meanings and make connections for themselves as a result of the activity.
One of the criticisms of the constructivist approach is that some students spend large amounts of time off-task as they wait for the attention of the teacher. Research has shown that the time spent on-task; that is, actively engaged in successful practice, is a key element in effective learning (Bennett, 1987; Rosenshine, 1995 as cited in Westwood, 1999). Thus students who lack knowledge of the most basic information to solve some problems, or who in fact, lack any “number sense” (Gersten and Chard 1999) will be disadvantaged if only exposed to the constructivist approach. While the constructivist approach may help students to understand how they could work out 9x8 (or any other number fact) there is some doubt as to whether this method alone will give the learner enough practice to provide for automatic recall or fluency in performing algorithms. Left to their own devices to discover number patterns and laws learning disabled students may never find the key that unlocks the door. It is possible that learning which takes place solely in the constructivist classroom creates the equivalent of Stanovich’s (1986) Mathew effect of Reading in mathematics.

The antithesis of the constructive approach is the Instructivist/Transmission approach to the learning of mathematics. The Transmission model of learning mathematics assumes that a learner will absorb ideas and make meaning from information and explanation provided by a teacher. With explicit direct instruction there is a crucial emphasis on teacher behaviour which ensures the teacher is in charge of the learning through explicitly detailed teacher instructions and often scripts. Greaves (2000) and Farkota (2000) suggest explicit instruction ensures faultless presentation so that children are ‘taught’ the rules for generalization – a skill students with disabilities may not have, and are unlikely to develop, with the constructivist strategy of learning. A meta-analysis of 25 studies, 21 of which included students with mild disabilities, analyzing the effect of DI concluded none of the studies significantly favoured the comparison group while more than half the studies favoured the DI group (White 1988). Given the empirical evidence in support of DI it is now one of a small list of research based reform models now eligible for funding in the U.S. (Hempenstall 2000).

Detractors of Instructivism argue that when such an approach is used in classrooms, little attempt is made to develop student’s mathematical reasoning and this particularly effects students ability to independently undertake problem solving in mathematics.

Both literacy and numeracy programs should be guided by what Miller and Mercer (1997) call replicated, validated programs that demonstrate effectiveness with targeted populations. One such program recently published is Farkota’s (2000) Elementary Maths Mastery (EMM) which was designed around the Mathematics profile for Australian Schools intended to be undertaken with students in their 6th and 7th year of schooling. EMM has been carefully researched and trialed over five years and results from one trial can be found in a report by Pincott and Gellie (2002). Results from a much larger trial should be available in 2003.
A program developed specifically to teach these children who are at-risk of school failure is Mercer and Miller's (1991-1994) Strategic Maths Series (as cited in Miller 1999). The program was devised to "help teachers to systematically apply validated practices to their math instruction" (Miller, 1999, p.165). The program, using seven instructional phases aims to:

a) develop conceptual understanding using the concrete to representational to abstract teaching sequence,
b) promote mastery through carefully sequenced lessons and fluency-building activities, and
c) teach specific strategies using mnemonic devices.

Miller (1999) reports a great deal of high achievement in students learning maths through this program and reports findings which support its use with not just low-achievers and those students with learning disabilities but also with normally-achieving peers. It should be noted however that Miller makes no mention of its success with high achieving peers.

A program which aims to identify and then assist Year 1 students at-risk of not coping with the mathematics curriculum is Mathematics Intervention (Pearn, Merrifield, Mihalic and Hunting, 1995, as cited in Pearn 1999). Pearn (1999 p.192) states this program features elements of both Reading Recovery (Clay 1987) and Mathematics Recovery (Wright, 1991; 1996) and offers students "the chance to experience success in mathematics by developing the basic concepts of number upon which they build their understanding of mathematics". In the Mathematics intervention program students identified as being "at-risk" are withdrawn from their classes for seven half-hour sessions per fortnight with a maximum participation of twenty weeks. This program documents students' progression through the counting as developed by Steffe et.al., (1983, 1988; as cited in Pearn, 1999 p.193)

- Perceptual
- Figurative
- Initial number sequence (count on)
- Implicitly nested number sequence
- Explicitly nested number sequence (p.193).

This program recognises that children use different strategies to solve maths problems and this as a key feature of the program. The value of this lies in research by Gray and Tall (1994) which shows that strategies used by young children who are successful at maths are different to those used by students who are struggling with maths. The program uses the knowledge of the child’s mathematical knowledge as gained through an initial assessment. The types of strategies the child uses to solve mathematical problems are used to design appropriate activities and to extend his/her mathematical understanding together with the classroom teacher (Pearn, 1999).

There is growing support (Harris and Graham 1996; McIntyre, 1996; Mercer, Jordan and Miller, 1996; Harris and Graham, 1996; Airisian and Walsh, 1997; Metsala et.al., 1997; as cited in Westwood, 1999) for the value of a combination of explicit teaching and constructivist learning opportunities for both the teaching of literacy and numeracy.
Another instruction issue is that of what I will refer to as textbook-instruction. Many teachers at both primary and secondary levels base their mathematics instruction on the textbook provided. The risks of this type of instruction are numerous. The use of a textbook often results in a maths lesson being no more than a brief textbook introduction of the problems to be tackled during the class, the setting of problems to be completed with problems not completed, or another exercise, set for homework. Teachers who teach like this seldom allow for hands-on maths or group problem solving, their students see maths in the narrow defines of a series of textbook problems. The issue of textbooks is not limited to their use in the classroom but is further added to by their cost, authors, and testing. Sprick (1997 as cited in Miller et.al., 1997) reports that only 3% of educational materials are field tested prior to being published while Carnine (1992) reports that most textbooks are not written by teachers or individuals who have been trained as educators. While Carnine’s study was undertaken in the USA and this appears not to be the case locally it should serve to make us wary of the necessary experience and expertise most of us would deem essential in order to write a mathematics textbook. Add to this Carnine’s (1992) marketing survey which found that the attractiveness of art was the most important characteristic in the sale of maths textbooks and as educationists. While this marketing survey was also undertaken in the United States could the same situation occur here?

The Curriculum
While Pillay (1999) differentiates between curriculum and syllabus, I will use them synonymously and refer to the curriculum for mathematics in Victorian schools as it appears in the CSF11 (Board of Studies 2000). The Board of Studies states the CSF11 (2000 p.1) was developed after much consultation with Principals, teachers and other members of the school community and while it claims to provide “a curriculum tailored to meet the needs of individual students”. It is, however, only a statement of the outcomes expected at each level and fails to offer any guidance as to how a teacher might in fact assist students in achieving these outcomes. Miller et al., (1999 p.10) suggest that asking all students to undertake a single designated mathematics curriculum is an example of “fitting students to the curriculum rather than fitting the curriculum to the student”. Westwood (1999) cites research by Knight et al., (1995) and Patton et al., (1997) which report the key areas for functional numeracy as identified by parents and employers as being:

- counting,
- multiplication tables,
- use of four basic processes (particularly + and -),
- money management,
- time and linear measurement,
- some grasp of simple common fractions and decimal fractions,
- the ability to understand simple charts, graphs and tables.

Westwood (1999) refers to this as core essential mathematics curriculum for non-academic school-leavers. Munro (1999) divides the knowledge we need into two types: personal interest and culturally valued. A year 10 student finding himself in a compulsory maths class is unlikely to have a personal interest in “…the role of the constants a, b and c in the relationships y = ax + c , y = a (x+b)…. (CSF 2000 p.215) and thus the curriculum may, justifiably, seem irrelevant to him. In an example such as this it is would be up to the teacher to motivate the student, and to find some relevance to the student of such topics. A textbook approach to such topics in the
curriculum is akin to rote learning tables i.e. carrying out the process often without the understanding.

Perhaps the term curriculum-disabled (Elliott and Garnett 1994) could apply to many of our students experiencing difficulties in mathematics.

The Teacher
The mathematics teacher, whether using the transmission or constructivist approach or a combination of both, is expected to provide feedback to students. The students’ maths self-concept is largely determined by the feedback he receives from the teacher during maths classes. Mercer and Miller (1999) report feedback is an important part of each lesson in their Strategic Maths program. Research by Kline, Schmaker and Deshler (1991) has shown that if certain steps are followed by the teacher when giving corrective feedback students would reach mastery in half the instructional time than when the steps were not followed. Fuson’s (1992 p.269) vision of a successful school mathematics classroom is one where “errors are just expected way stations on the road to solution and should be analysed in order to increase everyone’s understanding”. I support my own daughter’s classroom teacher who bans the use of erasers in class as he tells the children they do not make mistakes, they have learning experiences and you cannot rub out a learning experience, you build upon it.

The teacher is responsible for organising the maths classroom and administering any maths curriculum. If the teacher has neither the knowledge of the maths curriculum or the background to teach the curriculum we lack the foundations for successful student maths learning.

Westwood’s’ (1999) survey of 24 teachers all of whom had completed their teacher training within the past eight years indicated that:

- 79% had been strongly encouraged to use a constructivist approach to mathematics teaching,
- 67% reported not having been exposed to a wider range of methods,
- 50% reported that they had picked up that teacher-directed instruction is old fashioned and ineffective (p.185).

It becomes difficult for teachers to choose appropriate methods of instruction to meet individual student learning needs if they have not been exposed to a variety in their training. The opportunity for Professional Development in the area of mathematics is difficult for classroom teachers particularly with the recent literacy focus, nor do most teachers have the time to keep up with the latest trends through the variety of educational journals. Pearn (1999) does however report teachers are now acknowledging that they need ongoing assistance to ensure that the state goals with regard to numeracy are met. It is also reported that teachers involved in the pilot Mathematics Intervention program believe that “to be successful, all junior primary teachers need to enjoy and be competent in, and confident with, mathematics to ensure they can identify and assist children at risk” (Pearn 1999 p.203). I would suggest these characteristics would be desirable in every maths teacher.
Conclusion
The scope of this paper does not allow for a discussion of assessment, nor does it allow for a discussion of the variety of strategies used by students to solve problems in mathematics or Gersten and Chard's (1999) number sense; all of which are of great value when discussing maths difficulties.

Attention has been given to the four factors Westwood (1999) believes account for student's difficulties in learning maths. A small percentage of students arrive at school with a disability which predisposes them to maths difficulties however a much greater percent leave school with maths difficulties. Munro (1999b) believes these difficulties are the result of chronic mismatches in learning experiences, these learning experiences are a result of the interaction between the learner characteristics, instruction, curriculum and teacher.

The Grade 2 children mentioned in the introduction who do not believe they are good at maths are likely to have developed this view as a result of the interaction of their own characteristics, the maths instruction they have been given, the curriculum they have covered in maths classes and such factors as the feedback provided to them by the teacher during maths classes. One wonders what the future is for them with regard to mathematics.


Any successful maths program must build on what the student already knows, and allow the student to be successful and to see maths as interesting, challenging and relevant. Given the discussion presented is it possible that we the teachers are largely responsible for our children's maths difficulties?

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CHAPTER 11

The Impact of Teachers’ Understanding of Division on Their Students’ Knowledge of Division.

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Overview
This study examined the relationship between 54 year 7 students’ knowledge of division and their two teachers’ conceptual understanding of division. A pencil and paper test was given and interviews of 12 students and the two teachers followed. The results indicate that a quarter of the students have considerable understanding of division while the remaining students rely on following a procedure with limited understanding. The teachers displayed some conceptual understanding of division however they demonstrated a bias for procedural knowledge. Teaching primary mathematics is not an easy task. It would appear that the teachers do not have the depth of knowledge necessary to teach for conceptual understanding.

Background
The issues of conceptual understanding and procedural knowledge have been the topic of debate and research for many years. However conflict exists as there is a tendency to use the words interchangeably. A clear distinction needs to be made between these terms. Procedural knowledge means ‘to follow step by step an established method’ (Collins English Dictionary, 1979). Whereas understanding the process calls on understanding of the concept behind that process, ‘a clear picture of something formed mentally combining all parts and characteristic features’ (Collins English Dictionary, 1979). An appreciation of this distinction is the essential element in this study.

Hiebert (1987:3) suggests that conceptual understanding ‘can be thought of as a connected web of knowledge, a network in which the linking relationships are as prominent as the discrete pieces of information’. It is important to keep in mind that ultimately the aim is for our students to understand and that the priority does not rest with being able to perform isolated computations without meaning. It needs to be acknowledged that these discrete pieces of
information are essential but that greater significance of the linkage to other known concepts ensures that students have a greater understanding of the mathematics they are using.

This study specifically investigated children's knowledge of division and its relationship to their teacher's conceptual knowledge. A search of the literature has not found any study that has investigated a similar relationship. Interestingly however, the difficulties these two distinct groups experience when completing division problems are documented without association.

**Research on teacher and student teacher understanding**

Ma's (1999) research compared conceptual understanding and procedural competency of experienced, US and Chinese teachers. She did not look at division specifically in her study but her findings are very relevant to the topic of conceptual understanding and, as such, form a solid basis from which to consider the concept of division.

She found that the Chinese teachers had a well-developed and closely linked network of mathematical knowledge. They were able to legitimise the use of a rule or mathematical statement both verbally and symbolically. When problem solving, they demonstrated several ways to solve a problem. This flexibility indicated conceptual understanding and reflected on their ability to teach in many different ways.

This is in complete contrast to Ma's (1999) findings regarding US teachers. Their understanding was very fragmented and rule based. When asked to problem solve they offered only one solution, and when asked to explain their workings they quoted a rule.

Ma (1999) identifies what she sees as the basis for the difference between the two systems. The U.S. teachers consider that primary mathematics is basic and that it is not necessary for their knowledge to be any more in depth than that required of their students. Ma (1999:23) found their knowledge was superficial and limited to procedural aspects and termed it pseudo-conceptual understanding. She also found that the U.S. teachers' procedural knowledge of different topics leading to the following representation.

```
Procedural knowledge
   /\                     /\                  /\               /\            /\        /\     /\     /\
Procedural topic  Pseudo-conceptual understanding  Procedural topic  Procedural topic
```

**Ma (1999:23) Pseudo-conceptual Understanding**

The Chinese on the other hand see primary mathematics as fundamental as it forms the basis from which to construct greater knowledge of the subject. The importance placed on primary mathematics is evidenced by the level of professional development where teachers strive to have experience with and understanding of as many problem solutions as possible as these alternative solutions create greater cohesiveness of understanding and allow for links to other topics to be
identified and studied. Ma (1999:25) represents this understanding, where understanding of the process is linked to conceptual understanding with varying depths of understanding as:

![Conceptual Understanding Diagram](image-url)

**Conceptual Understanding (Ma 1999:25)**

Other research supports Ma’s (1999) view that US teachers have limited conceptual understanding.

- Teacher/student teachers who have experienced procedural teaching while at school believe that this is how mathematics should be taught. Ball (1988) argues for an ‘unlearning’ of past teaching methods as being necessary before student teachers can become truly informed about how to teach mathematics from a conceptual perspective.

- The belief that remembering the procedure to produce the correct answers was considered more important than understanding why the particular process was necessary (Thompson, 1989).
When difficulties associated with division are examined the research offers many examples including:

- knowing whether to use multiplication or division (Tirosh, 1989). An example she gives is ‘Girls club cookies are packed 0.65 pounds to a box. How many boxes can be filled with 5 pounds of cookies?’ (1989:84) Almost 50% of student teacher participants responded to this question incorrectly giving their answer as 0.65 x 5. She argues that understanding is restricted to the belief that multiplication makes bigger and division makes smaller. This is only true of whole numbers and the reverse is true when a decimal fraction is introduced.

- Simon (1993) found that student teachers made no connection between the meaning of division as sharing, with the symbolic expression when completing the division algorithm. These student teachers followed a prescribed step by step procedure without understanding.

- Being able to correctly complete the calculation was considered a more important stage in division problem solving than interpreting the answer to the problem. (Greer, 1988; Thompson, 1989)

Research on student understanding

Anghileri (1995a, 1995b), Reys (2001) and NCTM (1989, 2000) each provide similar suggestions as to why children have so much difficulty with division and how to avoid these difficulties. These include:-

- Students already have considerable experience of symbolic representations and are often expected to embrace division without the concept development stages that occurred with the other three operations.

- Students have considerable difficulty reading division and in particular are unaware of the importance of the order of the division expression. Alghileri (1999) suggests that the confusion over order may be that children have been working with multiplication and do not realise that the commutative nature of multiplication does not apply to division. A further suggestion may be that teachers do not make any link between division and fractions.

- Trial quotients must be used and the first guess may not be the closest multiple.

- Use of large numbers requires a greater depth of understanding of place value.

- Unlike the other operations the division computation begins from the left.

- Bell (1987) identified that students felt it was impossible to have a smaller number divided by a larger number. These Year 10 students clearly have limited understanding of division and make no links to other concepts such as fractions and ratios.

- Silver (1987, 1988, 1992, 1993) found that students encounter difficulty interpreting the remainder in calculations when completing the final stage in problem solving.
No research has been found that studies the relationship between teacher knowledge and student understanding. Clearly the level of teacher conceptual and procedural knowledge will have a significant impact on student learning. Consequently the following research questions have guided this study.

- To what extent does the depth of the teachers' understanding of division translate into student understanding of division?
- To what extent does the teacher extend the division concept by using problem solving, and is this reflected in the students' ability to solve division problems?

Method

Participants
Two schools from different education districts in Brisbane were selected for this study. The participants included two Year 7 teachers and their 56 students, 27 boys and 29 girls.

Procedure
Copies of the school mathematics program and student workbooks were obtained from the school several weeks prior to the testing of the students. These data were examined to ensure that the test met the expectations of the school program.

The test was administered to the two schools one day apart and at similar times in the day. The researcher was the test supervisor. One week following the pencil and paper testing six students from each school and their teachers were interviewed.

The test instrument
There were five questions on the test that progressively required the participants to demonstrate greater depth of conceptual understanding. Questions 1 and 2 probe understanding of the concept of division. Participants were required to read a division expression, write a simple story to match and calculate an answer that resulted in a remainder and finally solve their own problem.

Question 3 examined conceptual understanding of division of larger numbers using the algorithm. While questions 4 and 5 are aimed at identifying the participants' ability to complete word problems where they are required to interpret the problem, complete the calculation and interpret that result to produce the answer.

Results
Understanding of the Division Concept

Question 1
a) Write in words how you would read $6 \div 54$

b) Write a story to match this division.
### TABLE 11.1 Question 1 Student Results n = 56

<table>
<thead>
<tr>
<th></th>
<th>Q1a</th>
<th>Q1b</th>
<th>Q1a &amp; Q1b</th>
<th>Q1a correct and not Q1b</th>
<th>Q1b correct and not Q1a</th>
<th>Both Q1a &amp; Q1b incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number correct</td>
<td>44</td>
<td>37</td>
<td>33</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Number incorrect</td>
<td>12</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

Forty-four of the 56 student participants were able to correctly write in words the given division expression representing 78.5% of the total. This figure is considered particularly low when the students have been exposed to this symbolic format for 3½ years. Being able to accurately read the expression is of primary importance. Only 59% are able to both read the expression and write a simple number story. Consequently almost half the participants have no concept of what division means.

The interviewed students were challenged further. The 12 students were asked to read the following expressions $6 \div 54$, $28 \div 3$, $20 \div 3$ and $4 \div 24$. No student answered them all correctly and every student read $4 \div 24$ as ‘twenty-four divided by four’. It was pointed out to each student interviewee that they had read $28 \div 3$ in a different order from $4 \div 24$ and they were asked ‘Does the order make any difference?’ The responses included ‘You can read them either way’, ‘Oh I made a mistake, I should have said three divided by twenty-eight for this one’ pointing at $28 \div 3$, ‘This type is a bit hard, you have to stop and think, but it doesn’t make any difference to the answer’.

There were 18 incorrect answers to 1b of which seven answers included either multiplication or subtraction. For example Andrea’s answer was

```
there were 54 children
and 6 rides to go on
how much did it cost
```

While Kelly has limited understanding, she knows to use the two numbers, that something has to be talked about, and that the division part has to go in as well.
Clearly results on the pencil and paper test did not reflect the true level of understanding of how to read the division expression. They were very insecure when confronted with expressions that were unfamiliar. Their knowledge of division was more at a procedural level where their ability to interpret the division symbol and to provide an appropriate number story depended on the larger number being divided by a smaller number.

Teacher, Robin, gave three different examples of how to read the division expression.

a) Write in words how you would read \( 6 \div 54 \)
   \[
   \text{Fifty-four divided by six, Share 6 into fifty-four. How many times does 6 go into 54?}
   \]

b) Write a story to match this division.

Her second response was quite unexpected. It appears she still carries with her the very misleading language of 'goes into' and has this confused with the recent, more meaningful language of sharing. By combining the two language types she exposes her limited understanding of what is being shared and among how many. This result exposes a validity issue. These students have been studying division for 3\(\frac{1}{2}\) years while this teacher has had these students for less than one year. Interestingly not one of the teacher's students used the same language of 'share into' as she has done.

The second teacher Helen, gave only one example of how to read the given expression. She wrote 'How many sixes in fifty-four?' This is also an interesting response considering she was very insistent during the interview that she stresses sharing in her teaching of the division concept.

Once the symbols have been introduced, being able to read and interpret the division expression is the most fundamental aspect of division. Here it is quite clear that at least half the students and one of the two teachers have not achieved this very basic goal.

Question 2

a) What is 58 divided by 6?

b) Write a story to match this division.

c) What is the answer to your story?
Six students wrote the correct answer to 2a using both whole numbers and decimal fractions demonstrating their understanding by using both methods. This does not mean that the students who have chosen to use only whole number remainders do not understand both methods. This question identified that 39 of the 56 students knew their basic facts and can calculate a remainder and write it appropriately.

Nineteen students are very close to giving the correct answer, as their calculation is correct but they have failed to interpret the remainder in their calculation. This is a well recognised error that has been the subject of considerable research by Silver (1993) yet the problems continue to persist.

After the testing Robin said she had spent some time in the week prior to testing, preparing the children for the test. In particular she concentrated on how the remainder needed to be interpreted to answer the question. She spoke about writing stories that involved measurement because they were not so hard to interpret. Her class learned well as 9 of them used this technique. Her class achieved a good result for both b and c with 13 correct in her class compared to 6 correct in Helen’s class. The interesting thing here though is that she did not take her own advice. She wrote her calculated answer from 2a as her answer for 2c. She was unable to fully understand what was asked of her in question 2c even though 13 of her students were able to do just that.

After our discussion on remainders Robin also mentioned that she found question 2 very ambiguous and asked ‘Isn’t 2a the same answer as 2c?’ Clearly she is having considerable difficulty understanding the distinction between performing a calculation and answering a problem. This directly answers the second research question - To what extent does the teacher extend the division concept by using problem solving, and is this reflected in the students’ ability to solve division problems?

Fourteen members of Robin’s class were able to complete the calculation and write an appropriate story but failed to interpret the remainder. Amanda’s result is typical of this group.

a) What is 58 divided by 6?

\[
\begin{array}{c|c|c}
& 9 & 6 \\
\hline
6 & 58 & .66 \\
\end{array}
\]

b) Write a story to match this division.

I had 58 lollypops and I had shared them with my 6 friends. How many lollypops did each friend get?

c) What is the answer to your story?

\[
9.66
\]
Teacher Helen also had considerable difficulty with this question despite having said following the completion of her paper, 'Question 2 is exactly the sort of thing I like to get the kids to do, it really makes them think.' However the story she wrote to match the division was in fact multiplication.

b) Write a story to match this division.

Do I have enough money to buy
6 balls costing $9 each?

She had done exactly the same thing two of her students had done. Her answer to 2c was simply ‘Yes’

A number of students were very confused. Daniel’s attempt demonstrates this by the following number story.

b) Write a story to match this division.

I had 4 dollars, each brick was a
dollar how much mo so how much is
the bricks call together.

Division of larger numbers

Question 3

The following division has been done for you.

a) Explain what the number 81 represents.

b) What is the purpose of the number 81 and why is it part of the division process.
When division is being taught the sharing aspect needs to be stressed and the language used should support that sharing. This allows the student to understand what is happening and why. More often than not teachers teach the procedure of division by using a mnemonic such as ‘Don’t mix salt and butter’ or ‘divide, multiply, subtract, bring down’. These sayings do not aid understanding of the process they merely outline a procedure that can be followed. If the students get the order confused, or come across a difficult aspect such as an internal zero they have no understanding to help them complete the calculation accurately. This question identified well the limited conceptual understanding of the division process held by both teachers and students.

A typical procedural response to 3a was ‘9 times 9’. This is quite true, the number 81 can be made up of 9 multiplied by 9 but it was expected that the student or teacher who had a deeper understanding than just the procedure would answer this question in more depth identifying its place value. Question 3b that specifically asks for more information, in many cases, did not result in any more information than 3a. Question 3’s results highlight the difficulties both students and teachers have when distinguishing between procedure and concept. When the division process is taught as strictly a procedure that needs to be followed without understanding, it is not surprising that the errors identified earlier continue to persist. The absence of any understanding of how this procedure produces correct answers is very evident in the results from both schools.

**TABLE 11.2 Question 3 Student Results n = 56**

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Correct Conceptual Response</th>
<th>Incorrect Procedural Response</th>
<th>Incorrect Procedural Description</th>
<th>No Attempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3a</td>
<td>11</td>
<td>23</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Q3b</td>
<td>1</td>
<td>30</td>
<td>11</td>
<td>14</td>
</tr>
</tbody>
</table>

The typical procedural answers included
While Rhianna’s answer goes into more detail about the order of the process she fails to analyse why the number 81 is present other than from a procedural perspective.

Robin’s answer and her crossed out answer are both interesting. She has difficulty with language again and writes of sharing 9 into a larger number. The crossed out section implies that she only becomes aware of the number 81 if ‘long division’ or recording is chosen.

Helen’s answers although correct are very procedural. Her answer to question 3b is an example of quotation. If she is mixing up this language with the recommended sharing language
for the division algorithm this will add a further dimension to the confusion experienced by her students.

\[ a) \quad 9 \times 9 \]

\[ b) \quad \text{It's to find what is left after} \]
\[ \text{9 sets of 9 have been taken out.} \]

During the interview Helen spoke of running out of time to get through the year's work and that she did not have time to teach for understanding but if her students did what she said they would get it right. She said she liked structured teaching, which she classified as 'sit up and shut up'. This style of teaching fits very well with the procedural explanation she has given for the division process.

Problem solving

Question 4

When Movie World opened the Wild Wild West ride, 6445 people went on the ride on the first day. If each wagon holds 7 people, how many full wagons could there have been?

Question 5

A Birch Carroll and Coyle cinema need 9238 packets of skittles to stack their shelves. If 4 packets are contained in each box how many boxes would need to be ordered?

Table 11.3 Questions 4 and 5 Student Results n=56

<table>
<thead>
<tr>
<th>Ques No.</th>
<th>Correct Answer</th>
<th>Incorrect Answer</th>
<th>Difficulty interpreting remainder-calculation correct</th>
<th>Difficulty interpreting remainder-calculation incorrect</th>
<th>Internal Zero Error</th>
<th>Process Error</th>
<th>Fact Error</th>
<th>No Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4</td>
<td>15</td>
<td>41</td>
<td>13</td>
<td>16</td>
<td>9</td>
<td>14</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>Q5</td>
<td>7</td>
<td>47</td>
<td>22</td>
<td>11</td>
<td>8</td>
<td>12</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

More than half the students did not interpret the remainder and so failed to give the correct answer to the problems. This is a good indication of the prevalence of this problem that Silver (1993) has continued to document. Fact errors are also quite high, which has lowered the anticipated difficulty with the zeros in the quotient.
Some students resorted to extremes in support mechanisms for unknown facts. Note the lengths Rachel has gone to because she did not know how to share nine thousands between four. She has actually linked the 9 thousands and the 2 hundreds possibly because she does not understand that 9 thousands can be shared among four.

Kelly demonstrates a processing error. She may have read this as nine shared among four, 2. Two shared among four won’t go, put in a zero, three shared among four won’t go, put in a zero and eight shared among four goes 2. The remainder 1 may have been carried from the sharing of 9 thousands.

Jimmy displays the symptoms of a student who has learnt something without understanding. In question 4 he omits the internal zero while in question 5 he writes it in and then rubs it out, as he has difficulty remembering the steps in the procedure. An appreciation of the significance of place value does not appear to be one of Jimmy’s strong points, or at best he has not linked it to division. However note that he is trying to make sense of the question and the remainder.
Question 4
When Movie World opened the Wild, Wild West ride, 6445 people went on the ride on the first day. If each wagon holds 7 people, how many full wagons could there have been?

\[
\begin{align*}
92 & \div 7 = 13 \text{ remainder } 1 \\
92 & \div 7 = 13 \text{ remainder } 1
\end{align*}
\]

So, you will have 13 wagons and 5 people left over.

Question 5
A Birch Carroll and Coyle cinema needed 9238 packets of skittles to stack their shelves. If 4 packets are contained in each box how many boxes would need to be ordered?

\[
\begin{align*}
9238 & \div 4 = 2309 \text{ remainder } 2 \\
9238 & \div 4 = 2309 \text{ remainder } 2
\end{align*}
\]

You need 2310 packets or 2310 boxes.

Discussion
The errors documented in the literature have all been present in this small sample. The teachers argued that the students’ results would have been better had they followed the procedure they had been taught. It needs to be considered that if the teachers had a greater depth of conceptual understanding then they may well have taught for understanding as opposed to a procedure that was to be repeated without understanding. If the concept was taught with meaning in the first instance the process followed would not have been so piecemeal and better results could have been expected.

During the interviews a discussion about why division is considered the most difficult operation was initiated. Both teachers argued that the basis of the problem is that the children do not know their basic facts. It can be argued that knowing the basic multiplication facts will ease the computation process but it does not mean that students will understand division. Indeed the major difficulty for learners with division is that there are no division facts per se, enabling them to complete each step immediately as is the case for addition, subtraction and multiplication. Rather they need to be able to determine the nearest multiplication fact and calculate the remainder. This demands a conceptual understanding of multiplication that allows the multiplication facts to be re-interpreted as well as a conceptual understanding of division that links multiplication with remainders to the fundamental notion of division.

The teachers made significant errors on the test paper in line with errors made by their students and those documented in the literature. Robin was unable to read the division expression correctly. She repeated this mistake on 2 separate questions in the paper. When Robin was asked about this fundamental aspect during the interview she said that she would teach her students to read the division expression by using the language of sharing. She has used this very language herself but linked it with inappropriate language of ‘goes into’. Robin also had difficulty interpreting the remainder in her calculation to give the correct answer to the problem. It could be argued that Robin’s understanding of division is limited. When this is coupled with the fact that
she does not refer to any mathematics literature other than on old edition of the Syllabus Support Document, and that all undergraduate resources were ‘burnt when I left college’, there does not appear to be any prospect of future growth.

Neither teacher is currently, or ever has been a member of any professional organization. Helen has not attended any professional development in mathematics for as long as she can remember. Robin attended a full day’s in-service in mathematics last year and it was the first and only mathematics professional development in her 20 years of teaching. Astonishingly neither teacher referred to any teacher reference books at all on mathematics. Helen felt that she did not need to refer to them because ‘once I have read something I am confident of my ability’. Helen’s confidence in her teaching ability is the reason why she feels she has no need for reference books. She stated that she believes herself to be a reference site for other teachers as they are always asking her for advice and that it is her teaching experience that goes a long way. Experience is definitely a valuable commodity however depth of understanding is essential to support informed teaching practice. These teachers have not read anything on the common errors that students make, how to identify errors or ways to design an intervention program. The main source of reference for both teachers is student workbooks. Unfortunately these books do not tend to give in-depth explanations at the primary level. Consequently their teaching methods or understanding may not be challenged. To identify the extent to which these two teachers are representative of the teaching profession would need further investigation.

Implications
The implications drawn from this study focus on the fact that the major stumbling block to improving student outcomes is the minimal knowledge of mathematics concepts possessed by the teachers and their personal reluctance to seek out professional development in this area. It is difficult to imagine that a teacher who feels inadequate in mathematics would have no desire to improve understanding or the teacher who is confident not benefiting from collegial reassurance. When consideration of the amount of inservicing that teachers attend for literacy is compared to that of mathematics it is hard to understand how such a disparity has developed. Particular effort to balance the PD available and attended needs urgent attention.

It is impossible to calculate the degree of student difficulty caused by teachers who remain ill informed and fail to seek outside assistance yet continue to teach. Further study in this area is necessary to identify whether the impact of a teacher who teachers without sufficient understanding can be reversed by the commitment of subsequent teachers.

Finally, it is recommended that the school mathematics program is reviewed every few years by all teaching staff at a round table discussion so that they each have ownership of the program. There is no point having a program that is held by the mathematics coordinator and not used by the staff. This may or may not be the case with Helen who may have felt she did not need to acquaint herself with the program considering the short time frame of her relief appointment. Robin’s program is very old and was developed by staff 15 years ago. It is not that surprising that she does not use it. Robin uses the mathematics program a couple of times a year to see if she is
on track. If she was involved in writing the program she would find she understood what it all meant and as a result be more inclined to use it. It is recommended that a review of programs becomes a project that is part of staff professional development days that initially could be supported by an outside expert.

Both these teachers are working hard and making a contribution to the education of our youth. It is disappointing to consider that their efforts are not having a more profound impact simply because of a lack of obtainable knowledge. Schools, education departments, professional bodies and registration boards all need to be more outspoken about the benefits of professional development.

References


Facilitating Positive Social Interactions for Children with Learning Disabilities

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Overview
An analysis of social competence, teacher-student relationships, and student-student relationships indicates the importance of fostering the acceptance of all children within the regular classroom. This paper reviews and analyses relevant literature then summarizes a program designed to facilitate the social interaction of children with learning disabilities in inclusive classroom settings.

Introduction
If teachers are to facilitate the acceptance of all children in the classroom, they must do much more than allow them to exist without interference or support. It appears that acceptance is best promoted through the teaching/learning of social competence and through providing structured opportunities for social interaction (Segrin & Flora, 2000). This challenges teachers to establish a foundation of respect in their classrooms which can support positive teacher-student and student-student relationships.
Acceptance, as it is defined, has three critical facets. To "accept" means: (a) "to take or receive willingly"; (b) "to believe; agree to"; and (c) "to take responsibility for" (Longman Dictionary of Contemporary English, 1984, p.5). In a truly accepting classroom, then, each member of the group associates willingly with all others, agrees to uphold certain shared standards of behaviour (cooperation, expressing emotions appropriately, etc.), evidences a belief in self and others through positive interactions, and takes responsibility for attaining individual learning and social goals (Knight, Graham & Hughes, 1995).

A general program designed to foster social relationships is needed, such as the social competence program developed by Hughes (1996). An important aspect of such a program is facilitating the social interaction of children who have learning disabilities (LD) as these children tend to face more difficulties and be less accepted in regular classrooms (McConnell & Odom, 1999). Social competence, however, is indisputably important to all children.

**The importance of social competence**

People need to learn to accept each other. To be socially integrated and accepted, a child must be a member of a group where he or she (a) is socially accepted by peers, (b) has at least one reciprocal friendship, and (c) is an active and equal participant in activities performed by the peer group (Cullinan, Sabornie & Crossland, 1992). Research has reported benefits for one’s self-esteem, motivation and academic achievement when students feel socially accepted by their peers. For example, Ladd (1990) studied the impact on later adjustment of being ‘liked’ and ‘having friends’ when beginning school. He reported that children with a larger number of classroom friends had a favourable perception of school, and better overall school performance. However, children rejected by their peers had less favourable perceptions of school and lower levels of school performance. Vaughn and Hogan (1994), report that many children with learning disabilities are less accepted and more frequently rejected by their peers. This may be due to low self-esteem or to poor academic performance. Their lack of friends can lower self-esteem further and limit the opportunities for positive social interactions that these students have. Some may even display early indications of social incompetence (Hughes, 1996).

An important research focus has been the role of behaviours and/or cognitions that are used to regulate and control emotional arousal. Children who do not learn to control their emotional expression appropriately are at risk of being rejected by their peers because of their social incompetence. Kopp (1989), states that managing negative emotional states such as frustration and anger is a critical component in a child's adaptive social functioning and relationship competence. In addition, Zahn-Waxler, Cole, Richardson, Friedman, Michel, & Belouad (1994) have reported that some forms of oppositional and disruptive behaviour in preschoolers may indicate early disturbances in social competence and interpersonal skills that can signal possible long term emotional and behavioural problems. Such problems include delinquency, depression, anxiety, teenage suicide, and a future lack of success in the workplace (Coie, Lochman, Terry & Hyman, 1992; Erdley & Asher, 1999; Segrin & Flora, 2000).

Although it is recognized that problems with social competence may arise before a child attends school and can be formally identified as learning disabled (Vaughn, Hogan, Kouzekanani, & Shapiro, 1990), it is sobering to realize that adolescents with learning disabilities have a 220% chance of becoming delinquents when compared to their non-learning disabled peers (ACLD
Some researchers trace social problems to early familial influences. For example, Lytinen, Rasku-Puttonen, Poikkeus, Laakso, & Ahonen (1994) report that mothers of children with learning disabilities used fewer high-level strategies, spent less time teaching, exhibited more dominance over their children, and displayed less emotion and cooperation with their sons than mothers of non-learning disabled children. Similarly, Toro, Guare, Weissberg, & Liebenstein, 1984; Guralnick, Connor, Hammond, Gottman & Kinnish, 1995; Odom, Zercher, Li, Marquart & Sandall, 1998; McConnell & Odom, 1999 report that children with learning disabilities were less able in their social problem solving skills and exhibited poorer school behaviour.

After summarising much of the relevant research, Westwood (2003) states that social interactions are problematic for children with learning disabilities, for three main reasons: firstly, children without learning disabilities do not readily accept children with learning disabilities; secondly, teachers do not intervene positively on the children's behalf to promote social interaction; and thirdly, such children do not automatically observe and imitate the social models around them. Other factors that may contribute to low peer acceptance are, low achievement, less successful inclusion into the classroom and wider school environment, and negative teacher perceptions of children with learning disabilities (Vaughn & Hogan, 1994).

Facilitating the social interaction of students with learning disabilities
The literature pertaining to social interactions for students with learning disabilities clearly indicates that teachers need to establish a supportive learning environment for all students by using strategies which promote acceptance, social interaction, and social competence. There are some simple and effective ways that teachers can foster acceptance in their classrooms. Specifically, teachers can promote supportive student-teacher and student-student relations, increase social interaction opportunities by utilising cooperative learning strategies and other group work, and promote social competence through specific social skills programs designed for this purpose.

Creating an accepting classroom
Teachers must be cognizant of the general social skills problems that students with learning disabilities have. According to Garrett and Crump (1980), Vaughn and Hogan (1994) and others, however, teachers have lower expectations and less positive perceptions of children with learning disabilities. These attitudes can influence the perceptions of other class members toward these students. A good starting point for increasing acceptance in the classroom, then, is to increase teachers' awareness that they generally rate students with learning disabilities poorly on social rating scales, and that they must endeavour to provide positive models in their interactions with these individuals. Teachers also need to be reminded that they must strive to possess and project a high level of self-acceptance in order to promote the understanding and acceptance of others. Burns (1989) emphasises that it is those teachers with high self-esteem who are most able to successfully use socially interactive teaching methods to foster peer acceptance. All of these factors must be considered in order to create classroom environments in which genuine acceptance and social integration can flourish.

In creating an accepting classroom, teachers need to reflect on their teaching style and how it impacts on children's feelings, attitudes, and behaviour. Vaughn, McIntosh, and Zaragoza (1992) advise teachers to ask the following questions about their classrooms: (1) does each
student feel successful and valued in both educational and social situations?; (2) are students subtly ‘put down’?; (3) are students allowed to be ‘put down’ by their classmates?; (4) do I develop learning activities that allow all students opportunities to interact with each of their classmates?; (5) am I aware of my students’ areas of expertise?; (6) are opportunities provided for my students to appreciate each other’s talents? These questions embody guiding principles for facilitating social interactions.

**Improving relationships within the classroom**

The importance of children's social relationships must not be underestimated. Children who do not have satisfactory relationships may be preoccupied with their social lives and as a result are less than optimally interested in academic work. It is therefore important that teachers set a tone in their classrooms that affirms the value of all students and accepts individual differences.

*Student-Student relations.* Children with learning disabilities often have poor relationships with their peers. They are often rejected as playmates, rarely identified as popular, and generally less accepted by their peers than other classmates (Gresham & Reschly, 1986; Hoyle & Serafica, 1988; Pearl, 1987; Sabornie, Marshall & Ellis, 1990; Stiliadis & Wiener, 1989; Vaughn, Hogan, Kouzekanani & Shapiro, 1990). These are important findings because they suggest that children who are not accepted by their peers are at greater risk of psychological adjustment problems in later life (Parker & Asher, 1987, Segrin & Flora, 2000).

Vaughn & Hogan (1994) view this low level of peer acceptance as primarily due to three factors. Firstly, learning disabilities are associated with low achievement, difficulty processing information, and difficulty expressing information. These are all factors that can affect social judgement and interactions. Secondly, social acceptance may be poor because the perceptions and behaviour of others influence peer ratings of individuals with learning disabilities. Finally, low acceptance levels may be due partly to environmental factors such as students' poor school attendance and inconsistent participation and behaviour in classroom activities.

*Teacher-Student relations.* Teachers tend to rate students with learning disabilities poorly on dimensions of both behaviour and temperament (Vaughn & LaGreca, 1988; McConnell & Odom, 1999). Teachers rate male students with disabilities as more ‘disruptive’ and ‘disobedient’ than female students with disabilities, who tend to be viewed as ‘self-conscious’ and ‘withdrawn’. In general, students with learning disabilities are seen by their class teachers as less socially aware than their higher-achieving peers.

Observational studies conducted in the classroom and the playground (Feagans & McKinney, 1981; McKinney & Speece, 1983) have reported that children with learning disabilities are more likely to be off-task and to interact with teachers rather than peers. Most of these studies have looked at easily observable factors such as time on task. However, there is a clear need for further research which focuses on more subtle indicators of social competence which may help explain why students with learning disabilities have consistently negative ratings from classmates and teachers. Recent studies in this area suggest that the social incompetence of children with learning disabilities may be related to their lack of self-management skills combined with poor control of emotions and behaviour (Kopp, 1989; Zahn-Waxler et al., 1994).
Overall, teachers need to be aware of the impact they have on children's social acceptance. As Vaughn and Hogan (1994) point out, teachers' tolerance of individual differences and their skillfulness in creating accepting, nurturing classroom environments, plays a significant part in affecting children's social competence. This finding stresses the importance of a teacher's ability to structure a classroom environment which will improve the chances of social acceptance for students with learning disabilities. A study by Vaughn, McIntosh, Schumm, Haager, and Callwood (1993) reported that when teacher acceptance was controlled, no significant differences existed between groups consisting of students who were learning disabled, low achievers, average achievers, and high achievers.

The research relating to fostering teacher-student relations suggests that teachers need to (a) teach students strategies for successful academic and social achievement, (b) promote more independence, and (c) develop students' social knowledge and skills. These areas will be elaborated in the following section which focuses on what can be done to promote the social acceptance of students with learning disabilities.

**Strategies for facilitating social interaction in the classroom.**

Westwood (2003) states that teachers need to consider the following when endeavouring to facilitate social interaction for children with learning problems. Firstly, the attitudes of the peer groups and the teacher need to be positive and accepting. Secondly, maximum opportunity should be arranged for students to interact socially through working in pairs or groups both in the classroom and the playground. Lastly, specific skills should be taught to enhance social contact with peers.

Students can also support each other through such activities as peer tutoring, peer-teacher and peer-peer conferences, reciprocal teaching (Palinscar & Brown, 1984), and other activities that require genuine peer collaboration. Cooperative learning is a particularly useful teaching approach which can help develop and enhance social skills. Classrooms that focus on cooperative learning are typically positive and by their very nature enhance students' acceptance of each other. Students' performance is not compared and children are motivated to learn and contribute to the whole class. When students work in groups, they support each other's efforts rather than compete against each other. Because students actively cooperate in structured social situations, the benefits include enhanced motivation and general attitude to learning. These benefits assist in fostering acceptance of all individuals in the classroom.

As Slavin (1990) stresses, "all cooperative learning methods share the idea that students work together to learn and are responsible for their team mates' learning as well as their own" (p.3). The major principles of cooperative learning include team rewards, individual accountability, and equal opportunities for success. These principles ensure that all students are valued and accepted for their contribution.

As noted previously, research with students classified as learning disabled (Bruininks, 1978; Scranton & Ryckman, 1979) has identified this group as being less accepted than their regular class peers in mainstreamed classrooms. In a traditional competitive classroom, these students would obviously suffer academically. In contrast, they can benefit from membership of classrooms where teachers practice cooperative learning strategies. In such environments all students make positive contributions. Many studies (eg Anderson, 1985; Johnson & Johnson,
1981, 1986; Madden & Slavin, 1983; Miller, 1989) have reported positive effects for students with learning disabilities involved in cooperative classrooms. These students are rejected less often, are included in more free time activities and are chosen as work partners more frequently in these settings. Clearly then, teachers using cooperative learning methods can promote positive interaction between students and break down barriers that threaten acceptance.

Groups of teachers can also benefit from cooperative learning. For example, the Cooperative Teaching Project (Self, Benning, Marston, & Magnusson, 1991) focussed on regular and special educators cooperating to improve students’ reading skills and increase the repertoire of skills and strategies of regular classroom teachers for use with low achieving students. Teacher acceptance of these students increased when teachers believed that they had the skills and strategies to support students experiencing learning disabilities. As the targeted students made significant progress in this study, it seems reasonable to assume that both teachers and peers were more accepting of students with learning disabilities as a result of sharing knowledge and responsibility for learning.

Cooperative learning is based on group work and requires that students acquire the skills and social behaviours necessary for such a learning situation. Westwood (2003) has outlined important considerations which should be taken into account when planning group work for students, namely

- Teach group members how to work together.
- Monitor activities and model and reinforce cooperative practices.
- Plan individual tasks to ensure division of labour appropriate to abilities.
- Limit group sizes and ensure personalities are compatible.
- Use teamwork activities with accountability built in.
- Encourage discussion during group activities.
- Provide working space in the physical classroom environment.

**Hughes' social competence program**
The enhancement of students' social competence, and hence their acceptance within the classroom, may require a special program in addition to the use of teaching methods that support peer interaction. Such a program would ideally create an awareness of the skills and behaviours involved in social competence, as well as strategies necessary for dealing with social interactions (i.e., a metacognitive approach to social competence enhancement is advocated).
The research base in support of this type of program is wide and current. Relevant research indicates that:

- the use of cooperative goal structures, behaviour modification, cognitive strategies and self evaluation procedures enhance students' social acceptance in the classroom (Polirstok, 1989)

- social skills training and pairing students with their non-disabled and highly-accepted peers increases peer acceptance of the rejected students (McIntosh, Vaughn & Spencer-Rowe, 1989)

- cognitive strategy and skill training increases students' peer acceptance (Hatzichristou & Whang, 1987)

- planned modelling programs need to give appropriate feedback, many opportunities for practice and promote social interaction between all students in the classroom (Cullinan et al., 1992; Evans, 1984).

Hughes (1996) has devised a program to facilitate the social competence of students. The program has 10 foci and involves a variety of teaching methods, all with an emphasis on developing students' metacognitive awareness of social interactions. A metacognitive approach is used in order to help children become aware of their behaviours, think about them, assume control of their actions and provide opportunities for learning appropriate social strategies. This program would work best if continually reinforced both in class and in the playground e.g., praising, self report to teacher at the end of the day, etc. A summary of Hughes' Social Competence Program is outlined below.

**Focus 1: Friends**

*Outcome/Goals:* That children realise the value of having friends (i.e., that friends are fun and make you feel better).

*Equipment:* Picture board (scene containing group of children having fun together).

*Books:* Read and discuss "Lizzie's Invitation" by Holly Keller.

*Content:* Use picture board to promote discussion. Develop the idea that it is important that all children have friends i.e., it is fun to have friends to play with, to share experiences with, to help you when you need help, to sympathise with you when you are sad, talk with you about fun things that you have done, talk about how happy it makes you feel to have a friend, etc. Discuss/ask the feelings you have when you do not have friends i.e., loneliness. Discuss/ask how you could make school into a place where everyone feels that they have a friend. Establish some rules made up by children under the guidance of the teacher. These rules could be written on a chart with a picture to help recognise the rule e.g., offer to play with someone who has no one to play with, invite others to play 'fun' games. Stress the positives.
Focus 2: Attending and Listening
Outcome/Goals: That young children become aware of the importance of listening and watching others around them; of the skills needed for good listening and watching; that interrupting shows that you are not a good listener; that listening is a way of showing that you are interested in the person speaking, and is a friendly behaviour. Listening and watching helps with making friends.
Equipment: Picture board (scene showing people listening to one another) with discussion questions supplied.
Content: Use picture board to promote discussion. Discuss/ask what you do to show that you are listening to someone (look at them, nod, answer, remain still). Discuss/ask what things make it easier for you to listen to someone (speak loudly, clearly, make it easy to understand). Comment on good listening that occurs inside or outside the classroom. Model good attending skills. Encourage, praise and reward attending and listening skills. Propose a strategy that could help students attend i.e.,

STOP whatever you are doing,
LOOK at the person speaking,
THINK before you do or say anything.
Reinforce this strategy in natural classroom situations.

Focus 3: Feelings
Outcome/Goals: That children can identify and understand their own and others' feelings; are able to express their feelings appropriately, and understand that sharing feelings helps with making friends.
Equipment: Picture board: Various children's faces and bodies expressing feelings such as sadness, anger, happiness, concentration, fear, etc. Discussion questions supplied.
Books: "I Get So Mad" by Norma Leder.
Content: Use picture board to promote discussion. Discuss/ask how you know others are feeling (visual and auditory cues). Discuss other body language signs (turning away, folding arms). Cut out faces showing different expressions, draw them, ask children to act out emotions. Discuss/ask what you should do when someone is expressing a negative feeling. Reinforce and model appropriate behaviour in the playground and classroom. Discuss/ask what makes you feel sad, scared, happy, hurt, angry, excited etc. Try to include examples such as death, saying goodbye, having a bad dream. Talk about how we share others' feelings. Talk about how we should tell people how we feel and that we must learn to show our feelings appropriately.

Focus 4: Valuing Yourself
Outcome/Goals: That children appreciate themselves and realise that they can do almost anything (especially with a little help from others); that children realise that if they value themselves, then others will most likely value and like them too.
Equipment: Photo of class group.
Books: "I Can Do Anything!" by Dannalea Sloan and Diana Santleben. "Claire's Dream or the Girl who Wanted to Play Rugby" by Lynne McAra.
Content: Use class photos to promote discussion. Discuss the fact that everyone is different (unique) and can do some things well and other things not so well. Ask each child to mention one thing that he/she does well. Make sure everyone gets a positive mention. This could be taped. During the following weeks, other messages could be added when a classmate does something
positive or friendly. Another alternative could be to make a class journal in which events that promote self-image could be recorded. A few minutes per week could be devoted to a session for support sharing. Encourage children to praise themselves and each other. Ensure that the teacher models praising behaviour (including praising herself when she does well). Help children evaluate their performance. Model the proper use of self-criticism.

**Focus 5: Joining a Group**

*Outcome/Goals:* That young children are aware of group 'rules' and develop the behaviours necessary for being accepted into a group, and that they develop 'friendly scripts' for not allowing someone to enter a group.

*Equipment:* Picture board (child standing outside a group of children who are playing).

*Books:* "Is There Room for Me?" by Keith Pigdon and Marilyn Woolley.

*Content:* Use picture board to promote discussion. Discuss/ask what you might do if you wish to play with some children already playing in the sandpit (LOOK to see what is happening, TALK about what is happening). Discuss/ask what you should do if you do not want someone to join in (give a reason or provide an alternative idea). Discuss/ask about disrupting and interrupting and indicate how children don't like behaviour that interrupts. Comment on classroom incidents which are disruptive or interruptive (speaking while someone else is speaking, taking a book before someone is finished with it etc.), when they occur and ask for alternative solutions. Encourage children to tell peers what is disruptive behaviour. Suggest and model other non-disruptive behaviour in its place.

**Focus 6: Friendly Behaviours**

*Outcome/Goals:* That children be encouraged to think of others and play in a friendly way e.g., by sharing, turn taking, helping and cooperating; be aware that working together makes people feel good and they may become friends, and understand ways to comment on or praise the accomplishments of others.

*Equipment:* Picture boards that show children working or playing together; sharing, turn taking helping, cooperating etc.

*Books:* "Little Red Hen" by Brenda Parkes and Judith Smith. "Only One Toy" by Smadar Samson.

*Content:* Use picture boards or a book to promote discussion. Encourage others to do well and show pleasure with the accomplishments of others. Discuss ways of encouraging others, when to encourage, and what communication to use. Discuss/ask how you can think of others or adjust your behaviour to accommodate others. Discuss how we can change our behaviour to think of others e.g., sharing, turn taking, helping, cooperating, and negotiating. This can avoid conflict. Have a chart and reinforcement system that rewards those who display encouraging behaviours.
Focus 7: Problem Solving/ Taking Control

Outcome/Goals: That children begin to develop problem solving skills; begin to develop self management skills, and begin to recognise the intentions of others.

Equipment: Picture board (scene of a child kicking over a block building).


Content: Use picture board to promote discussion. Discuss/ask about situations that arise when you don't know what to do. Discuss steps in problem solving using the picture board.

WHAT is the problem?

HOW did it happen and WHY? How do you know? Why do you think he did it? (to get attention, wanted to play with you, he wanted to be mean).

What could you do? (SOLVE) Talk about ways that this situation could be solved.

CHOOSE a solution.

TEST the solution. Try out the selected solution on a different yet similar problem.

EVALUATE the solution. Did it work? If not try another. Model and discuss problem solving as situations arise.

Focus 8: Resolving Conflicts

Outcome /Goals: That children understand that other people may have a different point of view that should be respected; that children may have to think of others and compromise, and to introduce strategies for resolving conflicts.

Equipment: Picture board (scene where two children are talking to teacher- one is upset).


Content: Use picture board to promote discussion. Discuss how everyone has an opinion but not all opinions are the same. Hence, conflicts or differences in opinion may arise. Children should state how they feel and others should try to see another child's view. Discuss/ask what compromising means i.e., when you have a problem you settle for something which is slightly different to what you wanted.

When there is a problem you have three choices: 1. Do what the other wants; 2. Do what you want; or 3. Do a little of both.

Discuss/ask when conflicts might arise. Discuss situations where you have to compromise. Talk about how you may feel. Encourage children to feel good about themselves for compromising. Act out a little scenario with two children in conflict. Discuss/ask how this conflict could be resolved.

Focus 9: Peace Making Strategies

Outcome/Goals: That children understand reasons for and develop specific strategies for coping with antisocial behaviour ('peace making').

Equipment: Role play: Scenarios of teasing, bullying, fighting, being greedy, being destructive, and being wasteful, etc.


Content: Use role play to discuss/ask about unfriendly behaviour. How can this situation be resolved a friendly way? Discuss examples that occur, as they occur in the classroom. Develop strategies to cope with antisocial behaviour.
Focus 10: Revision of Friendly Behaviour and Language

Outcome/Goals: That children will revise what they know about friendly behaviour and friendly language.

Content: Talk about behaviours that help you get friends (listening, sharing, helping, cooperating, turn taking, compromising, encouraging others, liking yourself, telling people how you feel, and giving reasons for not doing things). Talk about language that helps you get friends (Saying: sorry, please, I like it when you ---, I don't like it when you ---, well done!). Praise the children for friendly behaviours and language as it arises. Talk about unfriendly behaviours that make it difficult for people to like you (breaking things, tattling, being greedy, not waiting your turn, and teasing, etc.). In various unfriendly situations that occur, mention that this is not friendly behaviour and ask the child how they could make it into a friendly situation. Ask children to model the correct way to resolve a conflict that occurred during the week. Offer to re-read books about friendly behaviours that were their favourites.

Conclusion
Enhancing an individual’s level of acceptance may necessitate changing attitudes. Facilitating social interactions for students with learning disabilities will thus involve changing the attitudes of those participating in both the classroom and playground so that social competence in all children is promoted and valued. Not only do children need to be taught about social competence but also they need opportunities for working with others to foster acceptance. The program for improving social competence outlined in this paper promotes acceptance of each and every individual by all school members. The program emphasises effective communication, acceptance of individual differences, positive attitudes, appropriate emotions, strategy-based instruction, and cooperation.

References


CHAPTER 13

The Affective Components of Difficulty in Learning: Why Prevention is Better Than Attempted Cure

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Overview
.... when students believe that effort will not result in mastery, they may refrain from putting in effort and settle for the belief that the subject matter is too difficult or that their personal resources are inadequate. These attributions may protect them from criticism in future, but they also trap them in a vicious circle. Indeed, students who refrain from putting in effort due to low self-efficacy lose their chances of enhancing self-efficacy, interest and self-regulation (Boekaerts, 1996, p.588).

Confession time
Although I have worked in the field of learning difficulties for more than forty years, it wasn’t until I moved to Hong Kong four years ago that I became really aware of the personal and emotional reactions that accompany the experience of failure — in this case my own inability to learn something that others appear to learn fairly effortlessly. I refer to my inability to master the Cantonese dialect despite an extremely high level of motivation to do so and abundant opportunities and resources at my disposal. I was desperately keen to learn the language because it is the only way to become integrated into the local Chinese community. At the outset I had every expectation of being able to master the vocabulary quite quickly and acquire a repertoire of everyday greetings, responses, requests and conversational patterns. I purchased three different ‘Teach Yourself Cantonese’ programs with audiotapes and texts and I also spent many lunch hours being tutored by a Cantonese-speaking secretary (who, in return, wished to improve her English). But I failed miserably! After many hours, and initially much effort, my basic vocabulary remains probably fewer that one hundred words. Even the words and phrases I do know I am reluctant to use because my pronunciation is always slightly inaccurate and the Chinese listener will stare back at me as if I am speaking a strange language he or she has never before encountered.
In a matter of months my endeavours to learn Cantonese took me on a descending path from high optimism and feelings of self-efficacy to a state of total pessimism, helplessness and avoidance. I now shun almost all opportunities to speak what little Cantonese I have acquired because I know it will be ‘wrong’ and I will be corrected. I feel that learning Cantonese, with its seven different tonal patterns, is simply beyond me. I just don’t have the ability. I feel extremely guilty that I have given up on something that is so personally important to me, and I am sad that the “Teach Yourself Cantonese” programs are now neglected on a remote shelf. The notebook in which at first I so diligently scribbled new words is also buried and forgotten in the bottom of a drawer. Basically folks, I just can’t do it; it’s all too difficult; I can’t handle the frustration; I can’t take the constant correction; I can get by without it. Who, at the age of 66, would want to fail kindergarten Cantonese? I give up. I now reject all offers of help because I would rather not try than have to fail again.

Nothing recedes like success
If all this sounds very familiar it’s because the description above is a classic example of what has been described for many years as the ‘failure cycle’— early failure leads to frustration, feelings of inadequacy, withdrawal, and on-going avoidance of the task (Dane, 1990). The individual caught in a failure cycle thinks: ‘I can’t do it. I don’t like it. I’m not successful. I don’t have the ability. I am going to give up’.

If Cantonese was a compulsory subject and if I were a student in school I would probably have been referred by now to the educational psychologist or the audiologist for assessment of my ‘specific difficulty’ in learning this foreign language (dyscantoniesia). Perhaps the audiologist would discover that I am tone deaf, or that I have poor auditory discrimination — and perhaps I have. Perhaps the psychologist would report that I have limited short-term auditory memory span for phonemes and my performance on the WISC digit span and coding tests is sub-average — and perhaps it is. No doubt the support teacher would find that my phonological awareness is deficient — and perhaps it is. But let’s face it, these are not the reasons I can’t learn to speak Cantonese; the reason is that I can’t handle failure very well and I have opted out. I needed some early success but I didn’t get it. As Boekaerts (1996) suggests, I have attributed my failure to uncontrollable factors such as my own poor aptitude and lack of ability for second-language learning, and to the level of complexity in Cantonese phonology and syntax (task difficulty). Wearmouth (2002, p.218) reminds us that, “...when students find a task difficult, those who attribute their difficulties to controllable factors such as insufficient effort, are more likely to persist than are students who attribute their difficulties to uncontrollable factors, such as lack of ability”. When students believe that effort will not result in mastery they will refrain from putting in effort and instead will settle for the belief that the subject matter is too difficult and that their personal resources are inadequate. An individual needs to believe that success is possible if sufficient effort is to be maintained (Carr & Kurtz-Costes, 1994; McNamara, 1994).

What really surprises me most about this personal example of failure is how deeply I am affected by it. As teachers we all talk in an abstract way about students’ emotional reactions to failure and the impact that problems in learning can have on self-esteem and motivation. I’ve lectured on the ‘failure cycle’ for twenty years or more, and the topic is well covered in the literature. But unless we have been there ourselves and experienced those emotions first-hand our words are fairly empty. Until we truly understand the affective consequences of learning failure
(McKissock, 2001) our actions to prevent such damaging occurrences for the children in our own classrooms will always be half-hearted and inadequate.

**Do we attend sufficiently to affective outcomes?**

In 1995 Hay wrote, “Increasingly the role of affect and self-perception is being better understood in students’ academic development” (p.24) — but I am not sure that this statement is actually true. I don’t think affect and self-perception are recognized sufficiently as variables in our approach to both assessment and intervention for learning difficulties. In support work we still seem to give most of our attention to assessing children’s knowledge and skills and then attempting to ‘remediate’ in these areas. Affective factors are almost always neglected both in the assessment process and in remedial intervention methods that focus entirely on skill and strategy building (Charlton, 1992). Burden (2002) suggests that knowledge and skills represent only part of the story; the other part is ‘learner self-perception’ — how learners view themselves in relation to the learning situation. It is essential that the emotional side of failure be given serious consideration when planning and implementing intervention programs.

**Failure and the young child**

Where does failure begin? Unfortunately the answer is probably that for most children with learning difficulties their problems begin in the first two years of formal schooling; and often from that point their downward trajectory is set, unless truly effective early intervention is provided. But even the act of providing additional support and intervention brings its own problems for the child in terms of self-perception and self-esteem, as I will indicate later.

Observation of young children suggests that, even at an early age, they can begin to regard themselves as failures in certain learning situations. If, for some reason a child finds that he or she cannot do something that other children are doing easily, there is a loss of confidence. This loss of confidence leads to deliberate avoidance of the type of activity associated with the failure, and sometimes even avoidance of any new or challenging situation. Avoidance leads to lack of practice. Lack of practice ensures that the individual does not gain in proficiency or confidence, while other children forge ahead. The effects of early failure are thus cumulative, and may contribute later to many instances of learning difficulty in school.

Slavin (1994) reports that failure in the early grades virtually guarantees failure in later schooling. The evidence shows clearly that many students never recover from early learning failure in basic academic skills (Mittler, 2000; Rosner, 1993). The consequences are severe for a child who fails to learn to read in the early years with longitudinal studies indicating that remedial help beyond Year 3 often has very little effect (e.g. Juel, Griffith & Gough, 1986; Smart, Prior, Sanson & Oberklaid, 2001). Children who fail to read adequately by Year 3 are still likely to be having major literacy learning problems in high school and may also develop negative attitudes and behaviours detrimental to further learning (Seligowitz, 1998; Torgesen, 2002).

So what goes wrong? West (2002) and Seligman (1995) tell us that all children are born with intrinsic motivation, a natural desire to learn and to build competence and mastery. Mastery orientation suggests that they enjoy informal learning for its own sake; they gain satisfaction from completing tasks they have set themselves; and they will persist in the face of challenge or difficulty. They exhibit such mastery orientation constantly in their exploratory and play behaviour in the preschool years. Slavin (1994) indicates that almost all children, regardless of
social class or other factors, enter school for the first time full of enthusiasm, motivation and self-confidence, fully expecting to succeed. But before the end of Year 1 some of them are losing that confidence because they are not experiencing success. Lack of success reduces mastery orientation, weakens a child’s feelings of self-efficacy, lowers their self-esteem and diminishes their motivation (Hauser-Cram, 1998; Neal & Kelly, 2002; Rosner, 1993). In the domain of reading, we know that failure to learn to read when others around you are learning to read easily can create in a child a very negative attitude toward reading, resulting in a reluctance to engage in that activity (Torgesen, 2002). Children with negative feelings about themselves as learners often will give up trying and will thus compound their learning problems (Webber et al., 2002).

Failure to learn in the first year of school can be due to many factors — environmental, genetic, maturational, neurological, perceptual, linguistic, psycho-social (Selikowitz, 1998); but perhaps the most common cause over which teachers have a measure of control is a mismatch between the child’s existing knowledge, skills, attitudes and values and the culture and expectations of the school (Smidt, 2002). When teachers set curriculum tasks that are too demanding for a child’s current level of aptitude, or when teachers fail to explain in language that children can understand, some students will fail. Persistent lack of success results in what Robinson (2002, p.33) refers to as a “downward cycle of de-motivation and lack of effort”. No child should be exposed to constant failure in school if he or she is to maintain normal motivation to learn. As Ormrod (2000) states, all teachers need to ensure that children experience success far more often than failure.

Lewis (1995, p.31) reminds us:

*One of the biggest challenges for the teacher of a child who has difficulties in school-based learning is to sustain the child’s confidence and enthusiasm in learning. The greatest disincentive in learning anything is to experience repeated failure. Even adults, who should be relatively confident and mature, tend to react to failure by wanting to avoid the activity which prompted the failure.*

We can readily appreciate that frequent failure undermines a child’s self-esteem and feelings of self-worth — but does this mean that all activities in the early years should be so simple that students never fail? Definitely not; accepting occasional failure and *attributing that failure to the correct cause* is an essential part of learning. It is not feasible or desirable that a child avoids all experiences of failure (Seligman, 1995). For teachers in the beginning years of schooling the problem is how to limit the amount of failure that any one child encounters; and when failures do occur children need help in attributing that failure to the correct cause. Studies have indicated that young children do not necessarily attribute failure to the correct factor (e.g. completing a task too quickly, not putting in sufficient effort, not really listening to the instructions); they are more inclined to blame external and uncontrollable factors such as bad luck or the teacher’s mood that day (Boekaerts, 1996; Eccles et al., 1998; Eisner & Seligman, 1996). In particular, young children may not appreciate the relationship between making greater effort and achieving more frequent success (Butler, 1994), so when teachers exhort them to ‘try harder’ they may be wasting their time. Even secondary-age students may not fully recognize the relationship between effort and achievement, instead attributing high achievement almost entirely to innate ability — something beyond their control (Bissaker, 2001).
Affective determinants in learning at any age
The major affective variables involved in learning include:

- how much a particular learning task is valued by the learner (intrinsic motivation);
- beliefs about one's own ability and competence (self-efficacy);
- attributional beliefs concerning the causes of success and failure (locus of control);
- awareness of the way others may perceive you as a learner (self-worth);
- appreciation of one's own capabilities and strengths (self-esteem).

These important variables tend to be strongly interrelated, with some sharing a reciprocal relationship. The experiences a student has while learning will shape, for better or worse, that student's perceptions of his or her capabilities, confidence and motivation — and will therefore influence future learning. These important affective variables will be discussed here in more detail.

Motivation: valuing the task or activity
Motivational psychologists study the variables that make people act and think in certain ways. They explore possible reasons or forces behind an individual's choice of activity, the persistence with which the person will engage in the activity, their reactions when faced with difficulties, and their thoughts about themselves as learners (Eccles et al., 1998). In the 1960s the motivational psychologist Atkinson (1966) developed what is now termed the 'Expectancy-Value Theory'. This theory suggests that for students to be willing to expend personal effort on an activity that activity and the outcome have to be seen as valuable to the learner and the learner has to believe he or she will be successful if they attempt the task. If the learner does not feel confident about success, or if the task is not valued, very little effort will be expended and low achievement can be anticipated.

Even in the preschool years children appear to have clear beliefs about what they value and what they are good at (Eccles et al., 1998). In the early years, when the children engage mainly in self-chosen play, they don't choose activities that are irrelevant or boring to them; indeed, everything they choose is of great interest to them. In the jargon of today we might say that they only engage in authentic and relevant tasks (Ormrod, 2000). They also handle difficulties without feeling incompetent. Unfortunately the reality of classroom situations means that some of the tasks we require children to tackle are not intrinsically interesting and it is often difficult to convince children of the value of an activity (Biggs, 1995). When a task is not perceived as relevant learners find much greater difficulty in giving their attention and effort. Similarly, when the tasks set for students are too demanding, too vague, or too complex they cause frustration and disengagement.

Teachers often blame a student's learning problems on his or her lack of motivation. According to Driscoll (2000) teachers believe that this lack of motivation is the underlying reason that students avoid class work, refuse to become fully engaged in a learning task, fail to complete work they could easily do, or are willing to complete a task only for some extrinsic reward it may bring. It is almost as if teachers believe motivation to be an innate trait of learners, rather than a variable that is significantly influenced by outside factors. On this issue Galloway et al. (1998, p.17) have remarked:
Too often, motivation is seen as a characteristic of pupils, perhaps not quite as unchanging as age or eye colour, but nevertheless firmly embedded in their make-up. We have argued that it can be seen as the product of an interaction between pupils and the varying situations in which they find themselves at school.

For many students with learning difficulties (and old men trying to learning Cantonese!) the problem is certainly not an innate lack of motivation but rather a marked reluctance to take risks or make any new commitment in a learning situation (Covington & Teel, 1996). This reluctance is due to prior experiences of failure.

Biggs (1995) suggests that the following factors help to maximize motivation:

- tasks should present the right level of challenge;
- activities should bring with them pleasure, enjoyment, satisfaction and success;
- social reinforcement should be available: for example genuine praise given to you by others; pleasure expressed by others concerning your performance;
- ownership of the task and self-determination are important: freedom to make choices and decisions concerning what you do and how you do it;
- feedback from others that implies or confirms your own personal competence.

Conversely, motivation is diminished by:

- irrelevant or boring tasks;
- frequent experiences of failure;
- negative reinforcement and criticism;
- information overload.

Self-efficacy
Expectations of success are directly related to the learner’s beliefs about ‘self-efficacy’. Self-efficacy relates to an individual’s awareness of personal competence in a given situation. Such awareness develops in part from students’ observation of their own performance and the results they obtain, from feedback given by others, and from comparing themselves with other performers (Eccles et al., 1998). Achieving good results, being praised and admired by others, enjoying your successes, and knowing that you are doing well all contribute to the development of one’s beliefs about self-efficacy (Chan, 1994; Gage & Berliner, 1998). Conversely, poor results and too much criticism reduce self-efficacy and lower a learner’s aspirations (Biggs, 1995). Self-efficacy in any task domain arises mainly out of experiencing successful performance in that domain. Individuals low in self-efficacy tend to shy away from difficult tasks because they are seen as personally threatening and likely to result in some loss of self-worth.

In intervention programs, every effort must be made to try to maximize each child’s feeling of self-worth and enhance his or her academic self-efficacy (Eccles et al., 1998; Erlbaum, 2002). The teacher’s use of descriptive praise when giving feedback is important in this respect.
Children’s awareness of self-efficacy

There is ample evidence to show that children’s beliefs about their own competence in relation to a domain of knowledge play a major role in influencing their performance (Eggen & Kauchak, 2001; Pintrich & Schunk, 1996). Achievement and self-efficacy go hand in hand; knowing that you are doing well enhances a learner’s feelings of competence and confidence — and the reverse is obviously true (Boekaerts, 1996). Due to a history of poor outcomes from their efforts, students with learning problems tend to have very detrimental beliefs concerning their own self-efficacy (Ormrod, 2000).

The level of a student’s self-efficacy is an important variable related to how much effort the student will put into any task and how long they will persist if the work is challenging (Moriarty, Douglas, Punch & Hattie, 1995). As children come to understand that their mistakes often occur simply because they have not applied enough effort, or have not taken sufficient care, their perceptions of inability will decrease. If students can be taught also to apply more appropriate strategies when approaching classroom tasks they will experience more success and there will be a corresponding increase in their feelings of self-efficacy (Chan, 1994; Craske, 1988). Learners need to believe they can be successful and that they have some personal control over their learning and progress.

Self-esteem

Self-efficacy and self-esteem are very closely related. Self-esteem can be loosely defined as appreciating one’s own qualities, worth and importance (McInerney & McInerney, 1998). Positive self-esteem is regarded as one of the most basic of human needs (Maslow, 1987). It is the responsibility of all schools to address this need within their students. Ormrod (2000) indicates that all learners must have abundant opportunity to be successful in academic, social and physical tasks if they are to develop positive self-esteem and maintain good levels of motivation. In the academic domain it is essential to gear all schoolwork to students’ developmental levels and capabilities, and to provide students with positive and constructive feedback. “We need to respond to students in ways that will boost rather than lower their self-esteem” (Ormrod, 2000, p.82).

It is sometimes suggested that a child’s self-esteem can be enhanced in some general and decontextualised way (‘making them feel good about themselves’) and that this in turn will result in improved learning and behaviour. Seligman (1995) challenges such a view and says self-esteem is created almost entirely by an individual’s successes and failures in the world; it does not exist in a vacuum. Low self-esteem is not usually the cause of a learning or behaviour problem but rather it arises from the lack of success.

Seligman (1995, p.33) states:

*Feelings of self-esteem in particular, and happiness in general, develop as side effects of mastering challenges, working successfully, overcoming frustration and boredom, and winning. The feeling of self-esteem is a byproduct of doing well.*
In their day-to-day interactions teachers need to nurture students’ endeavours if they are to develop positive self-esteem. But self-esteem is sometimes undermined in schools by:

- labelling some students as failures, either overtly in the feedback they receive or covertly by the ways in which they are managed and treated (Hay, 1995; Riley & Rustique-Forrester, 2002; Rosner, 1993; Smidt, 2002).
- using ability-grouping practices that reinforce feelings of inadequacy in students assigned to the lowest groups (Chang & Westwood, 2001; MacIntyre & Ireson, 2002).
- withdrawing students from classes to attend remedial lessons — this can negatively affect the student’s social status and self-esteem back in the regular class (West, 2002).
- setting unsuitable tasks that result in frequent failure (Chan, 1994; Charlton 1992).

**Self-worth**

While many psychology texts tend to equate self-esteem with ‘self-worth’ the concept of self-worth merits separate consideration here because it directly influences the way in which some students respond to potential failure situations. Self-worth theory is about the protection of one’s self-esteem or self-image from negative evaluation by others (Eccles et al., 1998). For example, many students would not wish their peers or the teachers to think they lacked ability in a particular area; and the students would rather give the impression that they get poor results because they are not interested in the subject and have not put in any effort. For them not trying may be better than trying hard and failing (Bissaker, 2001). Self-worth theory suggests that in some circumstances the student stands to gain by not making any effort because avoiding the task saves loss of face that failing would have caused. In this case, avoidance is protecting the student’s feeling of self-worth (Valas, 2001). Attempting to maintain self-worth can cause a student to adopt a variety of defensive strategies (Galloway, Leo, Rogers & Armstrong, 1995).

**Attributions for success and failure**

Attribution theory (e.g. Weiner, 1984) is closely related to notions of self-efficacy and indirectly to self-esteem and self-worth. The theory tries to explain an individual’s beliefs concerning what controls the outcomes of their endeavours. In the case of failure in school for example, a student may attribute lack of success to his or her own lack of ability — or instead may say that the task was too difficult, or the teacher was not being fair (Chan, 1994; Galloway & Rogers, 1994). Students’ past causal inferences about their own successes and failures are major determinants of future motivation and achievement (Ho et al., 1999). Attribution theory suggests that children will not be motivated to persist in learning if they have attributed success or failure to forces over which they have no control (e.g. their own innate ability) rather than to factors they can control to some extent (e.g. amount of effort they make, or their improved use of cognitive strategies) (Cole & Chan, 1990; Ormrod, 2000).

Eisner and Seligman (1996) use the term *explanatory style* to describe how a person accounts to themselves for their own failures and successes. An explanatory style can be optimistic or pessimistic according to the individual’s locus of control. A pessimistic explanation (‘Lack of success is due to my lack of ability’) has several negative outcomes for learners, including less motivation to try, poorer results, reduced productivity, and possible depression. Students who attribute lack of success to lack of innate ability will tend to avoid tasks or will not persist in the face of difficulty. They feel incompetent. A locus of control that blames self (‘I am
stupid’), damages feelings of self-efficacy. It is much better when students attribute lack of success to a lack of effort on their own part, or to not approaching a task efficiently. An optimistic explanatory style would have a student thinking, ‘I can do this job better next time. I just need to follow the instructions carefully’. Charlton (1992, p.35) states, “… intervention is likely to require a therapeutic input to promote children’s internal beliefs to a level where feelings re-emerge that academic failure can be avoided, and success opportunities maximized through the employment of effort and persistence”. One intervention designed to bring about this change is termed attribution retraining.

Attribution retraining

Teachers must not only try to increase students’ skills and knowledge in intervention programs, but also the ways these students think about themselves and the tasks they are given (Leo & Galloway, 1994). Attribution retraining is an approach that aims to help learners make the appropriate connections among the factors controlling or influencing their own performance (Chan, 1994; Gage & Berliner, 1998; Winebrenner, 1996). For example, we want students to recognize the causal effect of effort on quality of outcome. We want students to focus on controllable factors and to avoid a pessimistic explanatory style. Craske (1988, p.162) explains, “It is assumed that as a child comes to understand that his (sic) mistakes occur because he has not applied enough effort, and that he can improve his performance by trying harder, his perceptions of inability will decrease, and there will be a corresponding increase in feelings of self-efficacy and expectations for future success”.

In attribution retraining students are taught to appraise carefully the results of their own efforts when a task is completed. They are taught to verbalize their conclusions aloud: ‘I did that well because I took my time and read the question twice’; ‘I listened carefully and I asked myself questions’; or ‘I didn’t get that problem correct because I didn’t check the example in the book. Now I can do it. It’s easy!’ The main purpose in getting students to verbalize such attribution statements is to change their perception of the cause of their successes or failures in schoolwork. Verbalizing helps to focus their attention on the real relationship between their efforts and the observed outcomes.

Attribution retraining can be effective for students with learned helplessness (Cole & Chan, 1990; Craske, 1988) and it should be one important component within any intervention program. Intervention must aim to increase feelings of self-efficacy and establish a correct interpretation between effort and outcome (McNamara, 1994). In most cases, attributional retraining seems to have maximum value when it is combined with direct teaching of the task-approach strategies necessary for accomplishing particular tasks.

Grainger and Frazer (1999) have discussed the negative attributional styles of students with reading disabilities, many of whom have developed learned helplessness in relation to their own ability to improve. They suggest that these children may not respond to remedial teaching if the intervention focuses only on skill development. They recommend first helping the child explore his or her feelings, beliefs and attitudes linked to their reading difficulty, and then teach the child to use positive self-talk to overcome personal reluctance and to restore some feeling of self-efficacy. Do we include enough of this therapeutic emphasis in our intervention programs? Probably not.
Learned helplessness
Frequent lack of success and a markedly external locus of control can lead a student to a state of 'learned helplessness'. Eisner and Seligman (1996, p.199) remark, “Learned helplessness arises when a person expects that his or her responses cannot control outcome”. Learned helplessness in children is usually due to their attributing failure to their own lack of ability and to factors outside their control. Learned helplessness is also more likely to occur when students believe their teachers regard them as no-hopers and low achievers (Galloway & Rogers, 1994). Craske (1988) suggests that children with poor academic self-concept appear to be particularly susceptible to learned helplessness. As Cross and Vidyarthi (2000, p.13) remark, some students with difficulties are unable to separate ‘failing in class’ from ‘failing completely as a person’.

Learned helplessness represents a maladaptive motivational style and is most likely to be a serious obstacle to effective learning (Leo & Galloway, 1994; Valas, 2001). For example, ‘helpless’ learners tend not to develop a strategic approach to learning (Chan, 1994) but rather maintain a hit-or-miss style resulting in high error rate and frustration. Avoidance strategies will cause them to miss out on important practice thus maintaining a lack of improvement. Many students who struggle to learn will lose confidence, anticipate failure, and therefore do not fully engage the learning task (Pisha & Coyne, 2001).

Early identification and intervention: benefits and pitfalls
We always say, for good reason, that children with learning problems need to be identified and helped as soon as possible in their school careers (Bennathan, 2000; Torgesen, 2002). In general that advice is obviously very sound because prevention is much more effective than attempting a remedy after major problems have arisen. It is much easier to prevent the onset of the negative affects described above if a child does not have to experience too many difficulties. However, what is not always so readily appreciated is that the very acts of identification and intervention inevitably label some students as ‘different’ within the school system and within the their own eyes (e.g. ‘I am a child at risk’, ‘I am a remedial student’, ‘I am a Reading Recovery child’, ‘I need a support teacher’, etc.) and places them in a sub-system that changes their school experience compared to that of other students (Lewis, 1995). For example, most students do not go out from class to join a special literacy group; most do not have to be assessed by an educational psychologist; most do not have a classroom assistant, paraprofessional or parent volunteer giving them extra attention in the regular classroom; most children do not have to use modified worksheets, and so on.

Students with serious learning problems do need academic and instructional accommodations, but these changes set the students apart from their classmates. Differentiated resource materials or simplified curricula, for example, can make a student (particularly in upper primary and secondary school level) feel inadequate or incompetent because the simplified materials and less challenging objectives signal that teachers think he or she is lacking in ability (Erlbaum, 2002; Hall. 1997). On this issue Seligman (1995) says that if we deprive students of the opportunity to work toward the same objectives as other students we weaken their self-esteem just as certainly as if we had overtly belittled or humiliated them.
As Erlbaum (2002) has pointed out, school-level arrangements may either accentuate or attenuate the potentially negative effects of identification. In situations where students with learning problems are treated substantially differently from other students they are likely to suffer negative impact on self-esteem and self-worth (Beveridge, 1999; Knight & Rauch, 1999). The child who receives additional attention in the classroom does feel different (and perhaps inferior) and is viewed as different by peers. Valas (2001) reports that being placed within a special education support service, or having contact with a psychologist, special education teacher, or therapist can have a detrimental effect on the self-esteem of students with learning difficulties.

Some well-intentioned responses to students’ individual needs can act, inadvertently, to reinforce their feeling of inadequacy or difference. I recall working in a secondary school in Queensland where the door of the room carried the sign ‘The Special Needs Unit’. Did that improve the self-image of students who had to attend sessions in that room? Perhaps it should also have said ‘Abandon hope all those who enter here’. Being labelled (even covertly) as a student with special needs stigmatizes the child, diminishes self-concept, and may lower teacher expectations (Beveridge, 1999; Knight & Rauch, 1999; Riley & Rustique-Forrester, 2002). Students’ self-esteem and beliefs about self-efficacy are built, in part, out of the ways in which teachers behave towards them; and as Biggs (1995, p.98) remarks, “Any messages that suggest incompetence are damaging”. Children can quite easily detect hidden messages conveyed by teachers’ differential treatment of students, and this can influence their own views of themselves as learners (Carr & Kurtz-Costes, 1994). Alderman (1999) lists ‘communicating low expectations’ as one of the key factors contributing to students’ reduced motivation.

The potentially negative effect of identification and intervention creates significant dilemmas for teachers and schools. How can additional support best be provided? Should schools marshal all possible resources to assist a child with difficulties — but in so doing draw maximum attention to the child’s weaknesses (with possible negative impact on self-esteem and confidence); or should assistance be given in much less obvious ways? How do you provide assistance without making it obvious that you are doing so? Beveridge (1999) recommends that special assistance should be as unobtrusive as possible — this is very good advice, but difficult to operationalize. How can you provide an unobtrusive form of support that still has sufficient intensity, frequency and duration to have any real benefit? How can I modify the curriculum for some students without making the changes obvious to all? Perhaps I should not modify the curriculum at all, but instead find ways of motivating children with difficulties to put in more effort? Making children feel different or ‘deficient’ can cause negative affective outcomes.

These dilemmas remain unresolved. Perhaps we will continue to believe that the potential skill-development benefits for a student resulting from high-profile intervention outweigh any temporary (?) negative impact stemming from the identification and labelling process (‘You may not like coming to me and doing this work now, but you will thank me for it later’)? Does that argument really work?

This final section has raised more questions than it has managed to answer; but perhaps the issues provide food for thought. Too often we consider only the ‘improvement of basic skills’ aspect involved in remedial intervention; what about the impact on the student’s emotional development?
Conclusion
The main message I hope to get across to readers is that we need to be more sensitive than perhaps we sometimes are to the feelings, emotions, beliefs and attributions of the students we set out to help. Of course some students need more than the usual amount of help in learning the basic skills; of course they need to be taught effective strategies to become more efficient learners; and of course we need to ensure that they engage in successful practice. But even more importantly, we need to help them reflect upon and modify any negative attitudes and beliefs they may have concerning their own ability to improve. This is the counselling and therapeutic component of effective intervention, and it must not be neglected. Perhaps one reason why remedial intervention does not prove to be effective with some students (Kavale & Forness, 1999) is that the emotional, attitudinal and self-worth issues are not addressed. Burden (2002) is absolutely correct in saying that knowledge and skills represent only part of a learning problem; the other part is ‘learner self-perception’. Let us set ‘enhancing learners’ self-perception’ as a high priority in our support teaching objectives this year. You might like to begin with me. My self-perception regarding the learning of Cantonese is rock bottom.

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