Australian Education Review

Balancing Approaches

Revisiting the educational psychology research on teaching students with learning difficulties

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First published 2005
by ACER Press
Australian Council for Educational Research
19 Prospect Hill Road, Camberwell, Victoria, 3124

This publication was developed from the findings of a literature review conducted by Nola Purdie and Louise Ellis funded by the Australian Government Department of Education, Science and Training. A full copy of this review can be located at: http:www.acer.edu.au/research/programs/documents/literaturereview.pdf.

Edited by Carolyn Glascodine
Typeset by Wendy McGregor
Printed by Print Impressions

National Library of Australia Cataloguing-in-Publication data:

Ellis, Louise A. 1975-
Balancing approaches : revisiting the educational psychology research on teaching students with learning difficulties.

Bibliography.
ISBN 0 86431 540 6.

1. Learning disabled children - Education - Australia. 2. Students with disabilities - Education - Australia. 3. Special education - Australia. 4. Educational psychology. I. Title.

371.90994

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Foreword

A review of research on 'basic skills' education will always draw reactions from the educational community. It presents an opportunity to assess the advances that have been made in this area of our understanding. But, it now goes without saying, it also brings home again that the (surely!) innocent question – *how should we teach entry-level literacy and numeracy?* – introduces perhaps the most divisive of topics in education, a precinct of social science not generally known for the gentility or tractability of its researchers. It is simply no longer the case that a review of research literature on basic skills education can claim for itself a po-faced neutrality. The best it can hope for is that it can enrich and sharpen the lines of debate, giving us better heuristics for agreement or disagreement, at the same time as pointing to potential convergences and more confident professional applications – that is, turning the heat up on some points and down on others. A good review can convince, but it can also press us to improve our grounds for rejection.

The commitment, not to say fractiousness, that has characterised the field of basic skills education over the decades has parallels in the heated debates about the education of students with learning disabilities or difficulties. Even what that description means, or should mean, remains contested. Moreover, policy, professional commitment and community expectation have vacillated between an investment in pull-out / bolt-on approaches to the education of these students, whoever they are, and a commitment to mainstreaming, sometimes called 'inclusive' practice. Both options, again often zealously held, present their own particular opportunities and problems to individual teachers, systems and to students, but documenting the relative medium- and long-term costs and benefits of these has not typically been a goal of basic skills researchers.

In the teaching of literacy and numeracy and in the provision of education for students with learning difficulties, there has nonetheless been a lot of research conducted and published. But the questions of what kind of research is still needed, and how this research might meaningfully be interpreted for school or system level implementation, remain open and urgent. Louise Ellis's focused review takes and makes a stand on these questions, and accepts, front on, the challenges that brings. In the best possible sense, this is a review that deserves the reactions it will no doubt attract.

Part of the attraction of writing a foreword to such a review is to set up some possible interpretive frames for the reading of the piece. But I also intend to use the opportunity to express three points of disagreement – i) about the nature of 'basic skills' (focusing, as does the review itself, largely on literacy skills), ii) about how to describe pedagogy, and iii) about what kinds of research are needed in this area at this time. But lest it to be taken that framing the foreword in this

way questions the usefulness of the review in general, let me enumerate here its significant achievements:

- it presents a strong case for what 'evidence-based' education might mean, and sets transparent criteria for the acceptability of experimental findings and their application to practice
- it attaches its commentary to an unequivocal analysis of explicit / transmissionist versus constructivist / implicit teaching
- it serves to remind us of the urgency of basic skills education and the only partial adequacy of our current educational efforts (practical, theoretical and methodological) with respect to students who are performing well below expectations on school tasks.

I discuss these with the aim of sharpening an appreciation of the place and value of psychological research into the teaching and learning of reading to students with learning difficulties, and thereby offer some ways into Ellis's review as well as some ways that connect out to other debates.

In the review that follows, Ellis elucidates for us the fundamental descriptive choice facing educators who wish to describe students not performing the way syllabuses or developmental norms indicate they should. First, the problem can be described quantitatively – these students have *less* of an attribute, skill, body of knowledge, or attitude of inquiry, motivation, persistence, and so on. Alternatively, the problem can be read off as relating to a qualitative distinction between these and more predictably performing students – that is, we can take this to mean that some students are of a different *type*, dyslexic, learning disabled, ADHD, gifted, and so on. For psychologists, both kinds of accounts have a key common feature: regardless of any explanation about where these differences might come from, psychological accounts have typically provided (quantitative or qualitative) attributions that are 'in residence' in the student at hand, rather than, say, in the organised human and material resources amidst which a student has lived and now lives, developing both as a recipient of those resources and as agent in their use. A history is thereby conventionally read as a trait or a level, allowing for a known, standard institutional response.

In Ellis's review, the categorisation 'learning difficulties' is such an in-residence descriptor: it is something the student 'has', and in this case it is focused on a group identifiable by their lowered performance on basic skills scores (generally literacy and numeracy), perhaps contrasted with their more general level of observed academic performance. So a first point of contention that is sharpened for us by Ellis's review concerns the aptness of this categorisation for the topic at hand – teaching entry-level reading and mathematics. Categorisations are made and maintained for practical purposes, and the practical purpose that has led to the ongoing debate about the quantitative and qualitative descriptions of learning difficulties in basic skills is whether or not distinctive forms of teaching are called for. This is a live issue and not just for teachers: Fuchs, Fuchs, Mathes, Lipsey and Roberts (2001), for instance, conducted an extensive review of the reading differences between poor readers labelled as 'learning disabled' and those not so labelled. While their instincts were to claim strong qualitative differences for students labelled as having learning disabilities and difficulties, leading them to suggest that current efforts in brain scans using magnetic resonance imaging would confirm these, they nonetheless concluded:

> *It is difficult to argue persuasively that these students have a qualitatively different set of learner characteristics requiring a unique educational response. We are tempted to conclude that the conservative and correct characterization [Effect Size] difference between the Learning Difficulties and Low Achieving groups is simply a matter of degree, not kind.*

At issue here is that there are simply too many journeys that can deliver a student who does less well than peers on a basic skills test. Labels afford a warranted connection between our theories and our practical actions. But a sure hallmark of a paradigm-specific account is the uneven distribution of concept and category analysis. Some concepts or categories (of people, practices, processes, etc.) are carefully unpicked, their key attributes defined, distinguished

and hierarchialised; other concepts and categories remain curiously intact, apparently self-evident and self-explanatory, the 'hard objects' of the account. Ellis's review delineates the attributes 'learning difficulties' and 'disabilities' with fine attention as they apply to the teaching of basic skills; but the nature of the 'basic skills' themselves – reading and mathematics in this case – remains, analytically, comparatively neglected, in spite of a long history of theoretical and professional attention.

As objects of analytic attention, both reading and mathematics have travelled long distances. Edmund Burke Huey, for instance, a psychologist from the United States of America, compiled a substantial collection of research and theory on the teaching and learning of reading. Many of his observations have analogies in the teaching and learning of mathematics. Huey located and summarised a range of studies on familiar topics, some of which are alluded to in the following review – phonics training versus implicit exposure to the making of meaning; the use of the learner's other knowledge; reading as natural versus a cultural artefact; learning techniques versus learning values, and so on.

One notable feature of Huey's review of the available research, from the perspective of Ellis's review, is Huey's interest in everyday ('ethnographic') features of how people actually read and write, and his frustration with the received 'wisdoms' that have dominated much taken-for-granted educational practice. Huey does not mince words when it comes to the need to consider reading as socially relevant practice and the relative irrelevance of many teaching routines:

> *As a school subject, reading is an old curiosity shop of absurd practices. Until as late as 35 years ago, in America, the blind devotion to the unreasoned and unreasonable A-B-C method of learning to read was as universal and as fetishistic as the worship of reading itself had been ... We have surely come to the place where we need to know just what the child normally does when [s]he reads ... We have made a fetish of our doctrine of formal discipline, and formal reading has kept its artificial place in our curriculum supported in part by this now fast-decaying prop. (pp. 9–10)*
>
> *Huey described the better reading programs he observed as those in which ... reading is not made an end in itself, and does not gather the mannerisms and the debris of technique that accompany reading done for its own sake and by [school subject] 'Reading's' own special methods. (p. 300; insert added)*

Huey's review of reading research, *Psychology and pedagogy of reading*, was published in 1908, and opened a Pandora's Box for North American educators. The book is such a rich collage of ideas and research about reading that its provenance was mixed over the course of the century since its publication. It was to be mis/interpreted and mis/applied by behaviourist psychologists and others to build models of reading that was compatible with industrial-era US educational theory and administrative policy (Luke, 1988). The vestiges of those models – the construction of reading as conditioned behaviour, simple, atomistic skills somehow combining into more complex integrated skills, and, now, information processing – are still at the heart of many approaches to reading education, as Ellis's review illustrates. Not making reading 'an end in itself', studying 'what the child normally does' when he or she reads, and focusing on meaningful activities rather than on the routinised ceremonies of classroom subject Reading, have, for most psychologists studying reading, remained token afterthoughts to the research report, immediately preceding the dutiful 'need for further research'.

Two professional generations after Huey's book appeared, Chall's *Learning to read: The great debate* (1967) drew up the lines of battle in debates about reading education – 'skills training in phonics' versus 'meaning-driven' education – and debates in the US have continued to array themselves around those pure pedagogic forms (the most prominent of which are Adams, 1990 and Snow, Burns and Griffin, 1998). The contest had to be between these two approaches to teaching, and one of them had to be right, because children are children, the developing mind is the developing mind, and printed text is printed text. Huey's *what the child normally does when [s]he reads* is no longer a theoretical or methodological object in the debate, and the

implications of the new battle lines come straight from *reading [being] made an end in itself*. The elements of reading are decoding plus comprehension (as in Juel's 1988 'Simple Model', and see Gough and Tunmer, 1986), and the questions that remain are merely about the technical features of assessments of these processes and their optimal instructional sequencing. The nature of reading, what it is that our theorisation tells us about the qualities of practice that tests of reading *should* measure, remains relatively unexamined in most psychological accounts, an omission that may make Ellis's review feel curiously untextured and other-worldly to many practising literacy and numeracy educators.

So what are some theoretical propositions that can help us consider what reading (and writing and numeracy) tests should assess, and how does Ellis's contribution fit among those propositions? In Australia linguists, critical sociologists, anthropologists and others have joined in the fray since the late 1970s, moving reading and mathematics, literacy and numeracy more generally, out of the shadow of Special Education and challenging the exclusive right of psychology to inform both their definition and their teaching and learning of literacy and numeracy. These incursions by disciplines other than psychology have resulted in more broadly based and richer debates and a re-viewing of literacy and numeracy as and in social practice. One outcome is that the featuring in these debates begin to look as if they may be both complex and accessible enough to have some genuine leverage on everyday classroom practice. That is, pedagogy itself can be re-viewed as anthropological and sociological practice, rather than as a neutral conduit for syllabus content of psychological skilling.

Further, literacy and numeracy, for instance, have been re-presented as sets of phenomena that entail the orchestration of various perceptual, cognitive, social and cultural components. Demonstrations of the 'necessity' of some single component are taken to be demonstrations of neither its 'sufficiency' nor its 'sustainability'. In the case of reading, for instance, it is commonly taken by many Australian educators that reading entails:

- breaking the script codes of English
- using world knowledge to participate in the meaning formations in a text
- developing capability with a range of textual genres and modalities
- operating critically and analytically with texts as crafted devices that act to change people's understandings of the world (see, e.g., Anstey & Bull, 2004, and most Australian English/literacy syllabuses).

The view is that all of these categories of capabilities need to work together, all come from cultural / educational experiences of one sort or another (that is, do not generally come 'free' with the genes or with socialisation), and each, at particular times and for particular students, will require its own distinctive pedagogical airspace (Freebody & Luke, 1990; Healy & Honan, 2004). One implication of this approach that Ellis's review does not develop is that 'explicit' teaching is not a feature exclusively of code-breaking activities, and 'learning difficulties' is not a label that is applied only to learners struggling with breaking the code or with comprehension.

Thinking about literacy and numeracy in and for school leads us to consider the rapidly changing knowledge environments in which students must use these resources. Much reading research, in spite of Huey's century-old entreaties, is undertaken as if the knowledge content of the materials to be read for school reading does not actually exist (you can 'read', not so much 'read something') or at least does not matter. A fundamental fact of literacy and numeracy in and for school is the significant changes in the demands placed on students over the middle and senior school years and beyond – textual, cognitive, cultural social and technological changes. For the reader at school, the challenge is how to manage, use and produce mono- and multi-modal texts that embody linguistic and numeric knowledge, texts that reflect the increasing distinctiveness of each of the disciplines of school knowledge; that challenge, in the midst of changing pedagogical conditions, is re-presented anew throughout the years. So for students as well as for the serious literacy and numeracy researcher, these are the 'grown-up basic skills' of the middle and senior years, and the nature of engagement with them has consequences for students' possible pathways and the kind of citizens they can become.

So key questions arising from Ellis's review are: How are the platforms that are built in the early years sustained, and what qualities of experience at entry level afford maintenance and development through the school years? From his encyclopedic study of the research on the development of human skills, Nobel prize winner, James Heckman concluded that the beneficiaries of effective early intervention (in our case, in reading and mathematics learning in the early years of schooling) will perform at non-intervention group levels after a few years without continued support following the early intervention. Heckman is an economist; he puts the point about the development of human skills in the dialect of the market:

> *Complementarity (synergy) of investment reinforces self-productivity … this empirically established complementarity also suggests that early investments must be followed up by later investments to be effective*

(Heckman, 2005, pp. 3–4)

Literacy and numeracy are the arch 'skills that beget skills', sets of capabilities and dispositions that shape and enrich the development of cognitive skills and understandings. Without a powerful base, established early in students' encounters with a largely literacy- and numeracy-saturated school system, they are more likely to lack the capabilities that generate other knowledges and understandings. It is this fundamental significance that accounts for the enduring vitality and urgency around 'basic', entry-level questions that Ellis's review addresses. However, Heckman's point is about maintenance, and asks us to connect to the specialised evolutionary paths along which schooling leads literacy and numeracy resources.

Understanding and providing maintenance, in the case of 'basic skills' in and for school, means coming to terms with how progress through curricular areas, across the school years and across the disciplinary traditions, transforms these resources, retextures them as ways of inquiring about the world and displaying learning and mastery. The question of how we help young learners in the evolution of their literacy and numeracy capabilities in rapidly changing communicational environments also directs us to researching life pathways, not just test scores, as the outcomes of schooling. But it also must lead us to recognise the textures and significance of the pedagogies within which literacy and numeracy learning is experienced, and to research that learning in the complexities of its natural habitat.

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1

Introduction

This paper is a review of research deriving largely from the field of educational psychology on teaching students with learning difficulties. Concerns regarding the most appropriate methods with which to address the educational needs of students with learning difficulties are widespread among teachers. Although these concerns are not new, they have become increasingly pressing since the Commonwealth Government announced a policy objective to improve the literacy and numeracy skills of *all* Australian children. In April 1999, the Ministers for Education (Ministerial Council on Education, Employment, Training and Youth Affairs [MCEETYA]) endorsed new *National Goals for Schooling in the Twenty-First Century*. In relation to literary and numeracy, it was agreed that upon leaving school:

> *… students should have attained the skills of numeracy and English literacy; such that, every student should be numerate, able to read, write, spell and communicate at an appropriate level.*

(MCEETYA, 1999, p. 2)

Ensuring that *all* students gain at least minimum acceptable standards in literacy and numeracy is considered critical in overcoming economic disadvantage. At the national policy level, however, it has been recognised that such goals are more difficult to achieve for students with learning difficulties.

To help support the achievement of the National Goals, the Commonwealth has endorsed a *National Literacy and Numeracy Plan*. Under this plan, the Ministers agreed to espouse the need for early identification and adoption of intervention strategies for students with learning difficulties, in order to improve their literacy and numeracy outcomes. In furthering the objectives of the MCEETYA National Plan, and through consultation with government, Catholic and independent educational authorities, the Commonwealth has identified the following priority areas for research and development:

- the identification of effective teaching practices in the early and middle years of schooling for students with learning difficulties
- professional development for teachers so that they have greater confidence in meeting the special learning needs of this group of students
- measurement and assessment of achievement, and reporting of outcomes for this group of students.

(see Department of Education, Science and Training, 2002)

Teaching students with learning difficulties in mainstream classrooms

In most schools in Australia, there are significant numbers of students who are failing to learn effectively. They underachieve in all or some of the basic skill areas of the curriculum. This review seeks to identify effective teaching practices for students with learning difficulties in mainstream classrooms. It is important to recognise, however, that this is not a simple task. The role of teachers is particularly complex given the increasing educational needs of students attending regular classes today. Over the past 20 years, classrooms in Australia have undergone significant changes. A system of streaming and grading students into classes or learning groups solely according to their ability levels has given way to classes of diverse ability that encompass extensive physical, intellectual and behavioural differences. Students have been moved from special schools, classes or units to mainstream classrooms, placing greater demands on teachers.

The inclusion of students with diverse educational needs in the regular classroom is proving to be an extremely difficult and complex task for many teachers. Indeed, two recent surveys of teachers in Australia identified 'catering for the diverse range of students' needs' as the main professional challenge facing teachers in their day-to-day work (see Fields, 2000). This finding is noteworthy, as teacher concern for the effects of student diversity ranked ahead of other issues, such as discipline and violence in schools, which have, in the past, been consistently reported as the main difficulties confronting teachers. The task facing educators is daunting for many, and to be handled appropriately, it requires teachers to recognise, appreciate and include the differences between students in deciding what is taught and how they choose to teach (Kilvert, 1997).

Successful inclusive classrooms, therefore, require that teachers have an understanding of students' diverse learning needs and make a commitment to address those needs in their teaching (Burnett, 2004; Kilvert, 1997). However, the inherent complexity in identifying the most appropriate teaching practices for the learning of students in regular classrooms is characterised by Lyon (1993) as follows:

> *Which instructional reading approach or method, or combination of approaches or methods, provided in which setting or combination of settings, under which student–teacher ratio conditions and teacher–student interactions, provided for what period of time and by which type of teacher, have the greatest impact on well-defined elements of reading behaviour and reading-related behaviours, for which children, for how long, and for what reasons?*

(Lyon, 1993, p. 3)

The question posed by Lyon with respect to literacy learning is equally applicable to all other areas of the curriculum. It highlights the remarkable challenges faced by teachers as they seek to find effective ways to cater for the diverse range of educational needs, and in particular for those students who find it difficult to learn. There can be no simple answer because the question itself is not simple – there are many aspects to consider.

Structure of this review

This review is a consideration of the multiple parts that make up the area in its analysis of contemporary research on teaching approaches for students with learning difficulties. Evidence from varied sources is utilised in an attempt to identify methods that have been demonstrated to be effective for a wide range of students in mainstream classrooms, but are especially powerful for students with learning difficulties. In this context, it is crucial to note that programs and strategies per se are not independent of the teachers who deliver them to students, regardless of whether or not those students experience difficulties in learning (Hattie, 2003; Rowe, 2003).

From the outset, it is also important to emphasise that there is no formula for how best to cater for students with learning difficulties in mainstream classrooms, and readers looking for easy solutions are likely to be disappointed by any paper on this subject. What this review offers instead is detailed information on a range of teaching methods that have been used extensively and have been found to be effective in the research literature.

This review, in its selection of research evidence, and in its presentation of interpretations of that evidence, is influenced by the conviction that students with learning difficulties are not a race apart. Most teaching techniques that are effective for mainstream students are also effective for those with learning difficulties. Likewise, techniques that are effective for students with learning difficulties are generally effective for mainstream students. That is not to say that a shift in pedagogic emphasis or unique pedagogic practice are not appropriate for teaching those with learning difficulties. However, this review posits that teaching practices for those with learning difficulties need to be considered in the context of the broad context of the 'generally effective pedagogy'.

This paper is divided into four main sections, including this introduction. Section 2 provides an overview of important issues that must be borne in mind when reviewing research in this field. These issues pertain to definitions, contemporary understanding of effective classroom practice, and methodological considerations. Section 3 presents research evidence identifying effective teaching approaches for students with learning difficulties. Two key methods are identified and given special attention in Section 4. Lastly, Section 5 discusses the implications of the findings of this review for mainstream classroom teachers.

section

2

Key issues in learning difficulties research

Introduction

For this review, the term *learning difficulties* is applied to students in mainstream schools who do not meet national literacy and/or numeracy benchmark standards. In accordance with current trends in Australia, the authors have adopted the term *learning difficulties*, though at times it has been necessary to use the term *learning disabilities* when referring to American practices and research.

Students fail to achieve for a multitude of reasons. Some students perform at low levels across the range of academic tasks. Such students have been referred to as *slow learners*. For others, there appear to be discrepancies between their general cognitive ability and school achievement, and these students have been described as *underachievers*.

To date, use of the categorisation 'students with learning difficulties', is neither consistent, nor clear. This section begins with a consideration of definitional issues, which have significant implications for identification procedures, prevalence rates, and the development of effective instructional approaches for students with learning difficulties. There can also be funding considerations linked to definitions. This discussion of definitions is followed by an examination of contemporary understandings of effective teaching practice for mainstream learners and students with learning difficulties. Finally, this section provides an overview of important methodological issues that must be considered when reviewing research in this field.

Issues associated with conceptualising learning difficulties

From the outset, it is important to recognise the lack of clarity or agreement which exists regarding definitions in this field and the continuing controversy about how identification should be undertaken. Over the past few years, theorists and practitioners have highlighted the necessity for definitional changes that reflect contemporary understandings and allow for easier and more consistent identification (e.g., Kavale & Forness, 2000; Scruggs & Mastropieri, 2002). Despite increasing efforts to cope with the definitional problems plaguing learning difficulties research (Shaw, Cullen, McGuire, & Brinckerhoff, 1995), there is still little consensus in the literature on definitional issues. This is especially the case with regards to the role played by intelligence or IQ.

Ambiguity in the literature has been further intensified by the vast number of terms currently applied when discussing students who have problems with literacy and numeracy

learning. Such terms include: *students with learning difficulties, learning disabilities, special needs, reading disabilities*, or *dyslexia*; and *students at educational risk*. These terms have been used interdependently, both in the literature and by professionals working in the field. In a review of the current international situation in relation to this issue, Gale (2000) noted:

> *Although there have been literally thousands of studies concerned with learning disabilities, particularly focused on primary and secondary education, what the literature generally shows is that researchers are no nearer to a common understanding of what is meant by such terms.*

(Gale, 2000, p. 130)

The lack of consistency in terminology and definitions has obvious implications for the integration of research findings. For example, Klassen (2002) identified inconsistencies in definition among 36 Canadian research articles, thereby making comparisons between studies very difficult, if not impossible. As a result, attempts to synthesise empirical research in this field must still be carried out with considerable caution, as has been the case for several decades (see Chapman, 1988).

Part of the problem in terminology and definition arises from the heterogenous nature of learning difficulties:

> *By their very nature, pupils' difficulties in learning and behaviour are complex. Each child is an individual whose pattern of disabilities is unique. To lump children with similar problems into one category may imply that they should all be taught the same curriculum, in the same way and in the same place. The reality is, of course, quite different. Two children labelled as having specific learning difficulties may in fact require totally different provision and separate teaching programmes.*

(Farrell, 1997, p. 2)

The selection of studies for this review reflects the heterogeneity of the field and the definition below must suffice until more clearly conceptualised definitions are widely employed for identification and classification. Where terms such as *learning disabilities* and *special needs* were employed in studies incorporated in the sections of this review that follow, they have been changed to *learning difficulties*, so long as it was evident that the sample fitted the ascribed definition of learning difficulties (i.e., students who do not meet national literacy and/or numeracy benchmark standards). This definition draws on descriptions used most widely in Australian research and practice.

Definitions used in Australia and related issues

The terms used in Australia to describe students with learning problems vary from state to state and from school to school (Jenkinson, 2001; Louden et al., 2000).

> *In some states the term 'students with special needs', or 'students with special education needs' is preferred, or a broader term, such as 'students with disabilities or impairments' (Victoria) is used. Reference to 'special needs' can be confusing, as some authorities (for example, the Australian Capital Territory) use 'special need' to embrace a far wider range of need, including cultural or non-English speaking ...*

(Jenkinson, 2001, p. viii)

Despite some state, systemic, and school differences in Australia, the most frequently used term to describe students with educational problems is *learning difficulties* (Elkins, 2002; Louden et al., 2000). Further, Elkins (2002) noted that Australian state and territory education systems have generally not differentiated between *learning difficulties* and *learning disabilities*, instead using the former term to cover all students with high incidence learning problems. In Queensland,

however, the distinction is recognised, resulting in two separate definitions:

> *Students with learning difficulties are those whose access to the curriculum is limited because of short-term or persistent problems in one or more areas of literacy, numeracy and learning how to learn.*
>
> *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, 2004, 1.2 & 1.3)

The Australian National Health and Medical Research Council (NHMRC, 1990) has also made clear distinctions between the two terms, using *learning difficulties* as a generic or umbrella term and *learning disabilities* to refer to a small specific sub-group within the general field of learning difficulties. The following definitions have been proposed by the NHMRC:

> *Learning difficulties is a generic term which refers to the substantial proportion (10–16%) of children and adolescents who exhibit problems in developmental and academic skills. These difficulties are considered to result from one or more of the following factors: intellectual disability, physical and sensory defects, emotional difficulties, inadequate environmental experiences, lack of appropriate educational opportunities.*
>
> *Learning disabilities refers to the much smaller proportion (2–4%) of children and adolescents who exhibit problems in developmental and academic skills which are significantly below expectation for their age and general ability. The disabilities, which often include severe and prolonged directional confusion, sequencing and short-term retention difficulties, are presumed to be intrinsic to the individual, but they are not considered to be the direct result of intellectual disability, physical and sensory defects or emotional difficulties. Nor do they appear to derive directly from inadequate environmental experiences, or lack of appropriate educational experiences.*

(NHMRC, 1990, p. 2)

The Australian Commonwealth Government currently provides additional funding to schools to improve their literacy and numeracy outcomes (Rivalland & House, 2000). The *National Literacy and Numeracy Plan*, as agreed by MCEETYA, requires that all students with learning difficulties receive the necessary support required to achieve the national standards in literacy and numeracy. In most schools, this assistance may apply to more than 10% of students (Elkins, 2002). This is a sizeable minority.

A recent large-scale Australian study commissioned by Department of Education, Employment, Training and Youth Affairs (DEETYA; now DEST), known as *Mapping the Territory. Primary students with learning difficulties: Literacy and numeracy* (Louden et al., 2000), reported that 80% of schools in their study receive additional funding to support students with learning difficulties. The authors of this study found that most of the funding has been directed to students in the early years of schooling, especially to those experiencing difficulties in literacy. They identified a wide range of literacy programs and strategies that have been incorporated into Australian schools, such as *First Steps*, *Reading Recovery*, and *Success for All*.[1]

Numeracy programs, however, were much less frequently found to be the recipients of such assistance (Louden et al., 2000). Only 14% of schools involved in the study reported that they had incorporated programs to support students experiencing difficulties in numeracy. Accepted

[1] Another approach that has been widely used in mostly remote Indigenous communities across Central and Western Australia is *Accelerated Literacy* (Gray, 1990; Rose, Gray, & Cowey, 1999). This approach is designed to teach students experiencing severe literacy difficulties to read and write at an appropriate level. *Editor's Note:* This program was the subject of a DEST-funded evaluation in 2002, (Cresswell, Underwood, Withers, & Adams, 2000) and is the focus of a large-scale research, development and implementation study being currently conducted by the School for Social and Policy Research at Charles Darwin University.

numeracy programs include *Support-A-Maths Learner, Numeracy for All* and *Count Me in Too.* Milton (2000) identified several factors that may be impacting on the apparent lack of interest in numeracy:

- more government funding has been deployed in aiding the literacy development of students
- many curriculum materials are in use to assist teachers to deal with students' problems in literacy
- some teachers do not understand important aspects of numeracy and may not have very good teaching skills when it comes to numeracy.

Thus, although funding appears to be important in ensuring that all students meet national benchmark standards, it is evident that factors other than funding also need to be addressed. Milton argues that a range of appropriate assessment measures suitable for each year level must be developed to determine a student's areas of difficulty. In addition, extra professional development needs to be provided for teachers in order to enhance their own understandings and teaching of numeracy (Milton, 2000).

Issues of identification in Australia

As a result of the deficiency of consistently and clearly conceptualised definitions in Australia, issues of identification and prevalence have become highly complicated. At present, identification procedures depend largely on particular standards used in school systems, ministries and departments of education. In many cases, the method of identification is left up to schools, which are encouraged to choose from a range of identification procedures, both standardised and informal, that are recommended at the system or sector level. Scott (2004) describes the difficulty confronting educators in identifying students who require intervention and support, as follows:

> *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 learning-support teachers, resource teachers, reading recovery teachers or generalist special education teachers employed in regular schools.*

(Scott, 2004, p. 1)

Although there is considerable variability in identification procedures across all school systems, they share some notable similarities. Firstly, most schools have developed systematic early identification procedures at the classroom level in the area of literacy. Teachers are often required to monitor the progress of all students during the first three years of schooling, to identify those who are making slow progress (Elkins, 2002). Many schools use Clay's *An Observation Survey of Early Literacy Achievement* (1993) and the *First Steps Developmental Continua* to detect literacy difficulties in the early years (see Louden et al., 2000).

While identification procedures in literacy appear to be well established, they are considerably less organised and systematic in the area of numeracy. Part of the problem appears to stem from the deficiency of suitable numeracy assessment tools which would enable teachers to identify students with difficulties. As a result, identification of students with numeracy difficulties often occurs after they have passed through the early years of schooling and are experiencing major problems (Milton, 2000).

Issues of prevalence in Australia

Clearly, inconsistencies in definition and identification procedures across schools and systems make it difficult to provide authoritative estimates of prevalence. The *Mapping the Territory* report (Louden et al., 2000) found that prevalence rates for learning difficulties, as reported

by teachers, vary anywhere between 6% and 30%. Students who are achieving at a significantly lower level relative to their peers, or who are demonstrating a significant discrepancy between their intellectual ability and school achievement, are often identified by teachers as having difficulties in learning. One cohort of Australian learners which experiences significant learning difficulties is Indigenous students (see Mellor & Corrigan, 2004).

The majority of students experiencing problems in learning are identified in their first few years of school as the demand for reading competence becomes more apparent (Chan & Dally, 2000). Learning difficulties in literacy appear to be far more common than difficulties in numeracy, but Louden et al. (2000) noted that this may well reflect the current priority given to literacy in schools, rather than its greater relative prevalence.

Issues and definitions used in the USA

Since much of the research in this field has been conducted in the United States of America, it is important to be aware of the American context. Unlike the situation in Australia, the term *learning disability* has been widely used in the USA to describe those experiencing difficulties in learning (Chan & Dally, 2002). Kavale and Forness (2000) noted that a variety of American definitions of learning disability have been proposed, but none has emerged as an unequivocal favourite among professionals. The definition provided in the *Individuals with Disabilities Education Act* (IDEA) is probably the definition most frequently employed in current US 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, speak, 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 105-117)

The IDEA definition has been used as a basis for guidelines on the funding of school programs in the USA despite often being regarded as problematic due to its exclusion of external causes such as environmental, cultural, or economic disadvantage (Elkins, 2002; Sternberg & Grigorenko, 2001). According to this view, therefore, difficulties in learning are considered to be intrinsic to the individual. Notably, this is unlike the situation in Australia, where the classification of learning difficulties *includes* those experiencing poverty, of non-English-speaking or Indigenous backgrounds, and others with undue problems in learning for reasons that may be unclear (Elkins, 2002).

One diagnostic criteria required in the USA for access to intervention or educational services is the presence of significant discrepancy between intellectual ability (as indicated by an IQ score) and academic achievement (Bailey, 2003; Scott, 2004; Sternberg & Grigorenko, 2001). This approach is consistent with the major classification system employed by psychologists worldwide (*Diagnostic and Statistical Manual of Mental Disorders* [4th ed.]; DSM-IV), which stipulates that:

> *Learning Disorders are diagnosed when the individual's achievement on individually administered, standardised tests in reading, mathematics, or written expression is substantially below that expected for age, schooling, and level of intelligence. The learning problems significantly interfere with academic achievement or activities of daily living that require reading, mathematical, or writing skills.*

(American Psychiatric Association, 1994, p. 46)

Consequently, in contrast to Australia, students in the USA whose scores are low on both IQ and achievement tests are not eligible for funding or extra assistance. As affirmed by Scott (2004), 'this makes them doubly disadvantaged as they cannot receive the services that come with being identified as learning disabled' (p. 6).

Issues of identification in the USA

The IQ-achievement discrepancy approach as outlined above has been criticised in recent years for being unreliable (i.e., difference scores are not easily replicable) and susceptible to a number of statistical artefacts (Scruggs & Mastropieri, 2002; Sternberg & Grigorenko, 2001). Researchers have also found that there are few cognitive differences between students labelled as 'learning disabled' on the basis of a discrepancy between ability and achievement, and those who are low achievers without such a discrepancy (Stanovich & Siegel, 1994). In light of this research, an increasing number of educators in the USA are advocating the importance of helping *all* students to learn, not simply those who underperform on the basis of their supposed potential (Elkins, 2002). Thus, there is a growing movement towards the style of approach adopted in Australia, which is not based on an IQ-achievement discrepancy model.

Issues of prevalence in the USA

Consistent with the situation in Australia, the prevalence of learning disabilities in the USA varies considerably from one school to another. For example, Sternberg and Grigorenko (2001) reported that prevalence rates in Connecticut range from 7% to 24%. These researchers noted further that identification rates have increased over time. In fact, the number of students identified as learning disabled in the USA has grown by about 150% since 1975 (Bailey, 2003). As Rohl and Rivalland (2002) observed:

> *It is known that many students who are identified and served under the label learning disabilities are a heterogenous group of low achieving students … Most students in early US services for students with learning disabilities were below average in IQ and could be better described as low achievers in reading, and there is no evidence that this situation has changed. Learning disabilities remains within the categories that are included in the Individuals with Disabilities Education Act (US Department of Education), though the proportion designated as learning disabled continues to expand, suggesting that regular teachers refer students they feel need more help than they know how to provide.*

(Rohl & Rivalland, 2002, p. 46)

The substantial apparent increase in the prevalence of students with a learning disability in the USA has led many to question the reliability and validity of the identification process (Lyon, 1996). No doubt, the failure to produce a clearly conceptualised and generally agreed-upon definition of learning disability has given credence to concerns about present-day identification practices (Scruggs & Mastropieri, 2002). However, despite significant shortcomings in the definitions employed in this field, a number of other plausible explanations exist for the increasing numbers of students identified with learning disabilities. These include environmental changes, air pollutants and food additives. Furthermore, Lyon (1996) observed that, over the past decade, teachers have become increasingly aware that even *mild* deficits in reading and mathematics skills portent significant difficulties in academic learning. Teachers are, thus, now more inclined than previously to refer students showing mild deficits for diagnosis and intervention.

Summary of definitional issues

It seems that definitional issues continue to be the greatest impediment to reliable identification procedures and the establishment of prevalence estimates. The ambiguity and vagueness inherent in many of the existing definitions means that some students may be identified as

having learning disabilities when they do not have them, while others with learning disabilities may be overlooked:

> *Depending upon the magnitude of financial incentives and upon unrelated factors (for example, class size, goals for increasing test scores) that often shape the decisions of classroom teachers to refer students with special needs, an individual school district may drastically overidentify or underidentify students with learning disabilities. Therefore, local or national statistics on identification rates for students with LD must be interpreted with caution.*

(Lyon, 1996, pp. 62–3)

Definitions of *learning disabilities* employed in the USA are generally regarded as problematic because the difficulties are considered to be intrinsic to the individual and thus non-attributable to other causes, such as limited school attendance or economic disadvantage. In contrast, in Australia, the term *learning difficulties* is often used to describe the experiences of a larger group of students who do not respond well to their classroom programs. The author of this review concurs with the view of Elkins (2002) that learning difficulties are best understood to be the *experiences* of students:

> *Experience has shown that some students who experience learning difficulties don't respond to the usual classroom and additional supportive teaching that schools provide. Thus, the term 'learning disabilities' should be restricted to these 'hard to help' students where it seems reasonable to assume that their limitations in learning might stem from a constitutional impairment (even though usually we can't identify it).*

(Elkins, 2002, p. 12)

Furthermore, by adopting this view, it is possible to ascertain more reliable prevalence estimates from benchmark testing, which aims to identify those students who do not meet agreed standards at particular years levels (Elkins, 2002). The results from these tests establish how many students have low attainment in literacy and numeracy, irrespective of cause. Prevalence rates from benchmark tests in literacy at Year 3 are 13% nationally (Kemp, 2000). Notably, these figures include students from non-English-speaking backgrounds, of low socioeconomic status, and those experiencing other environmental factors which affect their learning.

The preceding discussion of definitional issues has also revealed the relative neglect of numeracy in comparison with literacy in Australian schools. Over the past decade, considerably more funding for program provision, student support and teacher development has gone into literacy than numeracy. As such, identification procedures and provision for students with learning difficulties in numeracy is an area that has yet to be addressed by many schools. However, advancements in this area already appear to be under way, with the authors of the *Mapping the Territory* report (Louden et al., 2000) observing that Australian states and territories are currently developing and implementing a range of numeracy programs, which it is anticipated will be reflected in classroom practice in forthcoming years.

Debate over instructional approaches

Instructional approaches have generated much interest and controversy for several decades, especially in relation to 'best practice' in the literacy domain (Drecktrah & Chaing, 1997; Rankin-Erickson & Pressley, 2000). Two clear theoretical orientations toward the teaching of reading have provided the foundation for this controversy and affect the basis of much classroom teaching of reading and writing. Mather, Bos and Babur (2001) described them as:

- explicit code-based instruction
- implicit meaning-based or *whole language* instruction.

For several decades, *whole language* has been an influential teaching approach for early literacy

learning in Australia (de Lemos, 2004; Westwood, 1999). Essentially, the whole language approach reflects a form of constructivism in which students are viewed as inherently active, self-regulating learners who construct knowledge in developmentally appropriate ways. In the context of the classroom, students read and write self-selected texts, with very little explicit decoding instruction (Harris & Graham, 1996).

In contrast, code-based approaches focus on an awareness of language structure and they function in a way which allows students to reflect on and consciously manipulate the language. Code-based approaches include an awareness of phonemes, syllables, and morphology. They usually require a high degree of teacher-centred presentation and evaluation of learning material, with an emphasis on explicit instruction, scheduled practice, and feedback (Westwood, 2003c).

Growth in constructivist approaches over code-based approaches

In Australia and in other Western countries, constructivist teaching approaches have become more generally implemented since the 1980s. The strongly code-based approach of the preceding period has since been tempered by an increasing realisation that students are active contributors to the learning process (Ashman, van Kraayenoord, & Elkins, 1992). The movement towards constructivist approaches is also evident in the field of special education:

> *Evidence of this [constructivist approach] is seen in the increase of whole language philosophy and its application appearing in special language professional publications. Special educators have been called to a paradigm shift in the way students with special needs are instructed, specifically supporting a movement to holistic, constructivist ways of teaching, which encompass the whole language approach to reading and writing.*

(Rankin-Erickson & Pressley, 2000, p. 207)

To date, there has been a relative shortage of research on the effectiveness of the whole language approach, in part because whole language theorists and practitioners believe that conventional scientific analyses are irrelevant and do not fully assess the competencies that whole language attempts to foster (Rankin-Erickson & Pressley, 2000). In spite of this, however, there are ample anecdotal accounts by teachers and parents of positive outcomes of the whole language approach (Harris & Graham, 1996).

Constructivist learning principles have also become dominant in other areas of the curriculum, such as in mathematics and science. In the domain of mathematics teaching, for example, Westwood (1999) noted that constructivist learning principles have been translated into practice through the *process approach* or *enquiry-based method*, wherein students actively collaborate in solving problems and discussing solutions. In an overview of the contemporary mathematics classroom, Kroesbergen, Van Luit and Maas (2004) observed that:

> *… students are expected to contribute actively to mathematics lessons by explaining their mathematical reasoning to each other and constructing their own understandings of mathematical concepts. This means that students must listen to the teacher and their peers, be able to explain their mathematical reasoning to others, and thereby build their own mathematical knowledge.*

(Kroesbergen, Van Luit and Maas, 2004, p. 234)

This description reveals the degree of change achieved in recent times, for the mathematics classroom was formerly a place of direct teacher-driven instruction and familiar routines where students were:

> *… expected to learn the basic operations so that they could solve computational problems quickly and correctly. During math lessons, students had to listen carefully as the teacher explained the desired way to solve various types of*

> *problems and then work independently to practice the teacher's method until it was automatic … To do well in mathematics, students needed to listen to the teacher, memorise important procedures, and write rapidly.*

(Baxter, Woodward, & Olson, 2001, p. 529)

American students, for example, are said still to be learning basic computational skills in mathematics classrooms, but currently spend more of their time and energy on solving problems that are open-ended or which can be solved using different strategies (Baxter et al., 2001). Whereas in traditional practice, learning was achieved by way of regular drills, revision and rote memorisation, constructivists generally assume that students will acquire basic number knowledge and skills through problem solving, enquiry and discourse.

Most Australian university departments of education currently base their teacher education programs on constructivist views of learning. For example, Westwood (1999) highlighted the results of a small South Australian study (n = 24) which elucidated that most teachers (79%) had been strongly encouraged to use a constructivist approach in their initial teacher-training courses and during in-service programs. Even more notably, 67% of the students in this study indicated that constructivism was the *only* teaching approach to which they had been exposed in their methodological courses (Westwood, 1999). In this context, Westwood (2003b) notes:

> *At the same time as constructivist approaches have been promoted, direct teaching methods have been overtly or covertly criticised and dismissed as inappropriate, with the suggestion that they simply don't work and are dull and boring for learners. The message that most teachers appear to have absorbed is that all direct teaching is old-fashioned and should be abandoned in favour of student-centred enquiry and activity-based learning.*

(Westwood, 2003b, p. 5)

Teacher graduates with such training are neither well-predisposed nor competent to use *both* theoretical orientations in their planning and teaching. While the appropriateness of this characterisation for current Australian teacher graduates should not be assumed, this review will indicate why such teacher graduates are, as a result, under-resourced for teaching students with learning difficulties.

Deciding appropriate approaches for students with learning difficulties

Although the whole language approach has gained widespread use, there is concern its emphases may not be in the best interests of students with learning difficulties. Reviewers such as Stahl and Miller (1989), and Stahl, McKenna and Pagnucco (1994) have stressed that students with learning difficulties fare worse from whole language approaches than from more traditional code-based approaches. The work of Stahl et al. (1994) is supported by a substantial body of research, which has established the greater effectiveness of explicit code-based teaching practices for students with difficulties in reading (e.g., Carnine, Silbert, & Kameenui, 1990; Hempenstall, 1996; Iversen & Tunmer, 1993; also see Rankin-Erickson & Pressley, 2000).

Some researchers are concerned that these constructivist approaches may also not be appropriate for teaching mathematics to students with learning difficulties (Baxter, Woodward, & Olson, 2001; Carnine, Dixon, & Silbert, 1998). Essentially, critics of constructivist approaches believe that multiple methods to solving problems in mathematics can only bring about confusion, and that one simple set of rules is the best approach to teaching these students. Furthermore, it has been observed that constructivist approaches cannot guarantee that students will acquire fluency and automaticity with basic number and computation and, therefore, consider it dangerous to exclude all manner of explicit instruction (Westwood, 1999).

Given that constructivism is currently an important and common model of what constitutes effective teaching practice, it is useful to provide an overview of its basic principles together with a consideration of its appropriateness for students with learning difficulties.

Basic principles of constructivism

The essential element in constructivism is that the learner is an active contributor to the learning process (McInerney & McInerney, 1998). Constructivist methods focus on what the student can bring to the learning situation as much as on what is received from the environment (Casey, 1994). This approach has its origins in the work of Piaget (1972) and Vygotsky (1978) and in Ausubel's assertion (1968) that 'the most important single factor influencing learning is what the learner already knows' (p. 332). Under the constructivist model, the role of the teacher is to be a *facilitator* of learning, rather than its director. Teachers should provide opportunities for individual learners to acquire knowledge and construct meaning through their own activities, and through discussion, reflection, and the sharing of ideas. While differing conceptions exist about the exact meaning of constructivism, Vermette and Foote (2001) identified the several tenets most commonly promoted as:

- Students are expected to learn subject matter by organising it themselves and developing their own personalised meanings.
- Constructivist practice requires individuals to unite prior and new knowledge and engage in the classroom-wide conversation/dialogue necessary for internalization and deep understanding.
- There is a recognition that knowledge is created by people and influenced by their values, cultures, and prior experiences and therefore diversity plays a major role in the stimulation of thinking.
- The philosophy is manifested in instructional practice by activities such as problem-based learning, dialogues, and authentic assessment.

(Vermette & Foote, 2001)

Vermette and Foote's (2001) summary of the major tenets of constructivism highlights the problematic nature of constructivism as a foundation for teaching students with learning difficulties. For instance, the first tenet assumes that students are able to organise subject matter. However, the research literature is replete with evidence suggesting that low-performing students have substantial problems in organising learning materials (Snow, 1992; Wong & Wilson, 1984). Additionally, and in relation to the second tenet, students with learning difficulties are characterised as having problems linking previous knowledge with new knowledge (Borkowski, Estrada, Milstead, & Hale, 1989).

The four tenets presented by Vermette and Foote (2001) provide the foundation for the basic principles for the teaching and learning process of constructivism. However, these tenets have been emphasised in different ways, resulting in various degrees or types of constructivism. For example, constructivism is commonly divided into three broad categories: *exogenous constructivism*, *endogenous constructivism* and *dialectical constructivism* (Moshman, 1982; Bruning, Schraw, Norby, & Ronning, 2004).

Exogenous constructivism emphasises the external nature of knowledge, where learning or knowledge acquisition is a process of building accurate internal models or representations of external structures that reflect 'the way things really are' in the world. On the other hand, endogenous constructivism emphasises the internal nature of knowledge. From this perspective, knowledge is not an accurate representation of external reality, but rather is an internally coherent and coordinated collection of processes and structures that provide for adaptive behaviour. Thirdly, dialectical constructivism lies somewhere between the transmission of the knowable reality of the exogenous constructivists, and the discovery of personal/relativistic reality of the endogenous constructivists. Dialectical constructivism denotes that knowledge is the result of the *interaction* between the learner (internal) and the environment (external).

A fundamental difference between exogenous and other types of constructivism relates to the role of the teacher. Exogenous theorists propose that direct teaching, feedback, and explanation *do* affect learning. Endogenous theorists, on the other hand, believe that exploration and discovery are *more* important than teaching. Thus, endogenous theorists perceive the teacher's role as one of simply assisting performance and the construction of knowledge, rather than explicitly providing knowledge and information.

Proponents of constructivism, and thus advocates of the whole language approach in literacy and the enquiry-based approach in numeracy, tend to discredit explicit, systematic teaching of skills. This applies especially to those skills associated with code mastery in reading and acquiring basic computational skills in mathematics. Harris and Graham (1996) observed that to some constructivist advocates, '*teaching* is a dirty word' (p. 27). They believe it is neither necessary nor desirable to teach explicitly, provide direct explanation, or require practice. However, such a view reflects a less than perfect understanding of the nature of constructivism. Additionally, it also appears not to be in the best interests of children with learning difficulties, who may require substantial amounts of explicit teaching and scaffolded practice.

The instructivist alternative

The popularity of constructivism has led many professionals in the field to reject any alternative instructional methods, regardless of how well they are established by research. Finn and Ravitch (1996) describe the damage caused by the overwhelming preference for constructivism as follows:

> *Ideally, education research should be experimental, pragmatic, open to new ideas, and willing to acknowledge the failure of practices that, after proper trials, turn out not to work very well. Unfortunately, many researchers prefer to seek validation of favoured approaches, find excuses when they don't work, and reject findings that do not confirm their own biases.*

(Finn & Ravitch, 1996, p. 22)

This explains, at least in part, why few educational practitioners and policy makers have expressed interest in what Finn and Ravitch have termed *instructivist programs*, even though they appear to produce positive outcomes for students with learning difficulties. (Note that, instructivist programs are frequently referred to as code-based approaches, particularly in the area of reading.) According to Kozloff, LaNunziata and Cowardin (1999), the success of instructivist programs for students with learning difficulties is attributable to:

- teaching with clear and explicit learning objectives
- teaching concepts, principles, strategies and operations in a carefully crafted sequence enabling students to build elemental knowledge into complex wholes
- attending closely to students' achievements and difficulties.

Instructivist teaching approaches are based on a fundamentally different assumption from those constructivist models outlined in the preceding section. In contrast to the constructivist perspective, instructivist teaching approaches are founded on the belief that there is an external reality which individuals must strive to come to terms with. According to Kozloff, LaNunziata and Cowardin (1999), there are two dynamic principles which follow from this point of view:

- Teachers are the primary agents of learning – they control it with their knowledge of general principles of psychology and of teaching and learning curricular subject matter.
- Education is about changing students' (learning) behaviour from what it used to be to what we all agree is better.

Thus, instructivist approaches emphasise the importance of goals and objectives that exist outside of, and apart from, the learner. Once the goals and objectives have been delineated, they are sequenced into learning hierarchies, generally representing a progression from lower to higher order of learning. Proponents of such approaches advocate the use of highly focused, teacher-led instruction to address each of the objectives in the hierarchy, generally through the employment of instructional techniques derived from behavioural psychology. In classical instructivist models, relatively little emphasis is put on the learner per se, who is usually viewed as a passive recipient of instruction (Beasley, 1999). This is in clear contrast with constructivist models of learning, where the learner is regarded as a more active agent in the learning, because it is expected the learning will involve individual constructions of knowledge.

The need for a review of the research evidence

In Australia, as in many other countries, educators have readily accepted the rise of constructivist approaches to educational practice. Although these approaches may be ideal for achieving certain educational outcomes, it is imperative that educational practitioners and policy makers, as well as the educational research community, make a commitment to the promotion of evidence-based educational practices (Borman, Hewes, Overman, & Brown, 2003; de Lemos, 2004). In this respect, the evidence appears not to be strong for the exclusive use of constructivist approaches in the teaching of students with learning difficulties when constructivism is narrowly defined as students constructing their own knowledge. Recent reviews indicate that some practitioners consider that constructivism has many forms and that its core is not contradicted or compromised by the provision of explicit instruction to help students acquire specific knowledge and skills necessary for successful academic learning.

This review argues that it is time to move away from teaching practices founded on philosophical beliefs about what should work, to evidence-based practices founded on research as to what does work. As observed by Joyce, Calhoun and Hopkins (1997):

> *At first, when people create or find a new model of teaching that works for some purpose, they're so thrilled they try to use it for everything. Our job is to provide some order, finding out what each model can do and building categories to help folks find the tools they need.*

(Joyce, Calhoun, & Hopkins, 1997, p. 17)

This assertion corresponds with the purpose of the following section of this review, which is to review existing local and international evidence-based research findings in an endeavour to identify 'best practice' for students with learning difficulties. Before proceeding to this section, however, it is important to be aware of some of the methodological issues relevant to this field of research.

Methodological issues in learning difficulties research

Whatever the approach to reviewing the findings of research in whatever field, there are methodological issues that reviewers need to consider. Some of these issues are particularly pertinent to evaluations of interventions for students with learning difficulties.

First, much of the research into learning difficulties fails to separate out methodological artefacts from intervention effects, thus severely compromising comparisons between the various approaches. For instance, one methodological problem concerns the procedures employed to classify the types of interventions used in the studies reviewed. There tends to have been over-reliance on labelling interventions according to the manner in which they were labelled by the primary author, rather than coding the actual procedures and components of instruction reported by the authors. For example, in their review of experimental intervention research on students with learning difficulties, Swanson and Hoskyn (1998) noticed that:

> *The authors based their classification treatments on the hypothesis of the primary study, as well as key words in the introduction, abstract, and title of each article related to the treatment of choice. This is problematic, because the distinction between various treatments may be more artificial than real.*

(Swanson & Hoskyn, 1998, p. 279)

One of the most striking design problems in research into learning difficulties has been the use of one-group pre-post designs. Threats to internal validity, including history, maturation, and regression-to-the-mean effects, are likely to make one-group pre-test designs among the weakest (Cook & Campbell, 1979). Further, empirical results from a meta-analysis of school reform models by Borman et al. (2003) illustrate that studies using a one-group pre-test post-test design typically produce significantly larger effect sizes than studies employing control groups.

Researchers have also pointed out that testing conducted immediately after an intervention can distort students' responses. Marsh, Richards and Barnes (1986) discussed the phenomenon of 'post-group euphoria' (temporary elation at the end of a program or study), which can inflate post-test scores. In other words, results may simply reflect a halo effect that fades with time and has no lasting impact on subsequent learning outcomes. Thus, Marsh et al. (1986) have stressed the imperative of collecting follow-up data to examine whether initial intervention effects are maintained over time.

Another key methodological problem has been the failure to assign students randomly to experimental and control conditions. Notably, Lysynchuk, Pressley, d'Ailly, Smith and Cake (1989), in their evaluation of the methodological adequacy of 37 studies of reading comprehension strategy instruction, found that randomisation of students to experimental and control conditions occurred only 64% of the time. Consequently, any cause-and-effect conclusions were compromised in more than a third of the studies under review. Lysynchuk et al. (1989) also identified important measurement shortcomings in these studies. Only slightly more than a third of studies on reading comprehension strategy instruction either included reliability information about the instrumentation or employed instruments with easily obtainable, published reliability information. Furthermore, they found either a ceiling effect or a floor effect for at least one mean performance score in a third of the studies.

It is also important to take account of differences between studies in terms of intervention duration, follow-up, and maintenance effects. Generally, it is assumed that interventions that occur over an extended period of time produce larger effects than those that are short-term. Various models of educational productivity, however, suggest that the effects of programs on academic performance follow a law of diminishing returns (e.g., Hattie, 1992; Walberg, 1996). That is, interventions of shorter duration have greatest initial impact and a reducing impact over time. Whether this holds for interventions for students with learning difficulties has not been thoroughly tested, but it should be an important consideration when comparing the effects of various interventions.

Intervention characteristics are as important as sample characteristics when assessing intervention effectiveness. The extent to which an intervention, sometimes known as *treatment fidelity*, has been implemented is a particularly important factor to consider. In non-experimental research, it is more difficult to control for teacher effects, with the probability that one teacher will be more rigorous than another in implementing a particular program, strategy, or approach. This teacher effect difference holds both within and across studies.

Further, when the effect of an intervention is assessed without consideration of sample characteristics and sample heterogeneity, findings will be limited in their usefulness to practitioners. For instance, students who have learning difficulties with disorders, such as attentional or behavioural problems, may require different types of intervention from those without these disorders. Similarly, students' motivational and attitudinal characteristics will interact with the effectiveness of an intervention; so, too, will their entry skill levels, and degree of support received in the home environment (Tunmer, Chapman, Greaney, & Prochnow, 2002).

Concluding comments

This section has identified and described key definitional issues, prevalence indicators and funding ramifications which beset research in the area of learning difficulties and any review of it. It has also begun to map the part these issues play on practitioner practice in classrooms and research. Analysing the principles underpinning certain modes of pedagogical practice and research methodology completes the preparation necessary for the next section.

In conducting the current review of the literature on interventions for students with learning difficulties, the author has been mindful of the methodological issues discussed above concerning approaches to synthesising research findings, and the potential methodological problems faced by reviewers. The following section reviews several important meta-analyses in the field which provide empirical evidence of effective interventions for children with

learning difficulties. This section will focus a great deal of its attention, though not exclusively so, on well-designed meta-analyses, which (a) partial out methodological artefacts from the effect sizes, and (b) base their classification procedures on the actual procedures and components of instruction used in the study. The selected meta-analyses synthesise evidence-based research which addresses important methodological issues. It is in these ways that the selected meta-analyses can contribute to understandings about 'best practice'.

section

3 Research into effective teaching practices for students with learning difficulties

Introduction

Significant numbers of students in mainstream schools have some form of learning difficulty. Students fail to achieve for a multitude of reasons. Some students perform at low levels across the range of academic tasks. For others, there are discrepancies between their general cognitive ability and school achievement. In a number of cases, poor performance appears to be linked to environmental factors, such as cultural differences, poverty or inconsistent school attendance. For such students, their difficulties may be transitory in that, given appropriate learning experiences, they are able to catch up with their peers. Others, however, require regular ongoing support to cope with the literacy and numeracy demands of their classroom. Furthermore, many students with learning difficulties also experience psycho-social problems, such as low self-esteem and *Attention Deficit Hyperactivity Disorder* (ADHD).

The complexity of teaching students with learning difficulties is, therefore, confounded by the heterogenous nature of the condition, and can be characterised in the following way:

> *When a child has been identified as having a learning difficulty, what is the exact nature of that difficulty? Is the difficulty (one) of not learning 'enough' in that he or she does not retain information? Is it that the child does not learn fast enough and requires a longer time in which to acquire information? Is it that the child does not reach the appropriate level or standard in a particular area? It could be that the child's difficulties are more subtle in nature in that he or she can learn specific skills and pieces of information but is totally lost when asked to use this newly acquired skill or information in a new situation.*

(Sugden, 1998, p. 213)

Clearly, no general or single teaching approach can be recommended for all students experiencing difficulties in literacy and/or numeracy learning (Swanson, 2001; Swanson & Deshler, 2003). However, certain teaching methods have been proposed as particularly effective for students with learning difficulties. Many of these approaches have their backgrounds firmly based in psychology, while others are more eclectic in nature, drawing upon a number of disciplines and classroom practice (Sugden, 1998).

This section of the review examines several important meta-analyses on educational interventions designed to enhance foundational literacy or numeracy skills for students with learning difficulties. The studies incorporated in these meta-analyses have employed a systematic pre-post research design, derived largely from the tradition of educational psychology. Much

of this research has been conducted in the United States of America. At present, little Australian research parallels this research design with its focus on the systematic evaluation of educational interventions designed to enhance literacy or numeracy skills. As observed by de Lemos (2004), the bulk of Australian research on teaching practices is 'descriptive and ethnographic, with an emphasis on observational and case study techniques' (p. 19). Despite the widespread adoption of programs based on constructivist learning principles, such as *Reading Recovery* and *First Steps*, there is, as yet, neither a cumulative nor a comprehensive body of quantitative research that could be used as a basis for conclusively evaluating the impact on such programs on students' achievement.

Two theoretical models of learning

This section of the review begins with an overview of two prominent theories deriving from the field of psychology, namely *behavioural* and *cognitive* perspectives of learning. These two, and very different views of learning, have been popular at one time or another and have given rise to a number of teaching techniques that can be seen in mainstream classrooms today. Constructivist teaching approaches, as described in the previous section of this review, are largely based on cognitive theory, whereas explicit code-based or instructivist approaches are generally based on behavioural theory. These two psychological theories are described below.

The behavioural perspective

The behavioural approach to teaching and learning places great emphasis on observable indications of learning. Essentially, proponents of this view believe that:

- all behaviour is learned
- enhancements in learning can be produced by improvements in instruction and by the manipulation of the consequences by the teacher.

(see Casey, 1994)

Behavioural theory posits that the development of any particular skill is purely a matter of good training and practice and accordingly, that teachers should take an active part in the learning process. As such, the behavioural perspective is essentially an optimistic approach as it purports that teachers are empowered to improve the learning of *all* students, including those with learning difficulties (Casey, 1994; Shorrocks-Taylor, 1998).

Proponents of behaviourism have developed highly structured instructional methods that maximise time on task and minimise student error. Two popular methods derived from this perspective include direct instruction and precision teaching. While these models differ in their presentation, they both rely on a very structured and carefully monitored system of teaching (Casey, 1994).

Although teaching methods based upon this perspective have proved popular and influential, they are not without critics. Some say that behavioural approaches are too mechanical and simplistic and that they focus on what might be considered 'symptoms' of the learning difficulties without addressing the underlying causes (see Casey, 1994; Farrell, 1997). Many also believe that these methods are too structured and inhibit the creativity of teaching. However, this review will later indicate there is sufficient evidence for adopting these methods as research findings indicate that students benefit significantly from their use.

The cognitive perspective

The cognitive perspective, on the other hand, places more emphasis on the role of the learner as an active contributor to the learning process. This theory is based on the work of various educational philosophers and psychologists, (e.g., Ausubel, 1968; Piaget, 1972; Vygotsky, 1978) who focused on what the learner can bring to the learning situation as much as on what

is received from the environment. In general, proponents of this approach are concerned with the study of perceptual processes, problem-solving abilities and reasoning abilities.

Teaching methods based on this perspective often require students to work in cooperative groups rather than just individually, and focus on the development of problem-solving skills rather more than on instructional routines. These methods often have built-in or learner-generated memory devices to help students retain and use the information in the future (Conway, 1997).

Essentially, cognitivists believe that students need to *understand* in order to learn. Students need to participate in how they are being taught, and to reflect on what they have done, in order for learning to take place. The teacher is seen as a *facilitator* of learning, rather than an instructor, thus allowing students to discover things for themselves and providing them with time to reflect (Reece & Walker, 2000). A summary of the differences between the behavioural and cognitive and perspectives of learning is presented in Table 1.

Table 1 Behavioural and cognitive learning perspectives compared

Behavioural perspective	Cognitive perspective
Teacher-centered	Learner-centered
Teachers present knowledge	Students discover and construct knowledge
Students learn meaning	Students create meaning
Learner as memoriser	Learner as processor
Learn facts	Develop learning strategies
Rote memory	Active memory
Teacher structures learning	Social interaction provides instructional scaffolding
Repetitive	Constructive
Knowledge is acquired	Knowledge is created
Teacher provides resources	Students find resources
Individual study	Cooperative learning and peer interaction
Sequential instruction	Adaptive learning
Teacher manages student learning	Students learn to manage their own learning
Students learn others' thinking	Students develop and reflect on their own thinking
Isolationist	Contextualist
Extrinsic motivation	Intrinsic motivation
Reactive teachers	Proactive teachers
Knowledge transmission	Knowledge formation
Teacher dominates	Teacher observes, coaches and facilitates
Mechanistic	Organismic
Behavioralist	Constructivist

Adapted from Hofstetter (1997)

Research findings on effective teaching for students with learning difficulties

Instructional methods have generated much interest and controversy for several decades, particularly in the area of literacy. There has been much debate among professionals regarding the most effective instruction techniques for mainstream students and for those with learning difficulties. Two prominent psychological theories, the behavioural and cognitive perspectives, have heavily influenced much classroom teaching practice. During the 1970s and throughout the early 1980s, behavioural approaches provided a structure and an optimism that were of immense benefit to teachers (Shorrocks-Taylor, 1998). However, an increasing number of people began to criticise, either directly or by implication, the exclusive use of behavioural methods (Farrell, 1997). As such, cognitive approaches have gained widespread use over the past 20 years; particularly by way of constructivism.

Although constructivist approaches have gained widespread popularity in other Western countries, they have been less influential in terms of their impact on educational policy and research than has been the case in Australia. This difference is particularly evident in the United States, where various research syntheses produced over the last decade have been important in identifying key general teaching practices that underlie effective instruction for students with learning difficulties (de Lemos, 2004).

This review focuses on *meta-analyses*, many of which were undertaken in the United States of America. The intent is to identify the relative effectiveness of various teaching approaches. Meta-analysis is a research procedure used to aggregate findings across many studies. Traditional research reviews, which are typically descriptive reports of an aggregate of individual research findings, are flexible in their methodology and can be undertaken effectively by an experienced research reviewer. However, this flexibility can allow a high level of subjectivity that may result in the reporting of inconsistencies in the conclusions of different reviews on the same issue (Suri, 2000).

What is a meta-analysis?

Meta-analysis is a procedure used to synthesise findings across many studies in an area, assess the effects of various moderators, and ascertain the major sources of variability in the intervention effects. The results of individual studies are converted to a standardised metric or effect size. Effect sizes range from zero (indicating no observable effect) to one or greater, and may be thought of as a z-score or standard deviation unit. Negative effect sizes are possible, and represent a decline as a result of the intervention. The scores are then aggregated across the sample of studies to yield an overall estimate of effect size.

Particular attention is given to the magnitude of the effect size. Cohen (1988) suggested that .80 could be considered a large effect size estimate, .50 a moderate estimate, and .20 a small estimate, although he cautioned that such interpretations are broad and need to be interpreted in light of methodologies used (e.g., length of treatment) and field of study. Larger effects are more commonly found in sociology, economics, and in experimental or physiological psychology research than in personality, social and clinical psychology research. In education, the typical effect of intervention is small to moderate. Effect sizes of .80, .50, and .20 indicate that the score of the average person in the experimental group exceeds the scores, respectively, of 79%, 69% and 58% of the control group.

As a research methodology, like all others, meta-analysis has benefits and limitations that must be acknowledged in its application. The benefits of meta-analysis include the ability to improve the power of small or inconclusive studies to answer questions, and the ability to identify sources of diversity across various types of studies. A rigorously conducted meta-analysis may reveal how heterogeneity among populations affects the effectiveness of treatments in different settings and with different individuals (e.g., boys/girls, primary/secondary school students). It can also help detect biases, such as publication bias (the reluctance of authors and publishers to present and accept negative results for publication), as well as deficiencies in the design, conduct, analysis and interpretation of research.

In terms of limitations, meta-analysis cannot improve the quality or reporting of the original studies. Other limitations come from misapplications of the method, such as when study diversity is ignored or mishandled in the analysis or when the variability of populations, the quality of the data, and the potential for underlying biases are not addressed. Analysing sources of bias and diversity is essential to performing, understanding and using meta-analyses in any field of research. Meta-analysis has demonstrated and promoted the sense that obtaining evidence is a global enterprise and in which complete information needs to be evaluated and synthesised in order to obtain the most unbiased results.

Unlike traditional reviews, meta-analyses can synthesise larger quantities of research findings and quantify the outcomes of, and make judgements about, the effectiveness of the strategy being researched. Meta-analyses are seen as providing a more objective, quantifiable summary of the evidence. The number of meta-analyses published in education research has increased markedly over the past ten years.

It is important to emphasise that comparing effect sizes across different instructional strategies is fraught with interpretive pitfalls because specific strategies have not, except in rare instances, been studied in direct head-to-head comparison. Furthermore, it is true that effect sizes are often derived from studies with different purposes, research samples and outcome measures. Nonetheless, an acknowledgement of the poor practice in the conduct of meta-analyses is not a criticism of the methodology. Certain value remains in comparing effect sizes because hypotheses can be developed about the relative effectiveness of strategies and about issues which need further investigation (Forness, 2001).

A number of criteria were used to select the meta-analyses for this review of intervention research relating to students with learning difficulties. The selected analyses were ones that:

- pertained to students experiencing difficulties in academic learning as per the discussion in Section 2 of this review which concerned students with *learning difficulties* or *learning disabilities*, but excluded those with other forms of *disability* (such as physical or sensory impairment)
- included students of school age
- were classroom-based (i.e., research that dealt with experimental interventions and teachers' regular classroom practice, but not with home-based, or provided by psychologists, psychiatrists, paediatricians, or other health professionals)
- pertained to literacy and/or numeracy; although some studies also reported findings in other areas such as science
- were data-informed and not purely theoretical or speculative in nature.

Table 2 is a summary of findings from the selected meta-analyses using the criteria outlined. Each of the analyses presented in this table has produced effect sizes across multiple teaching methods and, thus, allows tentative conclusions to be drawn about relative effectiveness. Further meta-analytic results on specific teaching approaches will be examined in Section 4 of this review.

Table 2 Summary of results from eight meta-analyses of interventions for students with learning difficulties

Author(s)	Academic domain	Teaching approach	Effect sizes	No. of studies
Swanson, Carson, & Sachse-Lee (1996)	General	Strategy instruction	1.07	44
		Direct instruction	.91	8
		Remedial instruction (i.e. approaches not directed specifically to academic skills)	.68	36
		Therapeutic	.59	17
Swanson & Hoskyn (1998)	General	Direct instruction	.68	47
		Strategy instruction	.72	28
		Direct instruction and strategy instruction combined	.84	55
		Non-direct and non-strategy instruction	.62	43
Forness (2001)	Mostly literacy	Mnemonic strategies (e.g., keyword, pegboard, or acoustic representations)	1.62	24
		Reading-comprehension strategies (e.g., strategy training, visual representations, or organisational cues)	1.13	48
		Direct instruction	.84	25
		Formative evaluation (charting or graphing of discrete units of progress, e.g., no. of words read correctly)	.70	21
		Computer-assisted instruction	.52	18
		Peer tutoring	.46	19
		Word-recognition strategies	.57	54
National Reading Panel (2000)	Literacy (Reading acquisition)	Phonics instruction	.41	38
		Kindergarten at risk	.58	6
		Year 1 Normal achieving	.48	14
		Year 1 At risk	.74	9
		Whole language instruction	.31	12
Jitendra, Edwards, Sacks, & Jacobson (2004)	Literacy (Vocabulary)	Keyword or mnemonic strategies	1.93	5
		Cognitive strategy instruction	1.10	10
		Direct instruction	9.78	3
		Activity-based models	.45	1
		Computer-assisted instruction	.16	2
Mastropieri, Scruggs, Bakken, & Whedon (1996)	Literacy (Reading comprehension)	Self-questioning (e.g., activating prior knowledge, summarisation, & prediction)	1.33	67
		Text enhancement (e.g., text manipulations, adjunct aids, & graphic organisers)	.92	81
		Skills training (e.g., vocabulary instruction, decoding skills, & fluency skills)	.62	50
		Direct instruction	.81	4
		Process training	1.22	1
Kroesbergen & Van Luit (2003)	Numeracy	Direct instruction	.91	35
		Self-instruction	1.45	16
		Mediated/Assisted	.35	10
Baker, Gersten & Lee (2002)	Numeracy	Direct instruction	.80	2
		Problem-solving strategies	.55	2
		Peer tutoring/Peer-assisted instruction	.62	9
		Contextualised instruction	.01	4

Meta-analyses by Swanson and colleagues

Of the results reported in Table 2, perhaps the greatest confidence can be placed in the research findings of Swanson and colleagues because of the stringent criteria used for inclusion of studies in their meta-analysis. The work of Swanson and colleagues required that the studies fulfil two criteria. Firstly, they were to include at least one between-instruction comparison condition (i.e., control condition) or within-design control condition (e.g., repeated measures design). Secondly, they were to focus on an extended treatment, rather than on an experiment with a single training session followed by an evaluation. Further, Swanson's work is distinguished because no other relevant meta-analyses have considered intervention research across a broad range of academic domains, nor have they controlled so stringently for methodological artefacts. A more detailed examination of this work follows.

Swanson, Carson and Sachse-Lee (1996) conducted a meta-analysis of 78 studies with samples of children and adolescents (aged 6–18 years) with learning difficulties. In the meta-analysis, studies were classified into one of four general instructional approaches:

- *therapeutic* (approaches not directed specifically to academic skills)
- *remedial* (e.g., one-to-one tutoring of core subjects)
- *direct instruction* (teacher-directed lecture, discussion and learning)
- *strategy instruction* (teaching techniques, principles or rules that enable students to learn, and to solve problems and complete tasks independently).

Swanson et al. (1996) calculated effect sizes in order to quantify the effectiveness of each instructional approach. The mean effect size scores in Table 2 were .59 for the therapeutic approaches, .68 for remedial instruction, 0.91 for direct instruction, and 1.07 for strategy instruction. Accordingly, Swanson et al. (1996) concluded that higher effect sizes emerged for direct and strategy instruction than for the two other approaches. Swanson et al. (1996) also found no significant differences in effect sizes across targeted domains (e.g., reading, mathematics, spelling). This finding indicates the wide-ranging effectiveness of direct and strategy instruction.

In a subsequent meta-analysis, Swanson and Hoskyn (1998) reclassified the earlier four general approaches as:

- a combined strategy instruction and direct instruction model (referred to as the combined model)
- direct instruction alone
- strategy instruction alone
- no strategy or direct instruction.

The results of this 1998 meta-analysis, involving 180 studies, were supportive of the pervasive influence of strategy and direct instruction models for addressing the academic difficulties of students with learning difficulties. A comparison of these four approaches resulted in the finding that the effect size was largest for the combined model (ES = .84; compared with effect sizes of .68, .72, .62 for direct instruction, strategy instruction, and no strategy instruction or direct instruction, respectively). It is important to note that the effect sizes were not the same in this study as in the earlier study of Swanson et al. (1996), largely because the authors based their analysis on 180 studies compared to the 78 studies incorporated in their earlier synthesis.

Results from other meta-analyses

In addition to meta-analyses by Swanson and colleagues, the results from several other meta-analytic studies for students with learning difficulties are also presented in Table 2. Results of strategies involving mental health services, such as psychotherapy and stimulant medication, have not been presented in the table, only results pertaining to general teacher practices.

Meta-analyses in the literacy domain

Forness (2001) summarised the results of 24 meta-analyses concerning special education provision that were published between 1979 and 1999. In accordance with the research of

Swanson and his colleagues, Forness found that mnemonic strategies (ES = 1.62), reading-comprehension strategies (ES = 1.13), and direct instruction (ES = .84) were the most effective teaching approaches for students with learning difficulties. (It should be noted that mnemonic and reading-comprehension strategies were classified as strategy instruction in Swanson's aforementioned research.)

The report of the National Reading Panel (the Panel) (2000) has been influential in the USA in its synthesis of research in the area of reading. This report is noteworthy because it (a) required that the included studies met rigorous scientific standards and (b) incorporated research across a wide range of areas in reading instruction, including phonemic awareness, phonics, fluency, vocabulary and text comprehension. The Panel conducted two meta-analyses, one on phonemic awareness instruction and the other on phonics instruction. The Panel was precluded from conducting meta-analyses on fluency, vocabulary and text comprehension due to a deficiency of methodologically sound research in these reading domains. Consequently, a traditional research review in these three areas had to suffice.

Results of the phonics meta-analysis are presented in Table 2. Note that phonics is a method of instruction that teaches students correspondence between graphemes in written language and phonemes in spoken language and how to use these correspondences to read and spell words. Further, phonics instruction was considered to be 'systematic' when the major grapheme–phoneme correspondences were both taught and in a clearly defined sequence.

The National Reading Panel's (2000) meta-analysis on phonics instruction provides a summary of 38 studies for those with and without learning difficulties from Kindergarten to Year 6 (also see Enri, 2003; Enri, Nunes, Stahl, & Willows, 2001). This meta-analysis showed that systematic phonics instruction (ES = .41) was more effective than whole language instruction (ES = .31) in teaching students how to read. Further, phonics instruction facilitated reading acquisition for students with learning difficulties as well as for normally achieving students [though the effects were larger among students with learning difficulties, particularly for those in Year 1 (ES = .74)]. Notably, the Panel reported that most systematic phonics approaches incorporated in their analysis employed direct instruction techniques in teaching phonics components. Essentially, these approaches involved the delineation of a planned, sequential set of phonics elements that are taught explicitly and systematically (National Reading Panel, 2000).

In contrast, whole language approaches generally provided some instruction in phonics, though it was taught unsystematically and only as the need arose. As observed by the Panel:

> *Whole language teachers believe that phonics instruction should be integrated into meaningful reading, writing, listening, and speaking activities and taught incidentally when they perceive it is needed. As children attempt to use written language for communication, they will discover naturally what they need to know about letter–sound relationships and how letters function in reading and writing. When this need becomes evident, teachers are expected to respond by providing the instruction.*

(National Reading Panel, 2000, p. 102)

As a result of their research in this area, the Panel concluded that 'explicit, systematic phonics instruction is a valuable and essential part of a successful reading program' (National Reading Panel, 2000, p. 10). Furthermore, the findings of the Panel have been cited as providing further support for the content and procedures used in direct instruction programs (see Carnine, Silbert, Kameenui, & Tarver, 2004).

The results of two other meta-analyses in the area of reading and literacy are included in Table 2. A recent study conducted by Jitendra, Edwards, Sacks and Jacobson (2004) provided a summary of findings of 19 research papers (comprising 21 investigations for inclusion in the meta-analysis) on vocabulary instruction involving students (aged 9 to 16 years) with learning difficulties. As shown in Table 2, the highest effect sizes were 1.93 for keyword/mnemonic strategies, 1.10 for strategy instruction, and 9.78 for direct instruction. These are large effects.

(Note that keyword/mnemonic strategies were classified as strategy instruction in Swanson's aforementioned research.)

However, the power of their findings is reduced, since, in comparison to other meta-analytic studies presented in this table, Jitendra et al. (2004) have provided little clarity in their description of what approaches were being compared (e.g., direct instruction compared with regular classroom practice). For instance, they reported 'in three group design investigations … as direct instruction of word definitions increased, students' performance on vocabulary measures improved' (Jitendra et al., 2004, p. 316), as indicated by an effect size of 9.78. However, here it is not clear which approaches were being compared. Furthermore, this very large effect size is questionable, given that the SD was 12.97 and it was obtained from only three studies in which the total number of students involved was not reported. Despite its limitations, this study indicates that strategy instruction and direct instruction are effective teaching techniques for vocabulary learning of students with learning difficulties.

Mastropieri, Scruggs, Bakken and Whedon (1996) presented the results of a meta-analysis of 68 reading comprehension studies published between 1976 and 1994. The purpose of the meta-analysis was to discern significant trends in the teaching of reading comprehension to students with learning difficulties. The age of students in this meta-analysis ranged from 8 to 17 years. The largest effect sizes for students with learning difficulties occurred for interventions under the rubric of strategy instruction (self-questioning, ES = 1.33; and text enhancement, ES = .92). These authors also reported a strong effect size for direct instruction (ES = .81), although they noted that this effect size was based on only four studies included in the analysis.

Meta-analyses in the numeracy domain

Fewer meta-analyses have been conducted in the numeracy domain than in the area of literacy. A summary of the results from two meta-analyses of mathematics teaching approaches for students with learning difficulties is presented in Table 2. Kroesbergen and Van Luit's (2003) meta-analysis involved 58 studies involving primary school students (aged 5 to 12) with learning difficulties. Each of the studies was classified into one of three general instructional approaches: direct instruction, self-instruction (teachers provide students with verbal prompts/routines to help students 'walk' through a problem), and mediated/assisted instruction (see Goldman, 1989, for further information on these three categories of instruction). Overall, this meta-analysis showed that direct instruction (ES = .91) and self-instruction (ES = 1.45) produced significantly higher effect sizes than mediated/assisted instruction (ES = .34).

In another meta-analysis, Baker, Gersten and Lee (2002) synthesised the findings of 15 studies designed to improve the mathematics achievement of students with learning difficulties. These studies included students in Years 2 to 11. Although the number of studies included in this meta-analysis can be considered rather small, the quality of the studies is generally high. The results of this research identified a small body of research elucidating the especially strong effects of direct instruction in mathematics for students with learning difficulties (ES = .80). The work of Baker et al. (2002) also demonstrated that the provision of both peer tutoring (ES = .62) and instruction in generic problem solving strategies (ES = .55) has moderately positive effects on students' mathematical achievement. In contrast, but similar to the findings in the Kroesbergen and Van Luit's (2003) meta-analysis, the overall effect for contextualised approaches (whereby the teacher serves primarily as a facilitator as students work through real-world examples of mathematical concepts and engage in discussions of alternative solutions to problems) approximated zero (ES = .01). As a result, Baker et al. (2002) concluded that:

> *… low achievers seem not to do well at authentic problem solving and discussion of mathematical concepts without solid preparation in the underlying mathematical foundations*

(Baker et al., 2002, p. 68)

Before proceeding further, it is important to emphasise the significance of the issue of methods used to classify intervention approaches and teaching practices. The meta-analyses presented

in Table 2, and this text, clearly show the disparate classification systems employed by researchers to synthesise research in this field, thereby reflecting a fragmented conceptualisation of the various instructional approaches and practices. Furthermore, this lack of clarity limits the impact the research findings can have on practice.

Part of the difficulty in classification transpires from the overlap in components that make up the general teaching approaches. As observed by Swanson (2001):

> *Strategy instruction and direct instruction have many commonalities. Both approaches involve the active presentation of information, clear organisation, step-by-step progression from subtopic to subtopic, use of many examples, demonstrations, and visual prompts … Clearly, however, there are differences in focus…strategy interventions focus on routines and planful action and/or general principles of handling information, whereas direct instruction focuses on isolated skill acquisition to support higher-order processing … Thus, although direct instruction has been associated with the behavioral paradigms, cognitive paradigms use some of the same procedures.*

(Swanson, 2001, p. 2)

Concluding comments

The results from the meta-analyses presented in Table 2 clearly demonstrate that teaching approaches based on direct instruction and strategy instruction tend to produce the highest effect sizes for students with learning difficulties. It is important to emphasise, however, that although the effect sizes displayed in this table provide an estimate of the relative power of various instructional approaches, they cannot be assumed to hold true in all instances or for all students.

> *Some particular versions of interventions may produce much greater effects than the general type of intervention with which they are classified, whereas other versions may produce much weaker effects. Some subgroups of students may benefit greatly, even when the average effect size (ES) for an intervention is modest, whereas other interventions may produce modest benefits for certain subgroups of students even when the mean ES is compelling.*

(Forness, 2001, p. 194)

Nevertheless, the findings do present compelling evidence to suggest that direct instruction and strategy instruction are generally the more effective teaching approaches for students with learning difficulties. In Section 4 of this review, a detailed description of these two approaches is presented. Further research supporting their pervasive influence for addressing the academic problems of students with learning difficulties will also be provided.

section

4

Two key effective teaching approaches for students with learning difficulties

Introduction

Meta-analytic research generated largely from the field of educational psychology strongly supports the pervasive influence of direct instruction and strategy instruction for remediating the academic problems of those with learning difficulties. This section is designed to provide educators with a thorough description of these two approaches. The origins of direct and strategy instruction are provided, together with their methods of implementation. In addition, more recent research findings are also presented, which indicate those areas of student learning that especially benefit from these two methods of instruction. This appears to be the case, even when it is provided in the context of a range of eclectic teaching styles or routines.

Direct instruction

Direct instruction (sometimes referred to as *explicit instruction*) is well grounded in behavioural theory, placing great emphasis on the learning environment and giving little attention to the causes of learning difficulties or the student's underlying abilities (Casey, 1994). Direct instruction can been defined as:

> *… a systematic method for presenting material in small steps, pausing to check for student understanding, and eliciting active and successful participation from all students.*

(Rosenshine, 1986, p. 60)

Thus, direct instruction programs are designed according to what, not who, is to be taught. Individual differences are accommodated by the inclusion of different entry points, reinforcement, amounts of practice, and correction strategies within the instruction (Hempenstall, 1996, 1997).

Direct instruction is based on the theory that learning can be greatly accelerated if instructional presentation is clear, eliminates all likely misinterpretations, and facilitates generalisations (Northwest Regional Education Laboratory, 2003). The principles upon which this approach is based include:

- all children can learn
- the teaching of basic skills and their application in higher-order skills is essential to intelligent behaviour and should be the main focus of an instructional program
- instruction with students with learning difficulties must be highly structured and permit large amounts of practice.

(see Block, Everson, & Guskey, 1995; Engelmann, 1999)

Characteristics of direct instruction

Direct instruction assumes that all children can learn and thus, the cause of a failure in student learning is chiefly derived from a deficiency in teacher instruction. The goal of direct instruction is to develop 'faultless instruction' (Engelmann, 1980), that is, sequences or routines for which there is only one logical interpretation by the student. Thus, the resulting action required by students is perfectly clear. The approach is teacher-centred (Veenman, Denessen, van den Oord, & Naafs, 2003) and is characterised by explicit performance expectations, systematic prompting, structured practice, monitoring of achievement, reinforcement and corrective feedback (Jones, Wilson, & Bhojwani, 1997).

Lessons follow a prescribed model–lead–test format, whereby the teacher first models a strategy, and guides the students through examples. After students are able to respond correctly on several prompted trials, they are urged to commence independent practice. Typically, lessons close with a review of what was learnt during the lesson, as well as a brief preview of the instructional objectives for the next session. These teaching practices are not content specific and can be applied to any curriculum and any instructional strategy (Stein, Carnine, & Dixon, 1998).

According to Gersten (1985), the features that distinguish direct instruction from most other behavioural approaches, include:

- the explicit teaching of 'general case' problem-solving strategies wherever possible
- an emphasis on small group instruction as opposed to students working alone
- a systematic technology of correction procedures
- principles for cumulative review of previously learned material
- insistence on mastery of each step in the learning process before new learning is attempted.

Key features of direct instruction

The most salient features of direct instruction programs include the following:

Scripted presentations

Scripted lesson plans are a hallmark of direct instruction and are intended to control the quality of instruction. Users of these programs assume that the particular examples and sequences of each lesson have been field-tested with other learners and have been designed to maximise learning and minimise confusion. The program developers recognise that many teachers, while confident in their understanding of learning principles, are not necessarily confident in the translating of direct instructional designs into pedagogical events in the classroom. It is assumed that, without explicit guidance, teachers may use language that students do not understand or that distracts students' attention from examples. Thus, direct instruction programs, based on the view that teachers are more likely to use effective instructional sequences when given explicit scripts for using field-tested procedures, provide such scripts (Binder & Watkins, 1990).

Teach the essentials

The essentials are determined from task analysis, whereby the specific skills needed to accomplish certain tasks are identified. These skills are taught to students in an explicit, step-by-step manner. Direct instruction is founded on the principle that proficiency in reading and mathematics can be achieved by analysis and teaching of sub-skills in a cumulative framework (Hempenstall, 1996).

Small groups

Direct instruction lessons are typically taught to groups of five to ten students. The approach assumes that small group instruction is more efficient than one-to-one instruction and provides the opportunity for more adult direction, attention, feedback and individualisation than large group instruction (Binder & Watkins, 1990). Students are often grouped on the basis of ability, which allows students with advanced skills to progress quickly and less advanced students to receive the extra help and practice they need.

Rapid pacing

Lessons are characterised by rapid pacing and 'choral group' response punctuated by individual turns. This approach is based on the assumption that students with learning difficulties can catch up with their peers if they are provided with more, not less, teaching. This teaching should embody the efficient use of technology and time (Cotton & Savard, 1982). Advocates of this approach have highlighted that even if students with learning difficulties are taught with effective instruction which results in their gaining at the same rate as their peers, they will always remain behind. Thus, only by teaching students with learning difficulties at a *faster* than average rate can the gap be closed.

Practice and drill

Teachers guide student practice by providing prompts, checking for understanding, and providing corrective feedback. The amount of practice decreases as the relevant skill is incorporated into more complex skills. In addition, teachers provide students with written exercises for independent practice (Veenman et al., 2003). Students are encouraged to practise a given task until mastery is attained (Hempenstall, 1996).

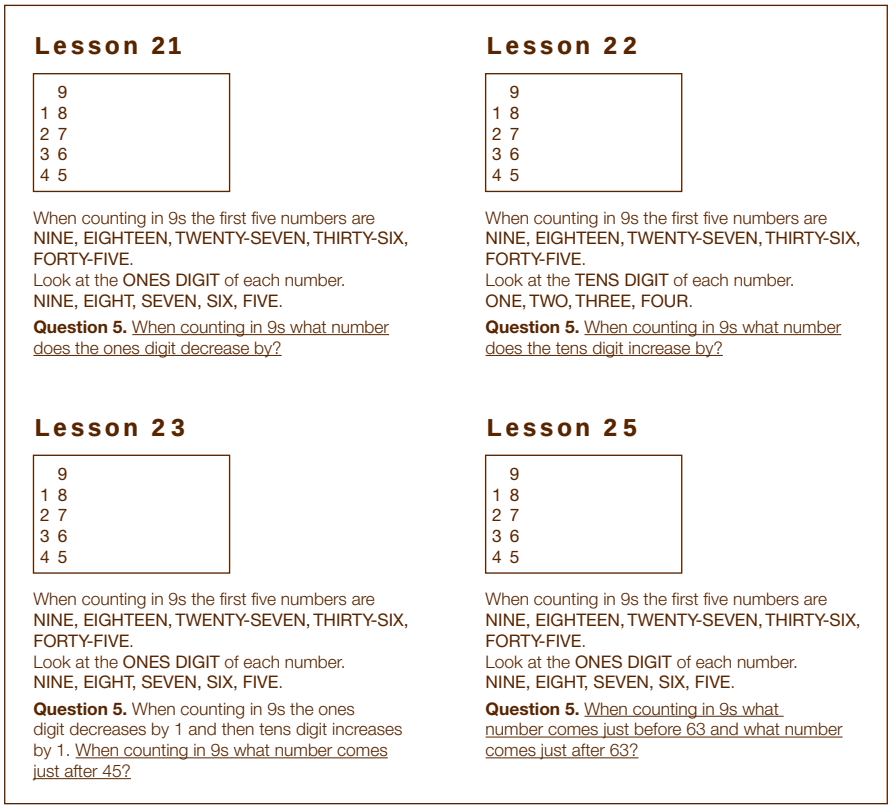
Direct instruction programs

Tarver (1986) has identified more than 40 direct instruction programs that have been developed to teach literacy and numeracy across the primary school years. Many comprehensive, self-contained programs go under the trade name DISTAR (Direct Instruction System for Teaching and Remediation), published by Science Research Associates in the United States of America. A typical feature of the DISTAR kits are scripted lessons from which the teacher is directed exactly what to teach and how to teach it (Casey, 1994). The most widely recognised DISTSAR program is *Reading Mastery* for students in Kindergarten to Year 6. This program has undergone several revisions since it was first developed more than 30 years ago. *Reading Mastery* uses an explicit phonics approach and emphasises students' ability to apply thinking skills in order to comprehend what they read. Another popular DISTAR program is *Corrective Math*, designed for students in Years 4 to 12 who are two or more year levels below year placement.

Some direct instruction programs have been designed for Australian schools. In Figure 1, an excerpt from one such program, *Elementary Math Mastery* (EMM) (Farkota, 2003) is displayed. This program has been designed around the *Australian National Mathematics Curriculum Profile*. EMM is a powerful diagnostic tool which clearly maps student progress, and can be used with both mainstream students and those with learning difficulties.

EMM has a 20-strand design component which enables teachers to identify exactly where and when students experience difficulty. Starting at base level, each strand (e.g., decimals, fractions, algebra, number patterns, problem solving) moves through its field interrelating with the 19 other strands that are running concurrently. The daily incremental portions learned are small, and because they are reinforced and built upon in subsequent lessons they are more easily retained (see Figure 1). The teacher models each scripted lesson in the prescribed format with whiteboard presentations being an integral component. The EMM design enables students to discover for themselves the formulae necessary to solve relatively complex problems automatically and speedily. Once foundations to the core areas have been laid, they are built on with small precise portions. Everything taught is revisited, developed further, and gradually integrated into the whole mathematical scheme. This gradual and consistent development of skills is one of the key elements of the direct instruction model upon which EMM has been based. In reading the script in Figure 1, one should note the following:

- What the teacher writes on the whiteboard appears in the text box.
- What the teacher says appears outside the text box.
- What the teacher says and simultaneously points to on the whiteboard appears in CAPS.
- What the teacher repeats is underlined.



(Farkota, 2003)

Figure 1 Elementary Math Mastery teacher script lessons in number pattern

Research on direct instruction

Research conducted over the past 40 years has provided considerable evidence to support the efficacy of direct instruction programs in primary schools. As discussed in Section 3 of this review, the findings of relevant meta-analyses (see Table 2) have presented strong evidence to suggest that techniques associated with direct instruction are some of the most effective teaching practices for improving academic achievement, particularly for students with learning difficulties (e.g., Forness, 2001; Swanson & Hoskyn, 1998). There are several other important studies presented below which provide further evidence for the pervasive efficacy of direct instruction for addressing students' academic problems. These studies were not in the form of meta-analysis (and thus, do not provide effect sizes), though they provide additional information and support regarding the value of the direct instruction approach.

The earliest and largest single comparing the effects of various instructional approaches was *Project Follow Through*, a United States government initiative designed to uncover the instructional approaches that work best in fostering and maintaining the educational progress of disadvantaged students. This project was a longitudinal study of more than 20 different instruction methods for students in Kindergarten to Year 3. The study lasted from 1967 to 1976 (although *Project Follow Through* continued as a federal program until 1995) and included more than 70 000 students from 180 schools. Abt Associates, an independent assessment agency, examined the data and concluded that most of the instructional approaches actually produced more negative than positive effects on basic test scores (Stebbins, Pierre, Proper, Anderson, & Cerva, 1977). The only notable exception to this trend was direct instruction, where students performed close to or at national norms on measures of reading, math, language and spelling. The *Project Follow Through* results have been summarised in this way:

> *In only one approach, the Direct Instruction (DI) model, were participating students near or at national norms in math and language and close to national norms in reading. Students in … the other Follow Through approaches –*

> *discovery learning, language experience, developmentally appropriate practice and open education – often performed worse than the control group. This performance came in spite of tens of thousands of additional dollars provided for each classroom each year.*

(Carnine, 2000, p. 6)

An important review conducted in Australia by Lockery and Maggs (1982), published earlier than the *Project Follow Through* report, also supported the benefits of direct instruction programs across a range of populations and in a variety of settings. This analysis consisted of more than 30 studies over a ten-year period and was notable in demonstrating the success of direct instruction with both mainstream students and those with learning difficulties. Lockery and Maggs concluded that:

> *If Direct Instruction is used appropriately we are finding that there is as yet no ceiling in sight for the progress possible. This applies to maintaining children in the regular classroom, continuing to improve the skills of the more severely handicapped child and in integrating an increasing number of children into effective participation in the regular classroom. There is no other major output of acceptable educational research in Australia that has shown the results obtained by this Direct Instruction research.*

(Lockery & Maggs, 1982, pp. 286–87)

Direct instruction research in the literacy domain

There is substantial evidence from the USA that relates the use of direct instruction to the successful development of phonemic awareness, vocabulary knowledge and word recognition (Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998; Swanson, 1999; Wright & Jacobs, 2003). Foorman et al. (1998) investigated the effects of direct instruction on growth in word reading for students with learning difficulties. In this study, 285 Year 1 and 2 students received one of three types of classroom reading programs. These types were:

1. direct instruction in letter–sound correspondences practised in decodable text (direct code)
2. less direct instruction in systematic sound–spelling patterns embedded in connected text (embedded code)
3. implicit instruction in the alphabetic code while reading connected text (implicit code).

The results of this research showed that students who received direct code instruction improved in word reading at a significantly faster rate, and achieved higher word-recognition skills than those who received implicit code instruction. Furthermore, 46% of students in the implicit code research group and 44% of the embedded code group exhibited no demonstrable growth in word reading, compared with only 16% in the direct code group.

Research support also has been found for the benefit of direct instruction in the teaching of reading comprehension (Foorman et al., 1998; Gardill & Jitendra, 1999; Swanson, 1999; Gersten & Carnine, 1986; Vallecorsa & deBettencourt, 1997). In one study, Gardill and Jitendra (1999) investigated the effectiveness of direct instruction of an advanced story map procedure on reading comprehension performance of six students in Years 6 and 8 with learning difficulties. The results of this study found a significant increase in students' grammar and comprehension from baseline to the independent phase condition of the intervention. In addition, generalisation of the comprehension learning to a novel passage and maintenance of effects were observed for all students on the grammar tests and for four students on the comprehension tests. However, it is important to note the small sample size of this study, which limits the conclusions in terms of generalisability of results.

Overall, the findings of instructional reading research indicate that direct instruction may be more effective for highly structured reading tasks, such as decoding, explicit reading

procedures, and foreign language vocabulary, than for less structured tasks, such as reading comprehension, and analysing literature (Rosenshine, 1986, 1995; Swanson, 1999). Swanson's well-regarded meta-analysis on 54 reading intervention studies with samples of children and adolescents with learning difficulties was conducted in the domains of word recognition and reading comprehension. (It should be noted that this meta-analysis was not included in Table 2, which supplied an overview of meta-analyses in the field.) The results of Swanson's synthesis showed that a prototypical intervention study has an effect size of .72 for reading comprehension and .59 for word recognition. Furthermore, the synthesis demonstrated that effect sizes for measures of comprehension were highest when studies included aspects of both strategy and direct instruction (ES = 1.15), whereas effect sizes for word recognition were highest when studies included direct instruction alone (ES = .70).

In summary, the findings from this study are supportive of the conclusion that direct instruction is particularly effective for teaching students well-defined tasks. These tasks can be broken down into a fixed sequence of sub-tasks and steps that consistently lead to the same goal (Rosenshine, 1986, 1995). Direct instruction is not as likely to be useful for teaching less defined tasks, such as reading comprehension. However, research suggests that as long as teachers also employ other effective pedagogical principles, direct instruction works in a surprisingly wide range of literacy domains.

Direct instruction research in the numeracy domain

Although teaching approaches in mathematics have not been studied extensively, (Swanson & Carson, 1996; van Kraayenoord & Elkins, 2004), recent research from both the USA and Australia indicates that direct instruction is an effective model for teaching particular aspects of mathematics to students with learning difficulties (Butler, Miller, Lee, & Pierce, 2001; Farkota, 2003; Grossen & Ewing, 1994; Kroesbergen & Van Luit, 2003; Kroesbergen, Van Luit, & Maas, 2004; Miller, Butler & Lee, 1998; Tarver & Jung, 1995).

In one study, Grossen and Ewing (1994) conducted research on the application of fractions, decimals and percentages with 58 students in Years 5 and 6. Students were randomly assigned to either the direct instruction or the constructivist condition and the duration of study was two years. Notably, this study showed that the performance of the students in the direct instruction group was significantly higher than that of the constructivist group.

More recently, Kroesbergen, Van Luit and Maas (2004) compared the effects of small-group direct instruction and constructivist mathematics instruction in basic multiplication on low achieving students' performance and motivation. This study included 265 students with learning difficulties, aged 8 to 11 years. Students received 30 minutes of explicit or constructivist instruction twice weekly for 5 months. The results demonstrated that direct mathematics instruction was significantly more effective than constructivist mathematics instruction.

Strategy instruction

Strategy instruction has usually been associated with constructivist models. However, proponents of this approach do not assume that students with learning difficulties will independently *discover* effective learning strategies, nor do they believe that direct teaching is required for internalisation and regulation of cognitive activities underlying effective learning. Learning strategies are tactics used by students to enhance their performance on a given task or tasks. Strategies may be broadly classified as cognitive, metacognitive, or self-regulatory in nature.

Types of learning strategies

Cognitive strategies

Cognitive strategies can be defined as those that focus on developing or enhancing particular task-related skills, such as underlining, note taking, rehearsal and summarising. As observed

by Pintrich (1999), cognitive strategies can be applied to simple memory tasks (e.g., recall of information, words, or lists) or to more complex tasks that require comprehension of the information (e.g., understanding a piece of text).

Meta-cognitive strategies

Meta-cognitive strategies are those that focus on the self-management of learning, that is, on planning, implementing, and monitoring one's learning efforts, and on the conditional knowledge of when, where, why, and how to use particular strategies in their appropriate contexts (Hattie, Biggs, & Purdie, 1996; Pintrich, 2002).

Self-regulation strategies

Self-regulation strategies have been defined in terms of self-generated thoughts, feeling, and actions, which are systematically oriented toward the attainment of students' own goals (Zimmerman & Schunk, 1989).

Alexander, Graham and Harris (1989) observed that although self-regulation and metacognitive strategies have several overlapping features (such as the oversight, monitoring, or control of one's thinking), there are important distinctions. Self-regulatory learners have been described as: 'students who are (meta)cognitively and (meta)motivationally aware of what they are doing and what needs to be done to successfully attain self-defined or set goals' (Boekaerts, 1996, p. 102).

Thus, self-regulation pertains not only to the intentional monitoring or management of one's cognitive performance, but also to the regulation of one's motivational or affective state, behaviour, and social environment. Indeed, Alexander et al. (1998) observed that those working with students with learning difficulties have found it critical to teach these students how to effectively regulate their motivational and emotional state.

Previous research has clearly demonstrated that students with learning difficulties have problems accessing and coordinating appropriate cognitive learning strategies (Borkowski et al., 1989). Research has also identified that students with learning difficulties also have problems in metacognitive and self-regulating mechanisms, such as checking, planning, monitoring, testing, revising, and evaluating during an attempt to learn or solve problems (Swanson, 1990). In addition, these students have been found to suffer from deficits in logical organisation and coordination of incoming information that requires carrying out mental operations (Swanson, 1988). They perform poorly on a variety of tasks that require the use of general control processes or strategies for solution (Pressley & Levin, 1987).

Based on such findings, researchers and practitioners have sought to develop students' metacognitive awareness and self-regulation. Intervention has been directed at firstly enhancing students' knowledge base and making them aware of the factors that influence their behaviour; and secondly teaching students strategies that will allow them to monitor and coordinate their learning more effectively (van Kraayenoord & Elkins, 1998).

Strategy instruction is based on a different view of the student from that which applies in the implementation of direct instruction:

> *[Whereas direct instruction] assumes a passive reader who has mastered a large number of subskills and automatically and routinely applies them to all texts … [strategy instruction] assumes an active reader who constructs meaning through the interrogation of existing and new knowledge and the flexible use of strategies to foster, monitor, regulate and master comprehension.*

(Dole, Brown, & Trathen, 1991, p. 242)

Furthermore, contrary to direct instruction, which is seen to focus primarily upon the acquisition of foundational skills (a 'bottom-up' approach), strategy instruction aims to develop students' higher-order cognitive abilities (a 'top-down' approach).

Characteristics of strategy instruction

Teaching designed to develop metacognitive awareness and self-regulation typically involves a detailed description of the strategy, explanation of why the strategy should be used, discussion of how the strategy should be applied, and provision of examples of the circumstances under which the strategy should be used (van Kraayenoord, 2004). Some of the instructional components of strategy instruction include modelling from teachers, step-by-step prompts or multi-process instructions, reminders to use certain strategies or procedures, and provision by teacher of assistance only when necessary (Swanson & Hoskyn, 1998).

Instruction begins with the teacher describing each step of a strategy, providing a rationale for the steps, and explaining how the steps are to be used to cue important thinking behaviours. Accordingly, during the initial stages of instruction, the teacher commences discussion on the parameters of generalisation and the process of enabling students to understand what the strategy is and how it works. The teacher models the strategy using think-aloud, dialectal, and scaffolding techniques and then guides the students through a number of practice examples. Gradually, there is a decrease in teacher control as the students become confident and competent with the strategy. Throughout the teaching process, the teacher directs students to think about instances where the strategy might be used, ways in which they can remember to use the strategy, and how to evaluate if the strategy has been successful (van Kraayenoord, 2004).

Although strategy and direct instruction are based on different underlying philosophies, they share a number of similar techniques (Block, 1993; Dole et al., 1991). Dole et al. (1991) summarised the similarities of and differences between the two approaches as follows:

> *Both emphasise explicit cues by teachers about what is going to be learned, guided practice of the to-be-learned material, and application to independent situations. However, there are three major differences. There is no assumption that the strategy will be broken down into componential subskills. The strategy is modelled, practiced, and applied to the whole comprehension task. There is no single correct answer or a single best way to apply a particular strategy. The strategy is modelled in a variety of ways and with different tasks. There is no feedback about the correctness of applying a particular strategy; rather the adaptability and flexibility of strategies are emphasised.*

(Dole et al., 1991, p. 252)

Once learned, the strategies can be applied to a range of different situations. In summary, strategy instruction concentrates more on the learning of generic or global strategies than on the acquisition and retention of specific skills (Dole et al., 1991; Swanson, 1996).

Advocates of the strategy instruction approach have made clear distinctions between learners who are *skilful* and those who are *strategic*. The differences pertain to the degree of automaticity of performance and to learner awareness or intentionality (Alexander et al., 1998). According to this view, strategies are 'conscious, instantiated, and flexible plans students apply and adapt' to a variety of tasks, whereas skills are 'highly routinized, almost automatic behaviours' (Dole et al., 1991, p. 242).

Key features of strategy instruction

Some of the most salient features of strategy instruction include the following.

Present strategy in small steps

Proponents of strategy instruction draw on varying theoretical assumptions about teaching and learning which are associated with particular instructional practices. Hence, they vary in the degree to which explicit instruction of task-specific strategies is emphasised in their work (Butler, 2003). Theorists who have been heavily influenced by cognitive-behavioural theories stress the importance of explicit methods of teaching, particularly in the early stages of instruction. They advocate the importance of presenting new strategies to students in several small, concrete

steps. However, as the instruction progresses and students move towards mastery, there is a conscious and marked shift to more implicit methods to enhance the generalisation of strategy use, as well as adaptation, independent design, and application of strategies by the students themselves (Schumaker & Deshler, 2003).

Modelling

Other strategy instruction theorists have emphasised Vygotsky's socio-cultural models of teaching and learning, when describing learning and teaching processes. They contend that students become more strategic when they internalise cognitive processes that are first explained or modelled by others (Butler, 2003). Advocates of this perspective stress the importance of teachers modelling using think-aloud, dialectal and scaffolding techniques. Initially, the modelling of a strategy should be simple and straightforward, focusing mainly on the surface features of the strategy (e.g., self-cueing performance of the strategy steps). However, as the instruction proceeds, teachers gradually reveal more sophisticated cognitive processes and increase their collaboration with students through open dialogue (Ellis, 1993).

Guided student practice and feedback

Researchers influenced by socio-cultural perspectives also emphasise the imperative for teachers to monitor students' progress as they apply their newly learned strategies to a range of tasks in a variety of contexts. Students are often encouraged to use overt verbalisations to guide their own thinking processes. The practice of encouraging students to think aloud also gives teachers an opportunity to encourage and reinforce appropriate use of strategies, or to provide assistance when necessary (van Kraayenoord, 2004).

Examples of effective learning strategies for middle school students

The good news is that students experiencing learning and memory problems can be taught to use effective strategies. When taught new information in the classroom, students can be assisted with storing this new information in a structured and organised way that will facilitate retrieval at a later date. A selection of useful strategies, adapted from Ostoja (1997), is presented below. Many of these examples involve assisting students to organise information.

Two-point strategy

1. Students are to think of all they know about the topic to be covered.
2. Students underline their two most important points.
3. In small groups, the students discuss their two most important points and come to a consensus on two points for the group.
4. The spokesman for the group tells the teacher the two most important points for that group and the teacher writes all the groups' points on the board in the form of a structured overview.

Caption strategy

This strategy and its variations assist students to explore and record what they know. It encourages discussion using the students' own words.

1. Students form groups of 4–5.
2. Students examine a number of pictures.
3. In each group, they write a make-believe title for each picture.
4. Each group feeds back their answers and justifies their answers to the whole class.

Creating graphics

One way of assisting students in comprehending graphics and to aid in comprehension of text is to have students create graphics themselves from the text. The completed chart, diagram, table, or graph can then be used as a revision tool at the completion of the topic.

For example, students work in small groups of two to four to create a chart or graph for the following information: Milk and butter are an important source of Vitamin A. Other sources include fish-liver oils and certain vegetables – carrots, tomatoes and dark green leafy vegetables are particularly valuable sources. Vitamin D is also found in fish-liver oil, butter, cheese, milk, and eggs. Vitamin C is found in fresh fruit and vegetables. Wholemeal bread, yeast, liver, and dairy foods contain Vitamin B.

Add, zoom, flashback and squeeze strategy

The strategy enables students to share and expand what they know. If the students have a great deal of knowledge on the topic, use this strategy before starting the topic. If the students do not have existing knowledge of a topic, then use this strategy as a revision.

Teachers can use this strategy to informally assess students' current knowledge.

1. Students form groups of 6–8.
2. The first student begins by recalling what she or he knows about a topic and when s/he decides, s/he stops and calls on another student to either 'add', 'zoom', 'flashback', or 'squeeze'.

Add is an invitation to continue recalling the topic.

Zoom is an invitation to 'zoom in' or add detail to the previous speaker's contribution.

Flashback allows the next speaker to return to any point in the recall.

Squeeze is an invitation to summarise all that has been said in a sentence or two.

Introduce one component at a time before students attempt it in groups.

Twenty questions

The idea with this strategy is to develop questioning and answering skills and to provide opportunities for students to discuss a concept relating to the current topic. This will assist the students in understanding the topic and is suitable as a revision exercise. It develops listening skills and provides opportunities for reflection. In addition, the teacher can informally assess the students' comprehension of the topic.

1. Students form groups of 4 or 5. Each group has one 'concept person' and one 'questioner'.
2. The teacher gives the 'concept person' in each group a card stating a concept.
3. The remaining group members develop two questions. The 'questioner' asks the questions of the 'concept person' who can only answer 'yes' or 'no'.
4. If the group cannot identify the concept at this stage (one guess only) they develop four questions for the 'questioner' to ask of the 'concept person'. Then a second guess is allowed. Six questions are asked then another guess is allowed. Eight questions are asked then the fourth and final guess occurs.
5. The aim is to guess the concept before the 20 questions are asked.

Mnemonics – Interacting images

A mnemonic is a technique to improve memory. Interacting images is appropriate when there are lists of pairs of words to be learnt. This occurs in schools more frequently than at first realised. The point, though, is that imagery has a very powerful effect on memory.

Basically, there are three points about this technique.

1. The first one is to visualise the words.
2. The second is to have the images interacting with each other.
3. The third point is to make it bizarre. If the images are silly, weird, or funny, the chance of remembering the words increases.

Reflective writing

Reflective writing involves students reflecting on what they have learnt in a lesson. It provides them with an opportunity to recall information and sort this information into their own words. It aids comprehension and memory. Teachers are then provided with an informal basis for assessing whether the students have retained and understood the information taught in the lesson.

(adapted from Ostoja, 1997, pp. 154–57)

Research on strategy instruction

Recent syntheses of research on instruction techniques have found that students with learning difficulties respond well to strategy instruction (Forness, 2001; Forness et al., 1997; Jitendra et al., 2004; Swanson, 2001). As outlined in Section 3, Forness (2001) examined the results of 24 separate meta-analyses across 20 intervention topics in special education. His primary purpose in conducting this synthesis was to draw tentative conclusions about the relative power of interventions as determined by magnitude of mean effect size for each. The results of this analysis were important in indicating that strategy-based models have stronger positive effects on student outcomes than any other type of interventions examined (e.g., behaviour modification, direct instruction, psychotherapy, stimulant medication, computer-assisted instruction, and perceptual training). Overall, the highest effect sizes were found for studies involving the development of mnemonic strategies (Mean ES = 1.62) and reading comprehension strategies (Mean ES = .94).

In addition, previous research has suggested that strategy instruction is effective not only for students with learning difficulties, but also for mainstream students. For example, Symons, MacLatchy-Gaudet, Stone and Reynolds (2001) evaluated the effectiveness of strategy instruction in enhancing the ability of Year 3 to Year 5 students (n = 180) to effectively locate information in text. None of the participating students had been identified as experiencing serious academic difficulties at school. The students in this study were randomly assigned either to a strategy instruction group or the 'no treatment' control group. Students in the strategy instruction group were taught to identify indexed terms, to skim text carefully, and to monitor how well extracted information fulfilled the search goal. On the other hand, students in the control group were not given any instruction of how to locate information in a book.

This study found that students in the strategy instruction group were significantly more successful in locating information than control group participants. Notably, students also transferred the strategy to an unfamiliar book. This finding is particularly encouraging as it suggests that strategy instruction can help students develop transferable knowledge, in this case about locating information in text.

Strategy instruction research in the literacy domain

Reading

In comparison with behaviourally based approaches to reading which conceptualise reading as a set of discrete skills, each to be mastered, strategy instruction is founded on a more holistic view. Reading is seen as a process in which readers actively search for, and make meaning for, themselves in what they read (Pressley & Wharton-McDonald, 1997). Indeed, there is considerable evidence that skilled readers use their prior knowledge as well as a number of flexible, adaptable strategies to construct a mental model of the text (e.g., see Dole et al., 1991; Dole, Brown, & Trathen, 1996). Strategy instruction is founded on these findings and emphasises the enhancement of students' existing knowledge, as well as using a set of reading strategies that good readers employ in a metacognitive, self-regulatory way.

Dole et al. (1991) identified five core strategies used by skilled mainstream readers which include the ability to:

- separate important from unimportant information
- effectively summarise information
- draw inferences from text
- generate story-specific questions
- monitor strategic processes.

A sizeable body of research supports the benefits of strategy instruction for improving students' reading comprehension (Anderson & Roit, 1993; Block, 1993; Deshler & Schumaker, 1993; Dole et al., 1996; Dole et al., 1991; Pressley & Wharton-McDonald, 1997; Swanson, 1999). Although relatively few studies have investigated the comparative effectiveness of strategy instruction and other instructional approaches, there is evidence to suggest that strategy instruction is particularly effective for enhancing students' ability to complete higher-order cognitive tasks, such as reading comprehension and writing.

For example, Dole et al. in their 1996 study, randomly assigned Year 5 and Year 6 students (n = 67) from a designated at-risk school, to one of three groups. These groups were strategy instruction, teacher-directed instruction (which the researchers called 'story content' instruction) or the control condition. The results of this study showed that students who received strategy instruction made superior gains in comprehension performance over their peers who either received teacher-directed instruction or were in the control condition. The differential and superior performance by the strategy group became particularly evident when students were asked to read texts on their own, without any instructional support from their teachers. In accordance with the aforementioned findings of Symons et al. (2001), this study elucidated the specific value of strategy instruction in enhancing students' comprehension of unfamiliar text.

Writing

There is also evidence to suggest that strategy instruction is beneficial for teaching expressive writing to students with learning difficulties. In a recent meta-analysis, Gersten and Baker (2001) examined 13 studies designed to teach writing strategies to students with learning difficulties. The mean effect size in the meta-analysis was .81, which is generally considered a strong effect. Gersten and Baker noted a number of commonalities among the 13 interventions. For example, most interventions adhered to the framework of three basic steps in the writing process: planning, writing and revising. Invariably, explicit teaching of each step was provided by the teacher through several examples, often supported by a 'think sheet', a prompt card, or a mnemonic. Another component common to all interventions was guided feedback. Either teachers or peers provided frequent feedback to students on the overall quality of writing, missing elements, and strengths.

Many of the studies in this meta-analysis did not investigate transfer of writing skills. However, when transfer measures were included, the results were decidedly mixed. Wong (1994) has urged refinement in writing interventions to promote transfer. In order to reach this goal, she asserted that:

> *… insufficient mindfulness during strategy learning appears to explain the difficulties in obtaining transfer among students with disabilities. This is because the typical intervention with students with learning disabilities rarely permits them to engage in the kind of deep and intent thinking necessary for transfer.*

(Wong, 1994, p. 111)

As such, Wong called for instruction that provides students with learning difficulties the opportunity to reflect on the relationship between their strategy and the subsequent successful learning outcome.

Strategy instruction research in the numeracy domain

A growing body of research suggests that strategy instruction is beneficial for enhancing the mathematics performance of students with learning difficulties.

Computation

Tournaki (2003) investigated the differential effects of teaching basic, one-digit addition facts to 42 mainstream Year 2 students and 42 students with learning difficulties. Students received instruction via either:

- strategy instruction
- direct instruction (including drill and practice)
- or were in the control group.

The results of this study were important in demonstrating that students with learning difficulties improved significantly only in the strategy condition, as compared to drill-and-practice and control conditions, on both post-test and transfer tasks. On the other hand, general education students improved significantly in both strategy and the drill-and-practice conditions as compared to the control condition. Thus, the findings of this study indicate that strategy instruction and drill-and-practice instruction have differential effects on addition skills, depending on the characteristics of individual students.

These results are in keeping with the findings from Swanson and Hoskyn's meta-analysis (see Table 2), which demonstrated that a combined model including elements of both direct instruction and strategy instruction covers the needs of most students. Tournaki (2003) concluded that when teaching students with learning difficulties, teachers should not rely on the premise that their results will not improve as a result of practice per se. For these students, even simple tasks like single-digit addition are problems to be solved, and they do appear to benefit from strategy instruction.

In addition, Naglieri and Gottling (1997) studied the differential effectiveness of a strategy instruction program for students with learning difficulties. Twelve students (aged 9 to 12 years) participated in 7 baseline sessions and 21 intervention sessions designed to facilitate planning processes. The results showed that the intervention had beneficial effects on mathematical computation for all students but was especially helpful for those who were poor in planning. Naglieri and Gottling (1997) suggested that the students with low planning scores improved more than those with high scores because firstly, the instruction met their need to be more planful, and secondly, previous research has found that planning is important for mathematics computation. Thus, in concordance with the research of Tournaki (2003), the results of this study indicate that students will differentially benefit from strategy instruction, and that matching instruction to the specific cognitive weakness of the student is important.

Problem solving

The preceding studies support the benefits of strategy instruction for improving students' performance in basic mathematics computation. However, there is also evidence to suggest that this form of instruction can be beneficial for enhancing students' problem solving ability.

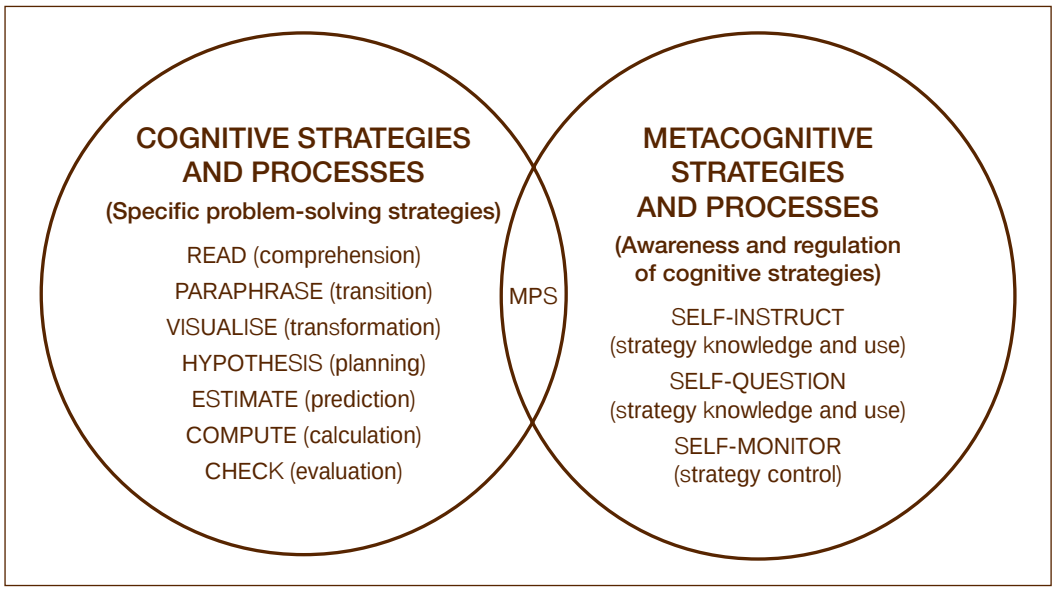
Case, Harris and Graham (1992) examined the effectiveness of a five-step strategy designed to help students with learning difficulties comprehend mathematical problems and devise appropriate solutions. The strategy was taught via one-to-one tutoring to four Year 5 and 6 students. The five steps of the strategy were to:

- read the problem aloud
- look for important words and circle them
- draw pictures to help
- write down the math sentence
- write down the answer.

The results of this study demonstrated that, upon completion of instruction, students' performance on mixed sets of addition and subtraction word problems improved, and they were much less likely to perform the wrong operation. More specifically, students' average baseline scores of 82% for word problems and 30% for subtraction problems increased to 95% and 82%, respectively. Furthermore, all four students generalised the use of the strategy from the tutoring sessions to their classrooms. However, maintenance of strategy effects administered 8–13 weeks

after instruction revealed mixed results. Two students maintained instructional gains, while two dropped in their performance. However, it is important to draw attention to the small sample size of this study, which limits the conclusions in terms of generalisability of results.

The work of Montague and her colleagues (Montague, 1992; Montague, Applegate, & Marquard, 1993) has also been important in demonstrating the effectiveness of strategy instruction for improving the mathematical problem solving performance of students with learning difficulties. The goal of instruction in these two studies was to teach students a comprehension cognitive and metacognitive strategy to help them solve one-, two-, and three-step mathematical word problems. The model of mathematical problem solving that served as the foundation for their studies is presented in Figure 2.



(Montague, 1992; Montague et al., 1993)

Figure 2 Cognitive and metacognitive model of mathematical problem solving adopted by Montague and colleagues

It is important to realise that this model reduces a highly complex recursive activity, involving a host of cognitive functions and resources, to a relatively simplistic description of the processes and strategies involved in efficient problem solving (Montague, 1992). Further, research has suggested that this model reflects the predominant cognitive and metacognitive activities used by good problem solvers (Montague & Appelgate, 1993a, 1993b).

In the first study, Montague (1992) investigated the effects of cognitive and metacognitive strategy instruction on the problem solving performance of six middle-school students with learning difficulties. Students were taught the seven cognitive strategy steps, as well as the three metacognitive strategy steps, depicted in Figure 2. Within this model, problem representation strategies include paraphrasing or restating problems in one's own words; visualising problems through illustrations on paper or mental imaging; and hypothesising, which involves establishing goals and setting up plans to solve problems. These strategies are thought to facilitate linguistic and numerical information processing, formation of internal representations in memory, comprehension and integration of problem information, and development of solution plans.

The metacognitive processes in this model focus on self-awareness of cognitive knowledge that is presumed to be necessary for effective problem solving. According to Montague (1992), successful problem solvers, either consciously or unconsciously, use self-instruction, self-questioning and self-monitoring to gain access to strategic knowledge, to guide execution of strategies, as well as to regulate use of strategies and problem solving performance. Self-instruction helps students to identify and direct the problem solving strategies prior to execution. Self-questioning promotes internal dialogue for systematically analysing problem information and regulating execution of cognitive strategies. On the other hand, self-monitoring promotes appropriate use of specific strategies and encourages students to monitor general performance.

Following six days of instruction, Montague (1992) found that five of the six students showed marked improvement in their problem solving test scores. However, follow-up generalisation measures that were undertaken several months after instruction indicated that students were unable to maintain their strategy knowledge without periodic review sessions.

A further purpose of this study was to investigate the differential effects of the cognitive and metacognitive components of instruction. Although Montague (1992) observed that the study was limited in its ability to identify the elements of the instructional package that were most crucial to student improvement, the results clearly indicated that the combination of cognitive and metacognitive strategies was more effective than either cognitive or metacognitive strategies taught in isolation. The model represents this combination of cognitive and metacognitive strategies in that aspect of the model where the circles of the Venn Diagram overlap (MPS).

In a subsequent study, Montague, Applegate and Marquard (1993) investigated the effects of cognitive and metacognitive strategies (see Figure 2) on the problem solving performance of 72 students (aged 13 and 14 years) with learning difficulties. Instruction was provided to groups ranging from 8 to 12 students in separate classrooms during their regularly scheduled 50-minute mathematics classes. The study lasted for 14 days (including two days of post-testing). All lessons were scripted to enhance treatment fidelity. The instructional routine for strategy acquisition included discussion of current performance, description of the cognitive processes and metacognitive activities associated with each process (see Figure 3), as well as verbal rehearsal of the processes and activities. Wall charts and booklets for home study were used during this period. Students were required to memorise the seven processes to 100% criterion and paraphrase the metacognitive activities. During classes, the teacher modelled strategy recitation and application using an overhead projector while solving problems; exchanged roles with students during demonstration activities; and gave positive corrective feedback during guided practice sessions.

The results of this study showed that, on average, students significantly improved in mathematical problem solving performance on two different measures of one-, two-, and three-step word problems and also compared well with a normally achieving peer group at the end of training. However, further tests taken after three and five weeks from training indicated that students' strategy knowledge was gradually deteriorating. In response, Montague et al. (1993) provided a two-day booster session, consisting of review and practice, which resulted in a significant improvement in students test scores. As a result, Montague et al. concluded that distributed practice and periodic booster sessions may be enough to maintain strategy use for students whose performance deteriorates over time.

Concluding comments

In summary, the findings of instructional research suggest that teaching approaches based on models of direct instruction and strategy instruction produce positive learning outcomes, not only for students with learning difficulties, but also for mainstream students. There is evidence to suggest, however, that these two approaches may differentially enhance learning for particular types of tasks and situations. It appears, for example, that direct instruction works best for teaching students well-defined tasks, which can be reduced to a fixed sequence of sub-tasks and steps that consistently lead to the same goal. Nevertheless, the research indicates that, as long as teachers also employ other effective pedagogical principles, direct instruction can produce positive outcomes for a wide range of situations and tasks. Thus, regardless of whether direct instruction is used to teach the steps in the writing process, or as a means for teaching reading comprehension, students with learning difficulties benefit when the elements of what they are learning are explicitly identified and demonstrated with examples.

The research literature suggests that a large number of students, including those with learning difficulties, have problems accessing and coordinating appropriate cognitive strategies when learning. Research evidence indicates that strategy instruction can help to remediate the academic problems of such students. It appears, however, that teachers can experience difficulty in helping students to generalise strategies and in promoting strategy maintenance. Various studies have found that distributed practice and periodic training sessions may be enough to maintain

strategy use over time. However, strategy generalisation is the ultimate test of strategy instruction, and its incidence must be addressed in future intervention research.

Read (for understanding)
SAY: Read the problem. If I don't understand, read it again.
ASK: Have I read and understood the problem?
CHECK: For understanding as I solve the problem.
Paraphrase (your own words)
SAY: Underline the important information.
Put the problem in my own words.
ASK: Have I underlined the important information?
What is the question? What am I looking for?
CHECK: That the information goes with the question.
Visualise (a picture or a diagram)
SAY: Make a drawing or diagram.
ASK: Does the picture fit the problem?
CHECK: The picture against the problem information.
Hypothesise (a plan to solve the problem)
SAY: Decide how many steps and operations are needed.
Write the operation symbols (+, –, x, ÷)
ASK: If I do …, what will I get?
If I do …, then what do I need to do next?
How many steps are needed?
CHECK: That the plan makes sense.
Estimate (predict the answer)
SAY: Round the numbers, do the problem in my head, and write the estimate.
ASK: Did I round up or down?
Did I write the estimate?
CHECK: That I used the important information.
Compute (do the arithmetic)
SAY: Do the operations in the right order.
ASK: How does my answer compare with my estimate?
Does my answer make sense?
Are the decimals or money signs in the right places?
CHECK: That all the operations were done in the right order.
Check (make sure everything is right)
SAY: Check the computation.
ASK: Have I checked every step?
Have I checked the computation?
Is my answer right?
CHECK: That everything is right. If not, go back.
Then ask for help if I need it.

(Montague, 1992, p. 234)

Figure 3 Cognitive processes and strategies for mathematical problem-solving instruction

section

5 Bridging the gap between constructivist and direct instruction methods

Introduction

Contemporary reviews of the educational psychology research literature and meta-analyses of those research findings indicate that considerable progress has been made over the past decade in identifying key teaching approaches that underlie effective instruction for students experiencing difficulties in learning. Essentially, the research presents compelling evidence that direct instruction and strategy instruction are both generally effective teaching approaches for students with learning difficulties, as well as for those without learning difficulties. These findings are particularly encouraging as they suggest that valuable instructional approaches for students with learning difficulties also result in improved learning outcomes for average-to-high ability students.

It is important to emphasise, however, that there is no one single instructional method that deserves sole claim to being 'best practice'. Of course this will come as no surprise to teaching practitioners operating in the real worlds of their classrooms. Rather than single strategy solutions, the common wisdom of research in the field currently points to the need for *balanced* approaches to be employed to accommodate for the diverse needs of students (Flippo, 2001). Balanced approaches are intended to take what has been learnt through research and practice and combine them into the means of providing students with the best possible education.

This section begins with an examination of contemporary conceptualisations of balanced instruction, followed by a review of evidence examining the impact of balanced programs for students with and without learning difficulties in mainstream classrooms. Research identifying key components of effective classroom practice is then presented, which can help inform teachers' decisions about how to enhance students' learning outcomes. Finally, the implications of the main findings of this review for teacher training and practice are discussed.

The case for a balanced approach to teaching

Although some advocates of constructivism consider that any form of direct or explicit teaching is antithetical to constructivist principles, and is equivalent to enforcing rote learning on students, this research review has demonstrated such a position to be somewhat misguided. Some constructivists explicitly acknowledge that students also need teacher-directed instruction and guided practice. For example, von Glasersfeld (1995), one of the leading advocates of constructivism, recognised that there are matters that can and perhaps must be learned in a

purely mechanical way. This view is also supported by a considerable body of evidence which identifies that explicit instruction is of tremendous value, particularly for students with learning difficulties. However, it is a misreading of this research to believe that teachers should reject constructivism in its entirety and swing back to purely teacher-directed methods.

Undoubtedly, the constructivist movement has made many important contributions to our understanding of how students learn, particularly in the area of literacy (Spiegel, 1998). It has also allowed teachers more freedom to use their professional judgement in selecting materials and activities appropriate to the particular needs of these students. This freedom to decide is one that they may have been denied in the past when purely teacher-directed methods were decidedly popular (Spiegel, 1994). It is imperative that educators and policy makers continue to consider the contributions of the constructivist movement so that its importance is not de-emphasised for all students in schools. Our students and teachers cannot afford the dire effects of 'throwing out the baby with the bath water again' (Spiegel, 1998, p. 115).

Indeed, some of the dangers of returning to a purely teacher-directed approach have been highlighted in the education literature. For example, Harris and Alexander (1998) reported their personal experience of teaching in the United States of America in the early 1970s when the curriculum was alleged to be dominated by skills development and prescribed teachers' guides and workbooks (also see Harris & Graham, 1996):

> *We have seen first-hand the toll that a forced-pace, decontextualised approach dominated by skills-based materials and curriculum takes, not only on children but also on their teachers. Lost opportunities for developing meaningful literacy and understanding; boredom and lack of relevance of school to students' lives; overwhelming emphasis on factual material resulting in inert, ritual knowledge; and a focus on innate ability rather than effort and development are among the shortfalls of a skills and workbook dominated approach to instruction.*

(Harris & Alexander, 1998, p. 117)

Consequently, rather than advocating a single-strategy approach, an increasing number of educators are promoting the benefits of balancing student-directed approaches with teacher-directed approaches in the classroom (Butler, Miller, Lee, & Pierce, 2001; Harris & Graham, 1996; Spiegel, 1992; Westwood, 1999). Proponents of the balanced approach believe that an integration of knowledge and successful teaching practices is critical in today's schools:

> *I believe that bridges can and must be built between whole language and more traditional approaches to enable teachers to blend the best of both in order to help every child reach his or her full literacy potential. Above all, we must avoid either/or positions that reject out of hand the possibility of blending and blind us to the value of different perspectives.*

(Spiegel, 1992, p. 43)

Given that various educational psychologists continue to advocate the benefits of using balanced teaching approaches, it is useful to examine more closely what is meant by the term 'balance' as used in the education literature. The following section presents contemporary research on mainstream classroom practice and an example of a popular, balanced program.

Conceptualisations of balanced instruction

'Balance' is a key term that has appeared increasingly in the education literature since the late 1990s. Other terms have also been applied, such as *eclectic* and *combined* approaches, but *balance* has emerged as the unequivocal preference of those working in the field. Although there is no one consistent definition of what is meant by *balance*, it can generally be described as a combination or alternation of various aspects of the curriculum and/or instruction (such as constructivist and direct instruction methods). Thus, balanced approaches can be applied to both *what* is taught (the curriculum) and *how* it is taught (the method of instruction) (Fitzgerald

& Cunningham, 2002). 'Best practice' is now recognised by classroom practitioners as the applying of the combination of instructional approaches which best fits the students being taught.

The range of research provided in this review suggests that teachers can, and do, successfully construct a balanced integration of instructional approaches in their regular classroom practice. Some American evidence resulting from survey research on teacher perceptions of the pedagogic needs of those with learning difficulties supports the view that combining explicit teaching with constructivist learning opportunities is beneficial.

In one study, Pressley, Yokoi, Rankin, Wharton-McDonald and Mistretta (1996) surveyed a national sample of Year 5 teachers nominated by their supervisors as being outstanding in promoting the literacy of their students. In this survey, teachers described their instruction as an integrated articulation of many components, including whole language experiences and explicit skills instruction. These findings are consistent with the findings of Drecktrah and Chiang (1997) in their survey of 183 American primary school teachers of students with learning difficulties. The results of this study showed that, although a large number (64%) of Year 5 teachers indicated that they used whole language frequently, only half that number considered the whole language approach alone to be effective. Over 70% of the teachers surveyed believed that a combination of direct instruction and whole language approaches is effective in teaching reading and writing.

Thus, the results of these two survey research studies suggest that effective teachers can, and in the case of American studies do, integrate teaching practices from each approach. Additionally, these findings are supportive of the notion that a balanced approach is more effective than exclusive reliance on one single approach.

Over recent years Australian state and territory government jurisdictional curriculum documentation has endorsed the adoption of a range of instructional approaches, particularly for the teaching of literacy (Luke et al., 2003). However, evidence of how instructional approaches are actually integrated in Australian classrooms, or the extent of the integration, has not yet been systematically collected and analysed. As observed by Shaddock, Hoffman-Raap, Giorcelli, Hook and Smith (2004), the majority of teaching practices that are currently occurring in mainstream Australian classrooms 'have not been validated by conventional procedures, such as through publication in referred journals or in government reports that have been through a quality control process' (p. 1). Thus, further research into the extent to which teachers currently implement integrated approaches for the teaching of literacy and numeracy would be of great value

Nevertheless, empirical research into this area appears to be underway. In one recent study, Smith, Robinson, Arthur-Kelly and Morgan (2004) surveyed a sample of primary teachers (n = 24) about their usage of instructional approaches in mixed ability classes. The results of this study indicated that most teachers believe that they use a variety of instructional strategies in the classroom. Smith and her colleagues are using the results of this study as a pilot test of the instrumentation and research procedures, which will lay the foundations for further work that will be conducted in this area.

An example of a 'balanced instruction' program

Although there is no one consistent view of what is meant by balanced instruction, it appears that most, if not all, of the predominant conceptualisations share the common idea of a balancing beam, with at least one axis that must be equally balanced (Fitzgerald & Noblit, 2000). The *Four Blocks* reading program is an example of this concept of 'balanced instruction'.

The *Four Blocks* reading program, developed by Cunningham and colleagues (Cunningham, Hall, & Defee, 1998), is one example of a balanced approach that is being widely implemented in primary classrooms across the USA. This program was developed with two major goals in mind:

- to provide instruction that meets the needs of students with a wide range of entering literacy levels
- to provide a combination of several approaches to reading instruction in one program.

Four Blocks incorporates the ideological strengths of combining whole language and code-based approaches. Recognising that each approach has its assets, and that all children do not learn in the same way, *Four Blocks* organises reading instruction into four 30-minute blocks: *Guided reading, Self-selected reading, Writing* and *Working with words*. Thus, in line with the metaphor of a balancing beam, this program consists of four components that need to be equally weighted for the beam to be in equilibrium. For further information about the instructional procedures of this program, a brief description of each of the four blocks is provided below.

Guided reading

Students are exposed to a wide range of literature, assisted in the development of comprehension strategies, and taught how to read materials that become increasingly difficult. During this part of the program, the teacher reads aloud a selection of text, often from the basal reader, with students following in their texts. The teacher uses this time to model reading strategies, such as using context clues or pictures to help decode unfamiliar words. The teacher will also monitor students' comprehension and skills as the text unfolds.

Self-selected reading

Students are given the opportunity to read books of their own choosing. Students select texts from various genres, at their own reading level, and read these books silently to themselves. While students are reading, the teacher confers with students individually about the books they are reading. At the end of this lesson, several students share their selections with the class.

Writing

During this part of the program, students are explicitly taught the connection between reading and writing. The lesson typically begins with a 10-minute mini lesson in which the teacher models an aspect of writing for the class. This is followed by about 30 minutes of students working independently on their own writing. The teacher confers with students individually about their writing.

Working with words

The goals of this part of the program are to assist students in learning to read and spell high-frequency words, and to teach students the patterns that will allow them to decode and spell words. These goals are achieved in varied ways. For learning how to spell and read high-frequency words, the teacher introduces five new words to the 'Word Wall' each week. This wall includes words that have common spelling patterns or are used frequently in students' writing. Students practise new and old words daily by saying them, chanting the letters, writing the words, and self-correcting the words with the teacher.

In summary, the range of research evidence presented in this section suggests that balanced approaches can be used successfully in mainstream classrooms. The studies of Pressley et al. (1996) and Drecktrah and Chiang (1997) indicate that many American teachers believe that a combination of instructional approaches is effective in teaching students with and without learning difficulties. Thus, as asserted by Drecktrah and Chiang (1997) there may be many more 'middle-of-the-roaders' than is often presented in published papers or at professional presentations. An important corollary of contemporary images of balanced approaches, as similar to the metaphor of a balancing beam, is that the focus has been on giving equal weighting to different types of curriculum and instructional methods. However, this review will later indicate that the notion of balance is considerably more complex than it may appear at the outset.

Research on the power of balanced instruction

The research presents compelling evidence that balanced approaches provide students with the best opportunities for success. As presented in Section 3 of this review, Swanson and Hoskyn's (1998) meta-analysis demonstrated that the highest effect size emerged for a combined model

that included elements of both direct instruction and strategy instruction. Table 2 showed that the effect sizes for the direct instruction and strategy instruction models in isolation (ES = .68 for direct instruction only; ES = .72 for strategy instruction only) are fairly strong and hence, both approaches seem viable for students with learning difficulties. However, the effect sizes for these approaches were actually smaller than the combined model (ES = .84 for direct instruction and strategy instruction combined) and, as a result, Swanson (2001) concluded that students with learning difficulties are most positively influenced by teaching approaches that combine essential elements of both direct instruction and strategy instruction.

> *Effective instruction is neither a bottom-up nor a top-down approach in isolation. Lower-order and higher-order skills interact to influence treatment outcomes. Clearly, performance at complex levels (writing prose, inferring the meaning of text) cannot occur without some critical threshold of skills. Children with LD [learning difficulties] vary in these skills. What is clear from this synthesis, however, is that varying degrees of success across treatment domains draw from treatments that focus on both high- and low-order instruction (i.e., strategy and direct instruction).*

(Swanson, 2001, p. 11)

Likewise, Vaughn, Gersten and Chard (2000), in their synthesis of research findings in the area of literacy, concluded that an integration of bottom-up and top-down instruction is valuable. These researchers reminded fellow researchers and teachers that although it is important to capitalise on the benefits of explicit teaching, this does not mean the abandonment of top-down teaching that focuses on the development of metacognitive skills. Notably, Vaughn et al. identified that some of the most effective interventions were metacognitive and strategic, which is consistent with the major findings reported in this review.

Guidelines for classroom practice

A number of educational professionals in the field have proposed that a balanced approach to instruction holds the greatest promise for improving achievement outcomes for all students in mainstream classrooms. (e.g., Butler et al, 2001; Harris & Graham, 1996; Spiegel, 1992; Westwood, 1999). Additionally, there is a growing realisation and documenting by educational researchers that the notion of balance is considerably more complex than was previously appreciated. The concept of providing students with an 'equal' weighting of explicit and constructivist teaching approaches may seem simple. But, in reality, a truly balanced approach needs to be considered as a complex and unified system of pedagogy. This point has been emphasised by Rasinski and Padak (2004) as follows:

> *A balanced program is more than the simple conglomeration of disparate approaches to literacy instruction – in a truly balanced system, one element influenced other parts of the curriculum, and that inter-relationship of parts needs to be considered.*
>
> *For example, the simple notion of weighting needs to be considered. When balancing feathers with marbles, a one-to-one correspondence won't work: several feathers will be needed to balance against one marble. This analogy applies in a balanced reading program as well. While it may be appealing to think that thirty minutes devoted to word decoding and phonics balances against an equal amount of time devoted to guided reading, this may not produce the optimum results that are hoped for. In sixth grade, for example, it may be wise to give additional weighting to guided reading and less weighting to decoding and phonics, so that perhaps fifty minutes per day is given to guided reading while ten minutes is spent focused on decoding or phonics. Both guided reading and decoding are being taught; however, appropriate balance in the intermediate and middle grades may require greater emphasis on negotiating meaning in text.*

(Rasinski & Padak, 2004, pp. 92–93)

This section of the review aims to go beyond the surface level consensus on balanced instruction by exploring some of the challenging issues that teachers need to consider in implementing a balanced program.

Firstly, it is important to emphasise that advocates of balanced programs do not endorse a *laissez-faire* combination of approaches, but rather a thoughtful, carefully integrated selection of validated instructional components (Harris & Alexander, 1998). Today, many researchers believe that effective balance is achieved through the selection of methods of instruction that best suit the types of learning involved in a lesson, and that in deciding such matters the age, ability, and aptitude of the students should have been taken into account. For example, Galton, Hargreaves, Comber, Wall and Pell (1999) emphasise that a teaching method should be judged on its *fitness for purpose*. According to these researchers, it is necessary for teachers to first identify the nature of what it is the child is expected to learn, and then decide the most suitable pedagogical principle for affecting this learning process. Choices should be made in accordance with student needs.

As suggested in the literature referenced above, balance in the classroom does not always involve a pedagogy that draws on components from *both* explicit and constructivist approaches. Balance often involves the teacher making an informed choice of *either* one *or* the other approach, given a particular set task and student attributes. Montague (1993) is one researcher who has emphasised the importance of teachers being able to find the best fit between the instructional approach and task, and also between the instructional approach and student. She observed, for example, that a mnemonic strategy such as the keyword technique might be particularly effective for remembering information. However, for a student who has difficulty forming and retaining mental images or making conceptual connections, the keyword strategy may not be as useful as categorical organisation of terms, or simple rehearsal or memorisation using flash cards. Thus, Montague suggested teachers need to know how to select, and have the pedagogical competence to use, instructional approaches that will enhance learning for particular students.

Various researchers have offered further guidance to teachers seeking to employ a balanced approach. In one paper, Rosenshine (1995) recommended that a particular teaching approach be selected depending on the degree of structure of the task. According to Rosenshine, direct instruction is more suited to well-structured tasks; that is, those tasks which can be broken down into a fixed sequence of sub-tasks which consistently lead to the same goal. Long-division computation is an example of a well-structured task. The steps are concrete and visible and there is a specific, predictable algorithm that can be followed, one that enables students to obtain the same result each time they perform the algorithmic operations. These well-structured tasks are best taught by explicitly teaching each step of the algorithm to students.

On the other hand, Rosenshine (1995) indicated that constructivist approaches may be more useful for less structured tasks. Unstructured tasks cannot be broken down into a fixed sequence of sub-tasks and steps that consistently and unfailingly lead to the goal. Note that Rosenshine's viewpoint is consistent with the findings of Swanson (1999), discussed earlier in this review, which affirmed that, while direct instruction was most effective for word recognition (a well-structured task), it was not as useful for reading comprehension (a less structured task).

Other researchers have proposed that the most effective combining of approaches is when teachers start off using more explicit approaches and move on to constructivist approaches as students become more competent. For example, Westwood (2003c) observed that initial heavy emphasis on explicit phonics and decoding could give way to practice in the application of reading comprehension strategies. Indeed, research evidence supports the contention that explicit teaching approaches are particularly beneficial during the early stages of learning. For example, the findings of the National Reading Panel (2000; Enri, Nunes, Stahl, & Willows, 2001) identified that reading programs which teach phonics explicitly and systematically have the biggest impact on Kindergarten and Year 1 students who are in the early stages of learning how to read. A different combination of approaches may be required to support subsequent learning.

Research evidence also suggests that adopting the strategy of balanced instruction can be of benefit to students with different learning styles. Students with analytic and auditory learning

styles have been reported to do better with phonics, while students who are visual, tactile and more global in their approach to learning do better with whole language (see Mackh, 2003). Research in the area of learning styles emphasises that teachers need to observe their students carefully, need to be familiar with a variety of teaching methods and learn to apply these methods flexibly (Carbo, 1997).

In conclusion, balanced approaches may be best seen as a decision making process through which teachers make thoughtful choices about the best way to help each student improve their academic outcomes (Spiegel, 1998). Such approaches both require and enable teachers to reflect upon what is being done in the classroom and to modify instruction based upon the needs of individual learners. These modifications are drawn from a broad repertoire of strategies and a sound understanding of students, learning and the theoretical basis of these strategies.

The following guidelines can be used to help guide teachers' decisions about the most appropriate instructional approach to employ in their classrooms.

Guidelines for teachers in selecting the most appropriate instructional approach

Teachers should move towards a more direct teaching approach:

- when an essential strategy, skill or concept is being employed for the first time
- for students who are falling behind their peers as a result of too little teacher direction
- for students who are in risk of cumulative difficulty because they learn more slowly than their peers
- for students who are losing confidence and interest when trying to work independently
- for students with analytic and auditory learning styles.

Teachers should move towards a more constructivist approach:

- when the concept of strategy can be easily learned through students' own exploration
- when the concept does not provide a foundation for other concepts and thus, does not need to be learned in a particular time
- for students who have been able to learn strategies primarily through their own explorations
- for students who will be held back and lose interest by having to listen to suggestions for accomplishing a task they already know how to do
- for students with visual, tactile, and global learning styles.

(Adapted from Westwood, 2003c, pp. 48–49)

Research on effective components of classroom practice

Consistent with research on balanced approaches, and in an extension of previous research, various educational professionals have searched for components of effective classroom practice – regardless of the theoretical orientation of instruction used or the content of instruction (e.g., Rosenshine, 1995; Shaddock et al., 2004; Swanson & Hoskyn, 1998, 2001; Westwood, 2003c). The empirical work of Swanson and his colleagues is particularly strong in this area.

In one notable meta-analytic study of instructional literature for students with learning difficulties aged 12 to 18, Swanson and Hoskyn (2001) drew data from a comprehensive range of studies. Their data set included a collection of group design studies (n = 93) published between 1963 and 1997. These studies were selected on the basis of a number of criteria, but emphasis

was given to high methodological quality. As a result of this research, Swanson and Hoskyn found that eight major instructional factors captured the majority of instructional activities. These factors are described below.

Swanson and Hoskyn's eight major instructional factors

1. **Questioning**: directing students to ask questions, teacher and student/s engaging in dialogue and teacher asking questions
2. **Sequencing/segmentation**: breaking down the task and sequencing short activities
3. **Skill modelling**: reminding students to use multiple processing steps and the teacher modelling the skill
4. **Organisation/explicit practice**: providing organisation prior to task commencement and repeated practice
5. **Small group setting**: arranging instruction in a small group with verbal interaction occurring between students and/or teacher
6. **Indirect teacher activities**: facilitating peer modelling, elaboration (additional information or explanation provided) and ancillary activities (e.g., homework and parent help)
7. **Technology**: providing computer presentations, strategy flow charts, etc.
8. **Scaffolding**: presenting and fading of prompts and providing necessary assistance.

(Swanson & Hoskyn, 2001)

Swanson and Hoskyn found, however, that only one of these eight factors increased the predictive power of instruction effectiveness beyond what can be predicted by variations in methodology and age. The factor that optimally predicted effect size estimates across all outcomes measures was *organisation/explicit practice*. This factor included only two instructional components: *advance organisation* and *explicit repeated practice*. The finding that these two components enhance instructional effectiveness is consistent with other literature in the field (Rosenshine, 1995).

Advance organisers and explicit practice

Interest in organisers has emerged primarily from research in the area of cognitive psychology (Ausubel, 1968; Ausubel & Robinson, 1969), where 'advance organisers' have been defined as:

> *… material that is presented in advance of and at a higher level of generality, inclusiveness, and abstraction than the learning task itself.*

(Ausubel & Robinson, 1969, p. 606)

According to cognitive theorists, advance organisers provide students with a mental scaffold with which to build understanding of information. They present students with a structure which facilitates learning and retention of key information, and supports the connection between students' current knowledge and the to-be-learned information (Swanson & Hoskyn, 2001). Mayer (1987) suggested that advance organisers are effective, and should be used when:

- students lack the background knowledge necessary to understand the to-be-learned information
- the goal of instruction is for students to transfer or apply learned information to new problems or circumstances
- a simplified or concrete model can be constructed that will be easy for students to learn and organise the information.

Likewise, other research studies have shown that retention of knowledge is increased by explicit practice. This evidence relates to distributed review and practice, repeated practice, sequenced reviews, daily feedback, and/or weekly reviews. It is important to emphasise, however, that although intensive practice of newly learned information in the early stages of learning is necessary, research findings in the area of learning and cognition have presented strong evidence that distributed practice is the most effective for retention.

Research has shown that students experience superior recollection when the repetition of

an item is spaced rather than massed during study (Dempster & Farris, 1990; Braun & Rubin, 1998; Mizuno, 1998; Bahrick, Bahrick, Bahrick & Bahrick, 1993). This finding has been known as a *spacing effect*. The phenomenon of the spacing effect reference is a very robust finding; one which has been observed in virtually every experimental learning paradigm, and with all sorts of traditional research materials (Dempster & Farris, 1990). In many cases, spaced repetitions (i.e., instructional presentations spread out over time) have been reported to be twice as effective as massed repetitions (i.e., presentations timed closely together) (Demspter, 1987). In light of the evidence regarding the *spacing effect*, Dempster (1987) emphasised that practice sessions and reviews 'should be repeated, but not too close in time, as instructors are prone to do' (p. 16). Clearly, such findings have important implications for education, suggesting that teachers should distribute practice and reviews on a given subject over several distributed sessions.

Although Swanson and Hoskyn (2001) identified that advance organisers and explicit practice are the two main components that enhance instructional effectiveness, it is important to consider the practicality of these findings. No teaching program would be sufficient with just these two components; they must be put in the context of daily teaching practice. Thus, the question arises as to where these two components fit within the context of other components of teaching. Several researchers (see Swanson & Deshler, 2003) have suggested that effective instruction for students with and without learning difficulties follows a *sequence of events*, such as the following.

'Best practice' sequence of teaching and learning events

1. State the learning objectives and orient the students to what they will be learning and what performance will be expected of them.
2. Review the skills necessary to understand the concept.
3. Present the information, give examples, and demonstrate concepts and materials.
4. Pose questions (probes) to students, assess their level of understanding, and correct misconceptions.
5. Provide group instruction and independent practice. Give students an opportunity to demonstrate new skills and to learn the new information on their own.
6. Assess performance and provide feedback. Review the independent work and give a test. Give feedback for correct answers and teach skills if answers are incorrect.
7. Provide distributed practice and review.

(Swanson & Deshler, 2003, p. 129)

The research evidence of Swanson and colleagues provides teachers with clear guidelines to direct instructional practice. In short, their findings suggest that instruction provided to students with learning difficulties must be delivered in a fashion that employs both advance organisers and explicit practice.

Implications for pre-service and ongoing teacher training

In view of the findings presented in Sections 3 and 4 of this review, it is worrying that significant numbers of teachers in Australia are not being exposed to training and research that emphasises the importance of direct instruction. As observed by Westwood (1999) and discussed in Section 2 of this review, most Australian university departments currently base their teacher education programs on constructivist views of learning and do not expose their students to a wider range of methods, including teacher-directed instruction. Westwood (2003a) highlighted some of the problems of the current philosophy underpinning the Australian education system:

> *The philosophy underpinning early years education is that children should be encouraged to develop at their individual rates; but the outcome can be that without direct teaching some children fail to acquire crucial knowledge, skills and attitudes that would enhance their progress. Instead they experience frustration and failure and develop increasingly negative feelings toward learning*

> *in school … The use of explicit teaching methods in the early stages of learning in no way precludes the student from ultimately developing independence in learning; indeed, direct teaching in the early stages facilitates greater confidence and independence in later stages.*

(Westwood, 2003a, p. 55)

There is also little evidence that teacher trainees are exposed to explicit strategy instruction as a pedagogy. Although the benefits of strategy instruction have been stressed in the education literature since the 1980s, it seems that few teachers actually employ strategy instruction on a regular basis.

In one study on instructional practices of Year 4 and 5 classrooms in America, Pressley et al. (1996) observed little teaching of strategy instruction during the course of the school year. Furthermore, this lack of instruction was observed despite the fact that teachers reported teaching strategies. Instead of teaching strategies in a comprehensive fashion to their students, these teachers occasionally mentioned strategies and presented questions tapping the understandings that follow from strategic efforts (e.g., What predictions did you make when you read? Did you have any images when you read?) However, teachers posing such questions in no way ensures that students know how to use such strategies, much less that they do, in fact, apply them.

In order to move closer towards the adoption of the 'best practice' for students with learning difficulties, it is critical that teachers be trained in the use of practices that have been shown to be effective. Thus, tertiary teacher-training courses and in-service professional development programs must incorporate training in the use of direct instruction and strategy instruction, as well as training in constructivist methods currently provided. This will provide teachers with the skills in the practices most necessary for those with learning difficulties. Only then will they be provided with a conceptual understanding, attitudinal and level of competence that will enable them to freely exercise the choices associated with best practice.

Implications for classroom practice

Over the past decade, considerable progress has been made in uncovering key general teaching practices that underlie effective instruction for students with learning difficulties. The findings presented in this review provide a blueprint for teachers about how they can most effectively meet the educational needs of their students with learning difficulties.

As presented in Sections 3 and 4 of this review, the research deriving largely from the field of educational psychology has essentially demonstrated four key findings. They are firstly, that teaching approaches based on models of direct instruction and strategy instruction produce higher positive effects for students with learning difficulties than other approaches. Secondly, when a balanced approach is adopted, the outcomes for students are most positive. Thirdly, teachers need to have the necessary theoretical and pedagogical knowledge and skills to combine essential elements of multiple approaches. Fourthly, teachers need to have the attitude that all students can learn, even those who experience difficulties in learning.

No single approach can affect all aspects of performance or the complex nature of learning difficulties. In this regard, Spiegel's (1998) cautionary observation concerning student and task variation is worth noting:

> *Learners, teachers, curricula, and schools vary. Not everyone learns in the same way; not every task requires the same strategies; not every teacher has the same talents; not every school has the same combination of learners and teachers. Rather than trying to shoot each child with the same silver bullet, we need to recognise, celebrate, and work with this wonderful diversity. A balanced literacy program allows each teacher to select what is right for each child and each task and to change the emphasis easily. A balanced literacy approach is flexible, and that flexibility empowers teachers to tailor what they do for each child each day.*

(Spiegel, 1998, p. 118)

The research and thrust of this review has shown why policy makers and practitioners should be less sanguine about effective learning outcomes being based on any single paradigm. At the same time, this review has selected research which values and recognises the continuing need for stimulation and critical evaluation engendered by theoretical separation and competing models. Integration of knowledge and successful practices is critical in today's schools.

In addition to these notable concerns about overgeneralising the results of any one single approach, several implications have emerged from this review that can help mainstream classroom teachers in enhancing their students learning outcomes, particularly for those with learning difficulties. To begin with, the findings of this review suggest that a balanced approach is best because it allows flexibility according to the student, the teacher and the task. Since not all students, tasks and teachers are the same, teachers require a full repertoire of strategies to improve students' literacy and numeracy learning (Spiegel, 1998). As a result, teachers require an understanding of the theories of direct instruction as well as constructivist teaching principles; and they must know how and when to effectively implement teaching strategies that reflect these differing philosophies (Rankin-Erikson & Pressley, 2000).

Balanced instruction should not, however, consist of simply a conglomeration of all methods that have been demonstrated to work. Rather than simply picking the best elements of various instructional approaches, it is imperative that teachers use a thoughtful, carefully integrated selection of validated instructional components. In supporting this objective, this review would encourage teachers to use contemporary research evidence that will allow them to make clearer and more purposeful instructional decisions. Furthermore, teachers should use the information provided by research to customise instructional strategies to their own students' needs. Of course, teachers who have been trained in the use of the full range of pedagogies would be best placed to do this.

Specific implications for teaching students with learning difficulties

The findings of this review clearly indicate that explicit instruction is an essential feature of effective instruction for students with learning difficulties. The research of the National Reading Panel has been particularly influential in drawing attention to the importance of explicit instruction, particularly for teaching phonics, in the early years of primary school. Overall, it appears that where explicit instruction is used, students with learning difficulties appear to make much better progress and become more confident and effective learners (Westwood, 2003a). They better understand the codes associated with their learning.

Regardless of whether explicit instruction is used to teach students the steps in the writing process, or as a means for teaching reading comprehension, students with learning difficulties benefit when the elements of what they are learning are identified and demonstrated with examples (Vaughn et al., 2000). Policy makers and practitioners cannot ignore this research evidence any longer. If teachers are to provide students with the best possible education, it is imperative that credence be given to explicit instruction, particularly where teachers are working with students who have learning difficulties.

The findings presented in this review also demonstrate that strategy instruction should be a powerful component of teachers' instructional repertoires. Several studies suggest that students with learning difficulties have difficulty accessing and coordinating cognitive learning strategies (e.g., Borkowski et al., 1989). Moreover, the research in this area suggests that well-designed strategy training can improve the academic performance of students with learning difficulties. Harris and Pressley (1991) argue that by explicitly teaching students strategies, the teacher provides them with 'their culture's best-kept secret about how to obtain academic success' (p. 395). Furthermore, Vaughn et al. (2000) observed that as proficiency with the strategy develops, students are more likely to apply the strategy in new contexts.

It is important to emphasise, however, that instruction in one or several cognitive and metacognitive strategies will by no means turn students into strategic learners who consistently approach tasks with forethought and planning. As emphasised by Wong, Harris, Graham and Butler (2003), a minimum requirement for transforming students with learning difficulties into strategic learners involves immersing them in strategy instruction *continuously* across the curriculum. To

facilitate this requirement, Wong et al. suggested that a community of practice be formed in which university researchers and classroom teachers join to collaboratively develop techniques to teach cognitive and metacognitive strategies. Wong et al. advised that these researchers and classroom teachers commit time to meet together on a regular basis and share their experiences:

> *A community of practice that pursues strategy instruction with single-mindedness may be a step in the right direction in our attempt to immerse students in strategy instruction because, as community members, supported by university researchers, the teachers will effect sustained and systematic instruction of cognitive strategies … Surely, research is called for on forming a community of practice as one way to fostering strategic learners.*

(Wong, Harris, Graham, & Butler, 2003, p. 397)

Implications for further research

The research findings presented in this review indicate that direct instruction should be an important part of effective teaching for students with learning difficulties. To date, there have been few Australian studies specifically designed to compare the effectiveness of direct instruction with constructivist instruction. Until such research is conducted which documents comparative effectiveness in Australian classrooms, it is difficult to move forward in the field. In order to move closer to the identification and adoption of 'best practice' in Australia, educational professionals and policy makers need to be prepared to look critically at the current programs and initiatives being implemented in Australian classrooms, and support the necessary research that is required to evaluate the effectiveness of these programs. This also necessitates that the programs be evaluated using sound research designs and valid and reliable research tools (de Lemos, 2004). This review has provided models of experimental designs that should be adopted in future research in this area.

While it is important to verify that future research conducted in Australia supports the overseas evidence regarding the effectiveness of direct instruction, particularly for students with learning difficulties, this review submits that an end should be called to the continuing contest between the instructivist and constructivist teaching 'camps'. Indeed, the best recent research avoids the adoption of either/or positions. Such a contest limits the professional consideration by practitioners of the possibility of balancing instruction and it blinds educators to the value of different perspectives. Rather than looking for the single best approach, educators would benefit most from knowing more about methods that blend the best of both viewpoints.

The evidence presented in this review also highlights the relative neglect of numeracy research in comparison with literacy research in Australia and other Western countries. Furthermore, over the past decade, considerably more funding for program provision, student support and teacher support has gone into literacy than into numeracy. This situation raises many questions, and researchers need to investigate the reasons why such a research policy position has persisted in Australia. Further research into the numeracy field is most certainly required to obtain a clearer picture of 'best practice' for teaching literacy and numeracy. If such work were undertaken, it may be found that much of the research findings in literacy are replicated, but there may also be unique characteristics to that numeracy learning.

Finally, research that provides insight into the methods of instruction which best suit particular types of learning and for differentiated students, across a range of Australian contexts, is needed. Research that would enable the research community to determine the extent to which Australian teachers implement integrated approaches when teaching students with learning difficulties, also should be conducted. This review has indicated other areas in the field which require further research attention. Findings from such research would enable teachers of students with learning difficulties to be more confident about what constitutes 'best practice' with these students. Such outcomes would benefit both practitioners and their students.

Concluding comments

The purpose of this review has been to examine the findings of local and international evidence-based research, deriving largely from the field of educational psychology, in an endeavour to identify effective teaching approaches for students with learning difficulties. This review has emphasised that no single instruction program or strategy will remediate all learning problems. Neither direct instruction nor constructivist approaches can guarantee that *all* students will achieve acceptable standards in literacy and numeracy. No teaching can guarantee that learning will occur, but the use of appropriate pedagogies does result in optimal outcomes.

This review finds that for the teaching of literacy or numeracy skills to those with learning difficulties, a balanced pedagogy, one which combines direct instruction and constructivist approaches, best accommodates the diverse needs of students. These findings should enable disparate groups of professionals to revisit what works best for students with learning difficulties. The review should provide further impetus to the investigation of how and when direct instruction and constructivist approaches are best made available to learners. It is hoped that these findings will be considered by policy makers and educational professionals in the field.

Finally, in the search for ways to ensure that all Australian students achieve acceptable standards in literacy and numeracy, it is crucial to make connections with established bodies of knowledge about teacher effectiveness. Thus, a goal for future work is to supplement this review of evidence-based research on effective interventions for students with learning difficulties, with research that draws on the broader fields of teacher effectiveness, teacher quality, teacher training, classroom pedagogy and organisation and teacher professional development. Only through, dynamic and ongoing investigations of the links between what have often developed as separate lines of research can a more complete picture emerge of how to assist students who find it difficult to learn.

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Australian Education Review

Number: 48

Series Editor: Suzanne Mellor

In most Australian schools, there are significant numbers of students who are failing to learn effectively. They underachieve in all or some of the basic skill areas of the curriculum. Concerns regarding the most appropriate methods with which to address the needs of these students remain widespread amongst teachers. *Balancing Approaches: Revisiting the educational psychology research on teaching students with learning difficulties* examines the findings from local and international evidence-based research, with particular reference to meta-analyses deriving largely from the field of educational psychology. The author identifies and illustrates methods that are effective for a wide range of students in mainstream classrooms, but which are especially powerful for students with learning difficulties.

The central finding of this review is that *balanced approaches*, whereby teachers combine both constructivist and direct instruction approaches, provide students with the best opportunities for success. These findings should enable disparate groups of educational professionals to revisit what works best for students with learning difficulties. The review should also provide further impetus to the investigation of how and when constructivist and direct instruction approaches are best made available to learners.

The review notes that future research should draw on the broader fields of teacher effectiveness, teacher quality, teacher training, classroom pedagogy and organisation, and teacher professional development. Only then can a more complete picture emerge of how to assist students who find it difficult to learn.

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ISBN 0-86431-540-6

9 780864 315403

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