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THE EFFECTIVENESS OF A METACOGNITIVE APPROACH TO TEACHING WORD IDENTIFICATION SKILLS TO UPPER PRIMARY POOR READERS

Merle Bruce and Greg Robinson
University of Newcastle

ABSTRACT

This study assessed the effectiveness of a metacognitive approach to developing word identification skills in upper primary poor readers. Subjects in one group were given instruction in metacognitive word identification strategies, within a reciprocal teaching format. Subjects in the other group used traditional methods of word identification within a reciprocal teaching format. There were four instructional groups involved (two for subjects in study group one and two for subjects in study group two), with seven to nine students in each group. The subjects were 32 poor readers in Years 5 and 6 who had discrepancies of 18 months or more between their chronological ages and their reading ages. Results indicated that a combination of metacognitive word identification strategies and a reciprocal teaching format was clearly more effective than traditional methods of word identification within a reciprocal teaching format.

Metacognitive research has provided valuable insights into effective methods of teaching comprehension skills to children with reading difficulty (for example, Bruce & Chan, 1991; O'Shea & O'Shea, 1994; Palincsar & Brown, 1987). However, there has been very little parallel research into metacognitive approaches to teaching word identification skills to children with reading problems (Spedding & Chan, 1994). The authors of a number of the successful metacognitive training programs stress that they are designed for students who are adequate decoders but poor comprehenders (Englert, Tarrant, Mariage, & Oxer, 1994; Palincsar, 1987), however, such students may only constitute a small proportion of the reading disabled population (Perfetti, 1986). Rather, the vast majority of poor readers have problems in both decoding and comprehension (Gough & Tunmer, 1986; Hoover & Gough, 1990; Perfetti, 1986; Shankweiler, 1989; Stanovich, 1986a, 1988), which become increasingly pronounced as children move through the primary grades and into high school (Perfetti, 1986; Stanovich, 1986a, 1992). It follows that an effective intervention at the upper primary level could seek to use metacognitive insights to remediate deficits in both word identification and comprehension skills.

Correspondence: Dr G.L. Robinson, Special Education Centre, University of Newcastle, Callaghan, NSW, 2308.

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STAGES OF WORD IDENTIFICATION

Recent theories of reading acquisition propose that normally-achieving readers move through several distinct yet overlapping developmental stages in progressing to fluent word recognition (for example, Adams & Bruck, 1995; Ehri, 1991, 1992, 1999; Gough & Juel, 1991; Gough, Juel, & Griffith, 1992; Spear-Swerling & Sternberg, 1994). While there is some debate as to the sequencing of the stages and the precise focus of each (for example, Ehri, 1999; Ehri & McCormick, 1998; Ellis, 1993; Stuart & Coltheart, 1988), most models suggest a progression from visually-based, to phonological-based to orthographically-based word recognition skills, with particular emphasis on the importance of the alphabetical or phonological-based stage in beginning reading (for example, Adams & Bruck, 1995; Ehri, 1991, 1992, 1999; Gough & Juel, 1991; Spear-Swerling & Sternberg, 1994).

The first stage is often referred to as the *logographic* (Frith, 1985), the *visual-cue* (Ehri, 1991, 1992; Spear-Swerling & Sternberg, 1994) or the *pre-alphabetic* stage (Ehri, 1999; Ehri & McCormick, 1998), because beginning readers tend to recognise words through association with some arbitrarily selected, distinctive *visual* cue which bears no relationship to the phonological structure of the word. These associations may include picture cues, the shape or length of the word, the colour or font in which the word is printed, the first or last letter of the word, or a distinctive logo (Adams & Bruck, 1995; Byrne, 1992; Ehri, 1991, 1992; Ehri & McCormick, 1998; Spear-Swerling & Sternberg, 1994).

The second stage is often referred to as the *alphabetic stage* (Frith, 1985), as word recognition is no longer dependent on an arbitrary selection of visual cues, but on systematic connections between spellings and pronunciations of words (Adams & Bruck, 1995; Ehri, 1991, 1992, 1999; Ehri & McCormick, 1998). Entry into this stage is dependent on at least three interacting factors. First, a basic level of *phonological awareness*, which involves an awareness of the sounds within speech and the ability to isolate, blend, segment, or otherwise manipulate those sounds; second, *a knowledge of letter sound/names*; and third, the attainment of *alphabetic insight*, or the realisation that specific speech sounds and letters map onto each other in a systematic way (Adams & Bruck, 1995; Byrne, 1992; Ehri, 1991, 1992; McBride-Chang, 1995; Munro & Munro, 1993; Spear-Swerling & Sternberg, 1994). Ehri (1999) and Ehri & McCormick (1998) divide this second stage into two phases: (1) a partial alphabetic phase where connections are formed between some of the letters in written words and sounds, and (2) a full alphabetic phase in which complete connections between letters in words and phonemes are formed. Ehri and McCormick (1998) consider the full alphabetic phase an essential beginning point to acquire the foundations of mature reading skill.

The third and final stage in word identification has been called *automatic word recognition* (Spear-Swerling & Sternberg, 1994), the *orthographic* stage (Frith, 1985), or the *consolidated alphabetic/automatic alphabetic phases* (Ehri, 1999; Ehri & McCormick, 1998). At this stage, words are recognised accurately and effortlessly through memory for specific visual/orthographic representations of the words or word parts (Adams, 1990; Barker, Torgesen, & Wagner, 1992; Ehri, 1999; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a). Automatic word recognition allows higher-order comprehension processes to operate efficiently (Näslund & Samuels, 1992; Perfetti, 1986; Samuels, Schermer, & Reinking, 1992; Spear-Swerling & Sternberg, 1994; Stanovich, 1986a, 1992).

There is evidence that automatisation of words in a specific subject area or domain can be acquired by normally-achieving readers as early as grade one (Perfetti, 1992), and by second- to third-grade they can recognise automatically most words that are in their spoken vocabularies (Anderson, Hiebert, Scott, & Wilkinson, 1985; Chall, 1983). However, while normally-achieving students may be reading grade-level materials fluently by mid-primary years, poor readers in the upper primary school (the subjects of this study) are likely to be still struggling through the earlier stages of reading (Spear-Swerling & Sternberg, 1994).

CONSEQUENCES OF FAILURE TO DEVELOP WORD ATTACK SKILLS

If students fail to develop a high degree of word recognition efficiency, comprehension processes may be placed at risk (Adams, 1990; Eldredge, Quinn, & Butterfield, 1990; Näslund & Samuels, 1992; Stanovich, 1992). It has been suggested that poor decoding skills can reduce comprehension in a number of ways. First, as indicated above, poor readers devote so much attention to the decoding task that there are not enough attentional resources left to allocate to construction of meaning (Ackerman, Spiker, & Bailey, 1989; Groff, 1991; Näslund & Samuels, 1992; Perfetti, 1986; Stanovich, 1986a, 1993-1994). Second, less-skilled readers often find themselves reading grade-level materials that are too difficult for them, thus degrading the contextual clues which they might otherwise use to facilitate comprehension of text (Juel, 1988; Stanovich, 1992).

Affective and motivational problems also usually accompany difficulties with learning to read (Carr, Borkowski, & Maxwell, 1991; Paris & Winograd, 1990a, 1990b; Pintrich, Anderman, & Klobucar,1994; Shell, Colvin, & Bruning, 1995; Stanovich, 1992). Fear, doubt, shame or anger resulting from repeated failure experiences can lead to attitudes of "learned helplessness" whereby students attribute their failures to factors beyond their personal control (Borkowski, Carr, Relinger, & Pressley, 1990; Carr et al., 1991). These students do not see themselves capable of success, believing that

they will fail regardless of whether or not effort is expended. Consequently, they give up trying and so perpetuate the failure cycle (Paris & Winograd, 1990a; Spear-Swerling & Sternberg, 1994).

Although the consequences of reading failure at the word recognition, comprehension and motivational levels suggest a poor prognosis, especially after a number of years of failure (Prior, Sanson, Smart, & Oberklaid, 1995; Stanovich, 1992; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993; Waring, Prior, Sanson, & Smart, 1996), there are also some positive implications for educational practice. This may be particularly so in the area of metacognitive functioning, that is, in awareness and regulation of appropriate strategies for identifying unfamiliar words (Spedding & Chan, 1993, 1994; Stanovich, 1986b; Wong, 1985). If the disabled reader is not aware of effective strategies for word identification, a metacognitive approach to decoding instruction may be effective in developing lower-order word recognition skills, in much the same way that it has been found effective in developing higher-order comprehension skills in the learning disabled population (Spedding & Chan, 1993, 1994; Wong, 1985).

METACOGNITION

A metacognitive approach to learning aims to help students develop an awareness of the skills, strategies, and resources needed to perform a task effectively; along with the ability to use self-regulatory mechanisms, such as planning, monitoring, evaluating and modifying (Baker & Brown, 1984; Wong, 1985, 1991). Metacognitive instruction thus focuses on students' thoughtful and selective use of cognitive strategies to promote academic learning (Winograd & Paris, 1988-1989).

Such an approach, however, must also take into account the affective and motivational problems mentioned above in order to ensure maintenance and generalisation of learned strategies. Even if students are taught how, when, where and why to use effective strategies, they may not activate them because of negative perceptions about self-efficacy, or an attitude of learned helplessness (Borkowski et al.,1990; Chan, 1993, 1994; Paris & Winograd, 1990a; Wong, 1991). As a consequence, metacognitive instruction could be expanded and refined to include self-appraisal and self-management of affective, as well as cognitive components of learning (Borkowski et al.,1990; Paris & Winograd, 1990a, 1990b; Winograd and Paris, 1988-1989). Metacognitive techniques should be included in both specific strategy training and motivational/attributional retraining (Bruce & Chan, 1994; Chan, 1993, 1994; Fulk & Montgomery-Grymes, 1994; Turner, Dofny, & Dutka, 1994), for if children are to develop into thoughtful and independent readers, teachers need to pay attention to both "skill and will" (Paris & Winograd, 1990a).

The crucial role of "shared knowledge" in helping children develop the metacognitive insights necessary for conscious control of both "skill and will" has been the subject of much discussion in the literature (for example, Beed,

Hawkins, & Roller, 1991; Duffy, Roehler, & Herrmann, 1988; Englert, Raphael, & Mariage, 1994; Englert, Rozendal, & Mariage, 1994; Garner, 1992; Rosenshine, & Meister, 1992; Paris & Winograd, 1990a, 1990b). Shared knowledge is based on Vygotsky's (1978) theory of socially-mediated learning. This theory suggests that the emergence and development of self-regulatory activities has its roots in social interactions with others, and only gradually comes under the conscious control of the child. Thus the focus of intervention should not only be on task and performance factors, but also on the personal involvement and impact of the teacher (Cole & Chan, 1990; Englert, Raphael, et al., 1994; Englert, Rozendal, et al., 1994; Paris & Winograd, 1990a, 1990b; Rosenshine & Meister, 1992).

A metacognitive instructional approach to teaching word identification skills could thus include the following features: (1) instruction in task specific strategies for word identification (cognition) and in techniques to monitor and control the use of those strategies (metacognition); combined with (2) a socially interactive learning environment which could include reciprocal teaching, where the teacher gradually helps pupils take responsibility for their own learning. Both of these aspects will now be discussed in more detail.

ME ACO NI ION AND OR D IDEN IFICA ION

Poor readers at the upper primary level (the focus of this study) are likely to be slow and inaccurate in visual, graphophonological and structural analysis, and rely on context to compensate for these deficiencies (Adams, 1990; Spear-Swerling & Sternberg, 1994). Use of context cues, however, is also likely to be inefficient because poor word identification may preclude the full accessing of syntactic and semantic patterns in text, especially when reading unfamiliar material in the content areas (Breznitz, 1997; Pratt, Kemp, & Martin, 1996; Stanovich, 1986a; Yeu & Goetz, 1994). Despite these obvious problems in understanding and using effective word identification strategies, only one study could be found which sought to assess metacognitive abilities in word identification and their relationship to reading achievement (Spedding & Chan, 1993, 1994).

Spedding and Chan (1993, 1994) confirmed that Year 5 poor readers' problems with word identification may reflect deficiencies in the metacognitive abilities that underlie this skill. The particular metacognitive abilities in which poor readers of this age group were found to be inferior were the use of orthographic cues, morphological cues and context cues. Poor readers were less strategic than average readers in using these cues, and were often unaware of the strategies they did use, which would suggest that a training program for upper primary poor readers should include metacognitive instruction in the strategic and flexible use of a variety of word identification cues.

Borkowski, Weyhing, and Carr (1988) suggest that for poor readers, metacognitive instruction in reading should also include motivational/ attributional retraining so they can learn to

attribute their success and failure to factors within their personal control. It has also been suggested that attributional retraining for these students should focus not only on effort, but on attributing successes and failures to the use or non-use of effective strategies (Borkowski et al., 1990; Borkowski & Muthukrishna, 1992; Chan, 1993, 1994; Turner et al., 1994). There is evidence that attributional training which focuses solely on effort may be potentially negative for students experiencing difficulties in learning, particularly if they have not developed efficient strategies and find themselves failing in spite of increased effort (Chan, 1994; Fulk & Mastropieri, 1990; Fulk & Montgomery-Grymes, 1994). To attribute failure to ineffective use of strategies, rather than lack of effort, has the advantage of turning future outcomes into problem-solving situations, where the search for a more effective strategy becomes the focus of attention (Clifford, 1986).

RECIPROCAL TEACHING

Reciprocal teaching (Palincsar & Brown, 1983, 1984) has been characterised as "a dialogue between teachers and students for the purpose of jointly constructing the meaning of text" (Palincsar, 1986b, p.119). The dialogue is structured by the use of four strategies that represent the text engagement experienced by successful readers: (1) *predicting*, (2) *clarifying*, (3) *question generating*, and (4) *summarising* (Palincsar, 1986a, 1987; Palincsar & Brown, 1983, 1984, 1986).

In reciprocal teaching, the teacher initially models and explains how to use the four strategies, together with providing information about their importance and the context in which they are useful. After the initial days of instruction, students are asked to take turns being *teacher* by leading the text dialogue for one segment at a time, while the teacher provides feedback and coaching as necessary. The dialogue acts as a scaffold - a temporary and adjustable support to instruction, allowing the teacher to adjust instruction to the students' individual needs and to gradually withdraw support as the students acquire and refine the strategies being learned (Brown & Palincsar, 1989; Palincsar, 1986a, 1986b, 1987; Palincsar & Brown, 1986, 1988, 1989; Palincsar & Klenk, 1992).

Since the original Palincsar and Brown (1983, 1984) experimental studies, reciprocal teaching has attracted a great deal of interest and attention from both researchers and classroom teachers (for example, Bruce & Chan, 1991; Carter, 1997; Coley, DePinto, Craig, & Gardner, 1993; Kelly, Moore, & Tuck, 1994; Kligner & Vaughn, 1996; Rosenshine & Mesiter, 1994; Speece, MacDonald, Kilsheimer, & Krist, 1997). A number of factors appear to have contributed to this interest. First, a growing body of research studies has confirmed the effectiveness of reciprocal teaching techniques for improving reading comprehension scores (for example, Bruce & Chan, 1991; Carter, 1997; Kligner & Vaughn, 1996; Marston, Deno, Kim, Diment, & Rogers, 1995). In

a review of sixteen quantitative research studies, Rosenshine and Meister (1994) found that when standardised tests were used to assess comprehension, students participating in reciprocal teaching scored approximately one third of a standard deviation (.32) higher than did students in control groups. When the outcome measure was experimenter-developed tests, the scores were .88 of a standard deviation higher than those of the control groups.

A second reason for the interest in reciprocal teaching appears to be the ability of the procedures to accommodate a wide range of age levels and instructional settings. In their review, Rosenshine and Meister (1994) found that successful interventions have been reported at all grade levels from Year One through to adult, in groups ranging in size from 2 to 23, and with the number of instructional sessions ranging from 6 to 50. They also found that studies were equally effective whether an experimenter or a teacher provided the instruction. Other investigators (for example, Carter, 1997; Coley et al., 1993; Kligner & Vaughn, 1996; Speece et al., 1997) have reported on the successful application of reciprocal teaching interventions in a variety of school-based settings. These include small group instruction by trained remedial teachers in a resource room setting, small-group or whole-group instruction by regular classroom teachers, peer and cross-age tutoring, cooperative learning groups, or a combination of two or more of the above methods.

A third emerging research interest in reciprocal teaching concerns the successful adaptation of the format to cater for particular classroom or school-based needs. Recently reported adaptions include the following: (i) the use of varying numbers of comprehension-fostering strategies (from 2 to 10) during reciprocal teaching (Kligner & Vaughn, 1996; Rosenshine & Meister, 1994); (ii) the combination of reciprocal teaching with other programs, for example, a behaviour modification program to improve student behaviour (Speece et al., 1997) or transenvironmental programming to promote transfer of learning across settings (Bruce & Chan, 1991); and (iii) the use of reciprocal teaching as a postreading activity rather than during first reading, with the student leader role modified to stimulate greater participation in group dialogue (Marks et al., 1993).

A fourth positive factor for reciprocal teaching is that it has proved highly motivating for many low-achieving students who had previously participated reluctantly, or even actively resisted participating, in teacher-dominated, worksheet-based forms of remedial instruction. In particular, it has been observed that these students enjoy the opportunity to be *teacher* during the reciprocal teaching dialogue and take their role seriously (Coley et al., 1993; Palincsar, 1987; Palincsar & Klenk, 1992; Speece et al., 1997).

One criticism of the original reciprocal teaching program is that it is designed for students who

are adequate decoders but poor comprehenders (Palincsar & Brown, 1983, 1984), and thus may not be entirely effective for the many poor readers who have inadequate word attack skills (Kligner & Vaughn, 1996; Rosenshine & Meister, 1994). Recent research studies have sought to address the problem of poor decoding skills by techniques such as: (i) the teacher reading the passage orally to students, or supplying unknown words when students are reading (Speece et al., 1997); (ii) the use of easy text (Marks et al., 1993; Speece et al., 1997); and (iii) rewriting of classroom instructional materials at the poor readers' instructional reading level (Bruce & Chan, 1991). Comprehension gains were reported for each of these studies. However, no specific instruction in overcoming decoding problems was provided, and hence the students would presumably continue to encounter difficulties in comprehension of grade level materials when not receiving support for their decoding problems. An effective instructional program for upper primary poor readers may thus need to include training in appropriate strategies for identifying unfamiliar words, prior to using reciprocal teaching procedures for improving comprehension of written text. It may also be possible to use the reciprocal teaching format to help students learn appropriate strategies for identifying unfamiliar words (Moore, 1988).

The purpose of this research was to design and examine the effects of a metacognitive training program for teaching word identification skills within a reciprocal teaching format.

The specific research questions of this project were:

1. To what extent will a metacognitive word identification program using a reciprocal teaching format improve the metacognitive abilities in word identification and the word recognition skills of a group of upper primary poor readers?
2. How does the effectiveness of a metacognitive and reciprocal teaching approach to word identification compare with the effectiveness of a traditional word identification and reciprocal teaching approach for a group of upper primary poor readers?

METHOD

Subjects

The subjects were thirty-two poor readers selected from the Year 5 and Year 6 classrooms of two public schools in a country town in NSW. Poor readers were defined as having a discrepancy of 18 months or more between their chronological ages and word recognition reading ages on the St Lucia Graded Word Reading Test (Andrews, 1973). A discrepancy of 18 months was chosen because upper primary students with an 18 month delay would be functioning at middle primary school level (or lower), and are thus likely to be seriously disadvantaged academically. Students with an obvious intellectual or sensory disability were excluded from the subject sample.

One of the study schools was located in an area of lower socio-economic status, while the other was in a middle income area. The subjects

Table 1. Descriptive statistics of the subjects in the two study groups

	Study Group One		Study Group Two	
	Year 5 (N=6)	Year 6 (N=11)	Year 5 (N=7)	Year 6 (N=8)
Chronological age (in months)				
Mean	123.00	135.09	124.14	136.25
Range	120-125	129-140	120-131	130-147
St Lucia word recognition reading age (in months)				
Mean	90.17	99.00	92.00	91.86
Range	76-99	88-128	80-105	77-108
Sex ratio (boys to girls)	5:1	6:5	4:3	6:2

came from eight classrooms. In each school the classrooms with subjects were randomly assigned to one of two study groups, resulting in two small instructional groups in each school ranging in size from seven to nine pupils. The mean chronological age and word recognition reading age of subjects at the start of the study is outlined in Table 1. The differences in chronological age and reading age between study groups were not significant. It should also be noted that the mean reading age of the groups ranged from 90 to 99 months, which indicated that they were reading at approximately the Year 3 level. For this reason it was decided to pitch instructional materials at the Year 4 level, and gradually increase the difficulty as the groups became more proficient at word identification strategies.

Experimental Design

An Instruction Type (2) x Grade (2) x Testing Occasion (4) repeated measures design was employed, with testing occasion being the within-subjects factor, as depicted in Figure 1. The sequence of phases for this study was as follows: (i) pre-test, which was spread over a period of two weeks; (ii) training phase one, which consisted of an average of 24 sessions spread over a period of nine weeks; (iii) mid-test, which was spread over one week; (iv) training phase two, which consisted of an average of 13 sessions spread over a period of five weeks (and which had to be cut two weeks shorter than originally planned because of illness on the part of the experimenter); (v) post-test, which was spread over one week; and (vi) maintenance test, which was spread over a period of two weeks commencing eight weeks after the post-test. The training sessions in phase one and phase two were each of 30 minutes duration.

During training phases one and two, the subjects in study group one received metacognitive instruction in word identification, combined with a reciprocal teaching approach. Subjects in study group two were given traditional instruction in word identification (which

Figure 1. A schema of the experimental design

	Phase One			Phase Two			
Study Group One (Years 5 & 6)	Pre-test	Metacognitive Instruction in Word Identification in a Reciprocal Teaching Format	Mid-test	Metacognitive Instruction in Word Identification in a Reciprocal Teaching Format	Post-test	Main-ten-ance Phase	Main-ten-ance Test
Study Group Two (Years 5 & 6)	Pre-test	Traditional Methods of Teaching Word Identification in a Reciprocal Teaching Format	Mid-test	Traditional Methods of Teaching Word Identification in a Reciprocal Teaching Format	Post-test	Main-ten-ance Phase	Main-ten-ance Test
Weeks Involved	2	9	1	5	1	8	2

involved the teacher supplying the word and the student pronouncing it), combined with a reciprocal teaching approach. The same instructional materials were used for both groups during both training phases.

Measures

During the testing occasions, the subjects were administered a number of individual and group tests designed to measure several aspects of the reading process, namely (i) accuracy of word recognition; (ii) metacognition in word identification; and (iii) oral reading rate. All pre-testing on the first occasion and group testing on subsequent occasions was done by the experimenter. Individual testing was administered by an independent qualified person with no knowledge of group status of subjects.

Four assessment instruments were used during the testing phases, as described as follows:

1. *St Lucia Graded Word Reading Test* (Andrews, 1973), which is designed to provide a reading age for recognition of words read in isolation. It is an untimed, individually administered test consisting of one hundred words, graded in difficulty. Test-retest reliability has been calculated at r = +.947 (Andrews, 1973).
2. *Metacognitive Abilities in Word Identification* (Spedding & Chan, 1993, 1994), which is an individually administered test designed to assess metacognitive abilities in the knowledge and regulation of phonic, orthographic, morphological and context cues in word identification. Each of the four tasks in this test requires students to respond by using a specific word identification strategy. A correct response to a particular task would indicate that the student has recognised the particular clue and is using the appropriate

Figure 2. The testing sequence

	Pre-test	Mid-test	Post-test	Maintenance Test
Word Recognition				
In Isolation- St Lucia	*	*		
In Context - IRI Accuracy	*	*	*	*
Metacognition				
In Word Identification	*	*		
Oral Reading Rate				
IRI Words Per Minute	*	*	*	*

word identification strategy. Following the completion of each task item, students are required to justify their responses in order to assess whether they are also aware of the strategy they have used. For example, to assess use of orthographic cues in unknown words, students are presented with a pseudoword containing all or part of a real word embedded in it (for example, "meauty"). The student is asked to say the word. If required, the student is shown the embedded or related word (for example, "beauty") as a cue. The student is then asked to justify his/her response. A parallel form of the test was developed by the experimenter for the second testing occasion.

3. *The Burns/Roe Informal Reading Inventory (IRI),* Grade 4, Forms A, B, C, & D (Richek, List, & Lerner, 1983), which is an individually administered test involving the oral reading of a passage, with students timed while they read the passage. This test provides measures of students' accuracy of reading words in context, and reading rate of words per minute read in context. A different form of the test was used on each of the four testing occasions.

The testing sequence for each of these measures is shown in Figure 2.

Instructional Materials

Instructional materials consisted of a total of 27 short passages (173-387 words in length) written at the Grade 4 to Grade 5 readability level, as determined by the Rix readability formula (Anderson, 1983). The passages were adapted from reading kits and library books in common use in schools and contained factual information in narrative or descriptive form. Each of the nineteen passages used during training phase one were structured to target a particular word identification strategy. For example, the passage may contain a number of multisyllable words requiring students to make use of morphological and structural cues. The remaining nine passages were used during training phase two to revise and consolidate the use of these word identification strategies.

The Training Program

The training sessions for each of the small instructional groups were conducted in a

withdrawal situation two to three days a week. During training phase one, the subjects in study group one were trained in the use of three strategies: (i) *Consider the Context* (semantic and syntactic cues); (ii) *Compare with known words* (phonemic and orthographic cues); and (iii) *Carve up the word parts* (structural and morphological cues). To help students monitor their use of those strategies, they were taught to: (i) *Be flexible*; (ii) *Look for the cues*; and (iii) *Ask: Does it make sense?* The training involved modelling and explanation of the strategies using "think aloud" techniques, followed by guided practice and feedback.

During training phase two, subjects in study group one were trained in the use of reciprocal teaching procedures to improve comprehension. Reciprocal teaching involved teacher and students taking turns leading a dialogue aimed at revealing the meaning of the text. During the dialogue the leader (teacher or student) used four comprehension-fostering strategies: (i) *clarifying* any misunderstandings; (ii) *questioning* concerning the gist; (iii) *summarising* the content; and (iv) *predicting* future content. All these activities were embedded in as natural dialogue as possible, with the teacher and students giving feedback to each other. Subjects in study group one were told to use the metacognitive word identification strategies learned in training phase one as part of the clarification process in the reciprocal teaching dialogue.

Subjects in study group two used a reciprocal teaching approach to improve comprehension skills, as described above in both training phases. Traditional methods of teaching unfamiliar words were also used in both training phases (Figure 1). The traditional method of word identification consisted of writing difficult words from the instructional passage on the board and asking pupils to pronounce each word and give its meaning. This method involved frequent interaction between pupil and teacher about word meanings and word identification as part of the reciprocal teaching approach.

Two sessions were spent on each instructional passage for both study groups, with a short answer comprehension test being given at the end of the second session. As a further measure of progress, once a fortnight each subject was given an oral reading test using material in prepared passages which they had not yet studied, to see how many words they could read correctly in one minute. The results were graphed and shared with the students.

RESULTS AND DISCUSSION

The measures obtained from the different testing occasions were analysed using an Instruction Type (2) x Grade (2) x Testing Occasion (4) repeated measures design. Where grade level was not found to be a significant factor, a second analysis was made using only Instruction Type and Testing Occasion. Table 2 contains the group means and standard deviations for those measures where Grade was not found to be a significant factor, and the means and standard deviations for the Year 5 group and the Year 6 group in each of the

Table 2. Means and standard deviation of the dependent measures for the two study groups

Section 1: Measures where Year level was a significant factor

	Study Group One				Study Group Two			
	Year 5		Year 6		Year 5		Year 6	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
IRI Words Per Minute								
Pre-test	35.26	15.84	55.69	22.09	33.79	19.09	47.78	18.31
Mid-test	55.61	26.87	93.27	37.31	52.72	28.02	60.15	20.71
Post-test	57.32	26.71	96.18	34.51	51.56	26.34	68.47	22.50
Mainten-ance Test	65.85	25.29	93.07	26.87	61.13	34.14	76.98	13.68

Section 2: Measures where Year level was not a significant factor

	Study Group One		Study Group Two	
	Mean	SD	Mean	SD
St Lucia				
Pre-test	32.94	8.71	30.40	7.80
Mid-test	45.82	12.61	34.80	8.95
IRI Accuracy				
Pre-test	89.06	7.92	85.50	7.62
Mid-test	95.49	4.61	89.52	8.81
Post-test	94.58	4.20	91.07	6.10
Mainten-ance Test	95.73	2.99	92.58	4.66
Metacognitive Abilities in Word Identification				
Phonic Cues				
Pre-test	4.00	2.78	3.60	2.67
Mid-test	7.00	4.71	5.07	3.24
Orthographic Cues				
Pre-test	10.18	2.24	9.80	2.18
Mid-test	11.47	0.87	9.20	3.03
Morphological Cues				
Pre-test	4.71	2.42	4.20	2.68
Mid-test	6.65	3.26	4.53	2.53
Context Cues				
Pre-test	9.59	2.18	7.27	2.71
Mid-test	11.00	1.54	8.47	2.56

measures where Grade was found to be a significant factor.

Word Recognition Accuracy

The St Lucia test was used to measure accuracy of reading words in isolation and the Burns/Roe accuracy score to measure accuracy of reading words in context. The St Lucia measure was taken before intervention began and at the conclusion of the first training phase, while parallel forms of the Burns/Roe were administered on each of the four testing occasions. The results of repeated measures analysis of variance for St Lucia are shown in Table 3.

Results of the analysis for word reading in isolation (St Lucia) revealed a significant occasion main effect, $F(1,30) = 66.28$, $p<.001$. There was also a Group x Testing Occasion interaction, $F(1,30) = 15.97$, $p<.001$. An examination of the graph in Figure 3 showed that study group one demonstrated much greater improvement on the St Lucia measure than study group two at the end of the first training phase. As shown in Table 2, the mean

Table 3. Summary of results of Group (2) x Occasion (2) repeated measures analyses of variance for St Lucia and Burns/Roe IRI accuracy

Source of Variation	df	SS	MS	F	p
St Lucia					
Between Subjects					
Group	1	733.13	733.13	4.23	.048
Error	30	5194.73	173.16		
Within Subjects					
Occasion	1	1190.05	1190.05	66.28	.001
Group x Occ	1	286.68	286.68	15.97	.001
Error	30	538.68	17.96		
Burns/Roe IRI Accuracy					
Between Subjects					
Group	1	507.63	507.63	4.23	.049
Error	29	3479.16	119.97		
Within Subjects					
Occasion	3	850.89	283.63	27.38	.001
Group x Occ	3	38.79	12.93	1.25	.297
Error	87	901.26	10.36		

Figure 3. Mean raw scores of the two study groups for the St Lucia graded word reading test across testing occasions

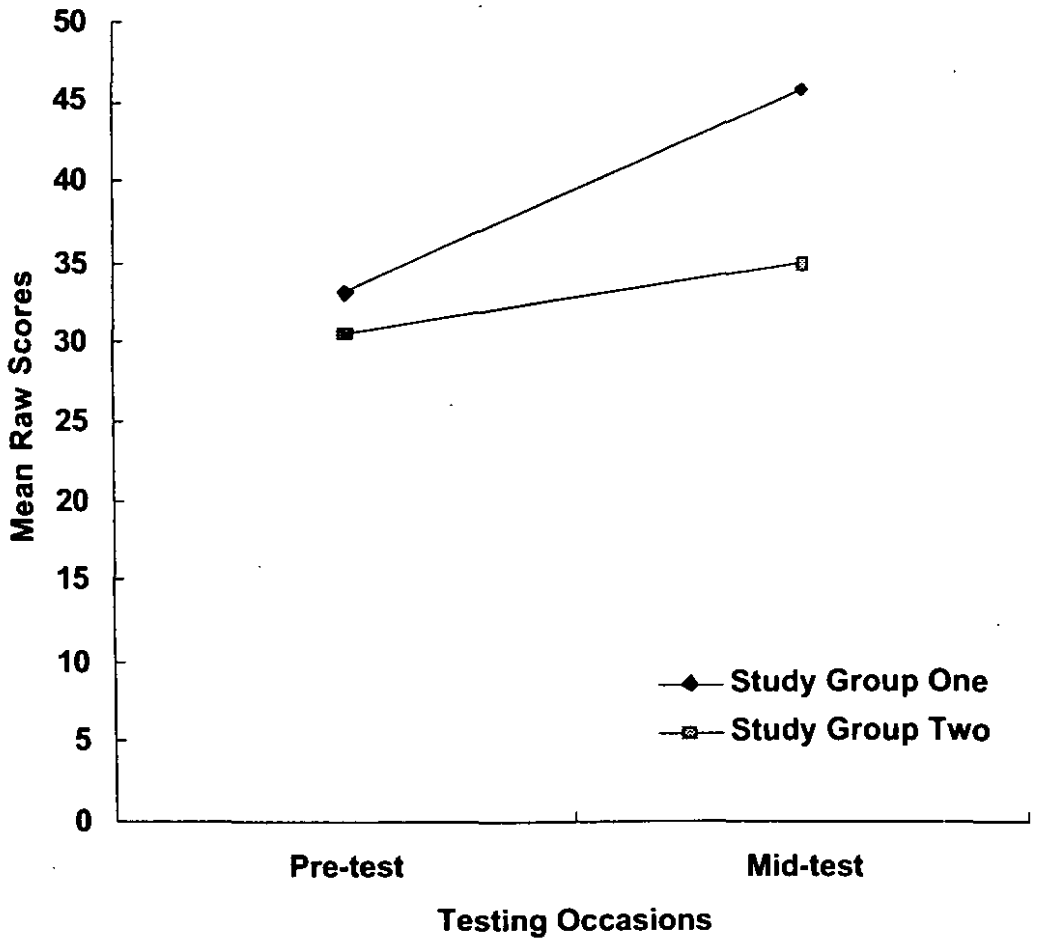
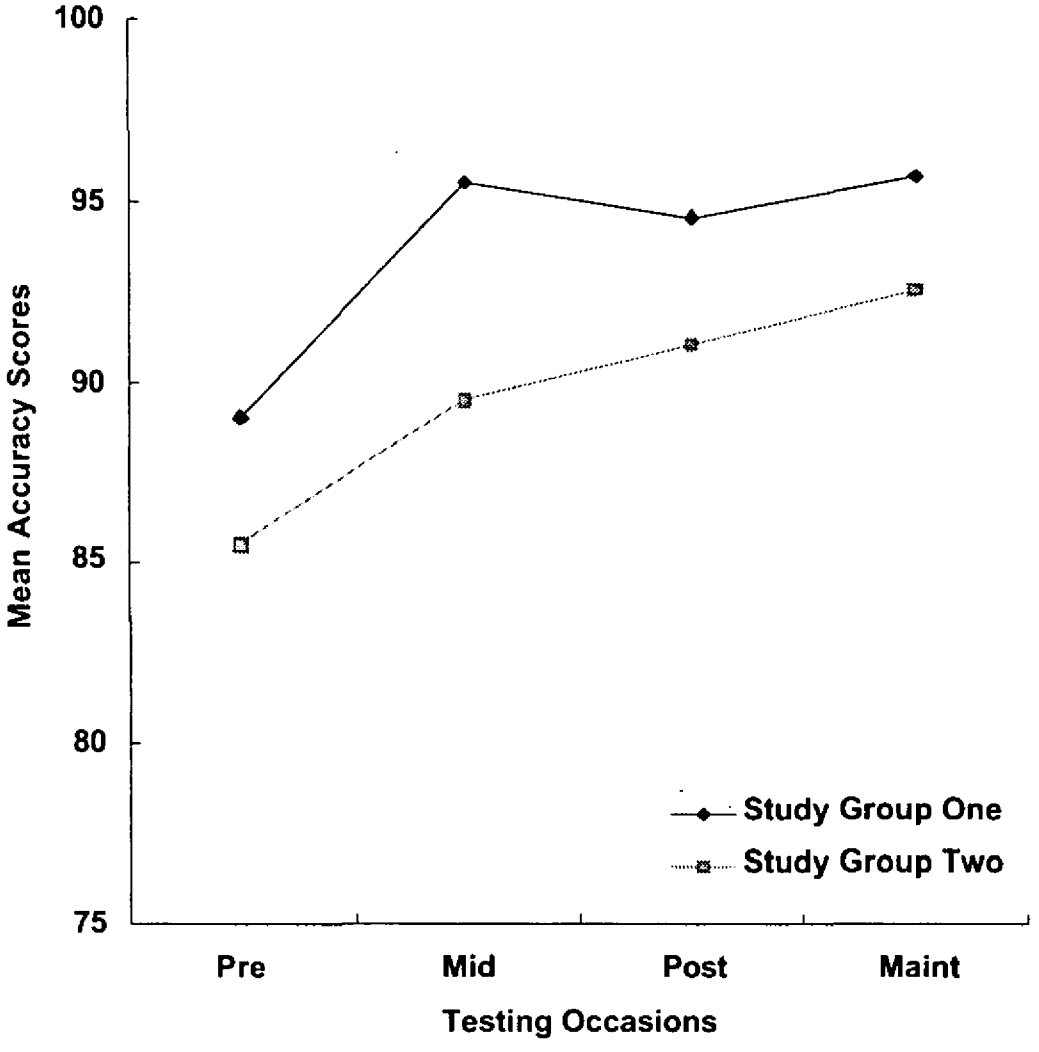


Figure 4. Mean accuracy scores of the study groups for the Burns/Roe IRI across testing occasions



raw score for study group one improved by almost thirteen points from 32.94 to 45.82, which represents a mean improvement in word recognition reading age of approximately seventeen months. The mean raw score for study group two improved from 30.4 to 34.8, representing a mean improvement in reading age of approximately seven months.

The significant occasion main effect, combined with the fact that study group two made seven months gain in word recognition during the four months, suggests that the daily exposure to word pronunciations and meanings which occurred in the traditional teaching process enabled these students to improve their word recognition performance. However, the significant Group x Occasion interaction clearly demonstrated the greater facilitative effect of the metacognitive word identification intervention strategies for subjects study group one.

The significantly greater facilitative effect for metacognitive word identification training was not evident, however, in the analysis for word recognition in context using the Burns/Roe IRI. Both groups benefited from small group instruction, as indicated by the significant occasions main effect, $F(3,87) = 27.38$, $p<.001$, but there was no significant interaction. An inspection of the graph in Figure 4 shows that subjects in both groups made the greatest gains from the first to the second testing occasion.

The fact that the word identification training program favoured study group one over study group two for competence in reading words in isolation, but not for reading words in context may have been influenced by students being able to rely on context clues when reading words in context to compensate for other word attack deficiencies (Goldsmith-Phillips, 1989; Yeu & Goetz, 1994). This would be consistent with the interactive-compensatory model of reading proposed by Stanovich (1984), which suggests that less-skilled readers make greater use of context clues to compensate for their difficulties in decoding.

Metacognitive Abilities in Word Identification

The metacognitive abilities in word identification measures were taken before intervention began and at the end of the first training phase to ascertain to what extent training in word identification strategies would increase the metacognitive awareness and monitoring of word identification for the students in study group one. The results of repeated measures analyses of variance for Metacognitive Abilities in Word Identification are shown in Table 4.

Results of the analyses show significant occasion main effects for all word identification cues except orthographic cues (phonic cues, $F(1,30) = 14.83$, $p<.001$; morphological cues, $F(1,30) = 9.79$, $p<.01$; and context cues, $F(1,30) = 8.65$, $p<.01$). These results suggest that metacognitive word identification strategies and traditional word recognition techniques were both effective for developing awareness and monitoring of word identification.

There was a significant Group x Occasion interaction for only one of the word identification cues tested, namely that of morphological cues, $F(1,30) = 4.89$, $p<.05$, although the interaction for orthographic cues approached significance. Inspection of the graph in Figure 5 indicates that subjects in study group one had improved their awareness and monitoring of the use of morphological cues and orthographic cues at a greater rate than subjects in study group two, suggesting a greater facilitative effect for metacognitive word identification training.

These results seem to indicate that *Carve up the word parts* (morphological cues) and *Compare with known words* (orthographic cues) were the most useful strategies for improving the word identification skills of the subjects in study group one, which could reflect the relevance of such skills to word identification requirements for Years 5 and 6. Many of the difficult

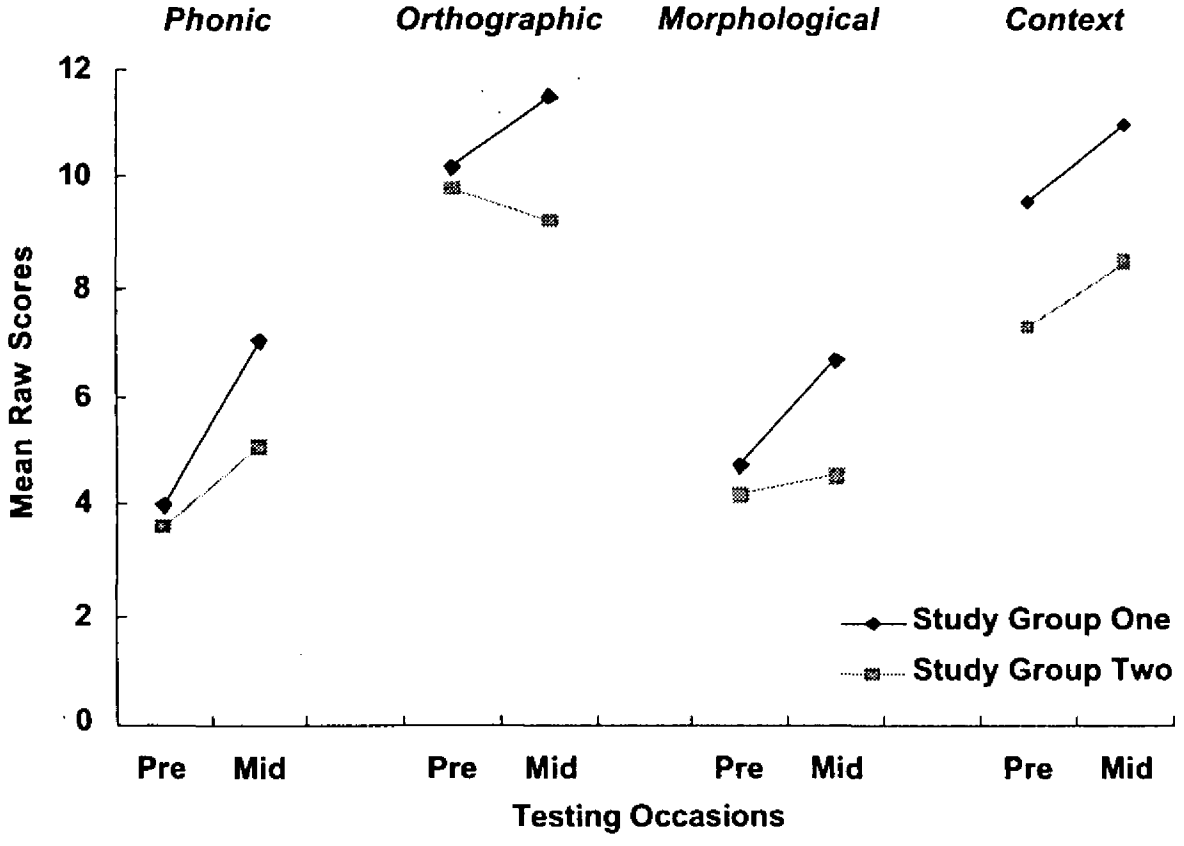
Table 4. Summary of results of Group (2) x Occassion (2) repeated measures analysis of variance for metacognitive abilities in word identification scores

Source of Variation	df	SS	MS	F	p
Phonic Cues					
Between Subjects					
Group	1	21.69	21.69	1.15	.292
Error	30	565.67	18.86		
Within Subjects					
Occasion	1	79.49	79.49	14.83	.001
Group x Occ	1	9.37	9.37	1.75	.196
Error	30	160.87	5.36		
Orthographic Cues					
Between Subjects					
Group	1	27.92	27.92	4.90	.035
Error	30	170.95	5.70		
Within Subjects					
Occasion	1	1.92	1.92	.49	.488
Group x Occ	1	14.29	14.29	3.68	.065
Error	30	116.56	3.89		
Morphological Cues					
Between Subjects					
Group	1	27.34	27.34	2.10	.158
Error	30	390.41	13.01		
Within Subjects					
Occasion	1	20.61	20.61	9.79	.004
Group x Occ	1	10.30	10.30	4.89	.035
Error	30	63.14	2.10		
Context Cues					
Between Subjects					
Group	1	93.91	93.91	13.13	.001
Error	30	214.53	7.15		
Within Subjects					
Occasion	1	27.18	27.18	8.65	.006
Group x Occ	1	.18	.18	.06	.813
Error	30	94.26	3.14		

words encountered at the upper primary level require an awareness of morphology and/or of unique spelling patterns (Alexander & Pate, 1991; Henry, 1993; Spear-Swerling & Sternberg, 1994; Spedding & Chan, 1994). When questioned informally at the end of the intervention, subjects in study group one agreed almost unanimously that *Carve up the word parts* was the most useful strategy they had learned.

The implication seems to be that poor readers at the upper primary level require specific training in the use of morphological and orthographic cues in order to improve their word identification skills (Alexander & Pate, 1991; Ekwall & Shanker, 1988; Henry, 1993; Lewkowicz, 1985; Spear-Swerling & Sternberg, 1994; Spedding & Chan, 1993, 1994; Taylor, Harris, & Pearson, 1988), and that metacognitive training is effective in achieving

Figure 5. Mean raw scores of the two study groups for metacognitive cues in word identification across testing occasions



this. The improvement of both groups in the *Consider the Context* strategy may reflect the fact that it is already used by most poor readers (Henshaw, 1992; Nicholson, 1991; Perfetti, 1986; Stanovich, 1986a; Yeu & Goetz, 1994), and as a result of the intervention, both groups may have learned to use this strategy more efficiently, irrespective of the method taught.

Oral reading rate

Oral reading rate was measured as words read correctly per minute on the four testing occasions using Forms A, B, C, & D of the Burns/Roe IRI Grade 4 passages. The results of repeated measures analysis of variance are shown in Table 5.

The significant occasion main effect, $F(3,81) = 59.95$, $p<.001$, indicates that rate of reading was facilitated by both methods of intervention. However, the significant Group x Occasion interaction, $F(3,81) = 3.06$, $p<.05$, indicates that the training program for study group one (i.e., metacognitive word identification in a reciprocal teaching format) improved the oral reading rate at a greater rate than subjects in study group two who received traditional methods of word identification and a reciprocal teaching format (see Figure 6).

Figure 6 also suggests that the metacognitive training program was more effective in the first study phase and for Year Six subjects.

Table 5. Summary of results of Group (2) x Grade (2) x Occasion (4) analysis of variance for Burns/Roe IRI scores for words read correctly per minute

Source of Variation	df	SS	MS	F	p
Between Subjects					
Group	1	4647.23	4647.23	1.89	.181
Grade	1	14874.41	14874.41	6.04	.021
Group x Grade	1	2291.32	2291.32	.93	.343
Error	27	66524.85	2463.88		
Within Subjects					
Occasion	3	16651.47	5550.49	59.95	.001
Group x Occ	3	849.82	283.27	3.06	.033
Grade x Occ	3	432.28	144.09	1.56	.206
Grp x Gr x Occ	3	639.44	213.15	2.30	.083
Error	81	7499.37	92.58		

This was verified by univariate results for the Group x Grade x Occasion analysis, which was significant for the contrast between the first and second testing occasions, $F(1,27) = 4.19$, $p<.05$. This result suggests that the younger Year 5 subjects may need a longer intervention in order to make gains comparable with their older peers. They may also not have sufficient maturity to utilise a metacognitive approach (Cross & Paris, 1988; Paris, Saarnio, & Cross, 1986).

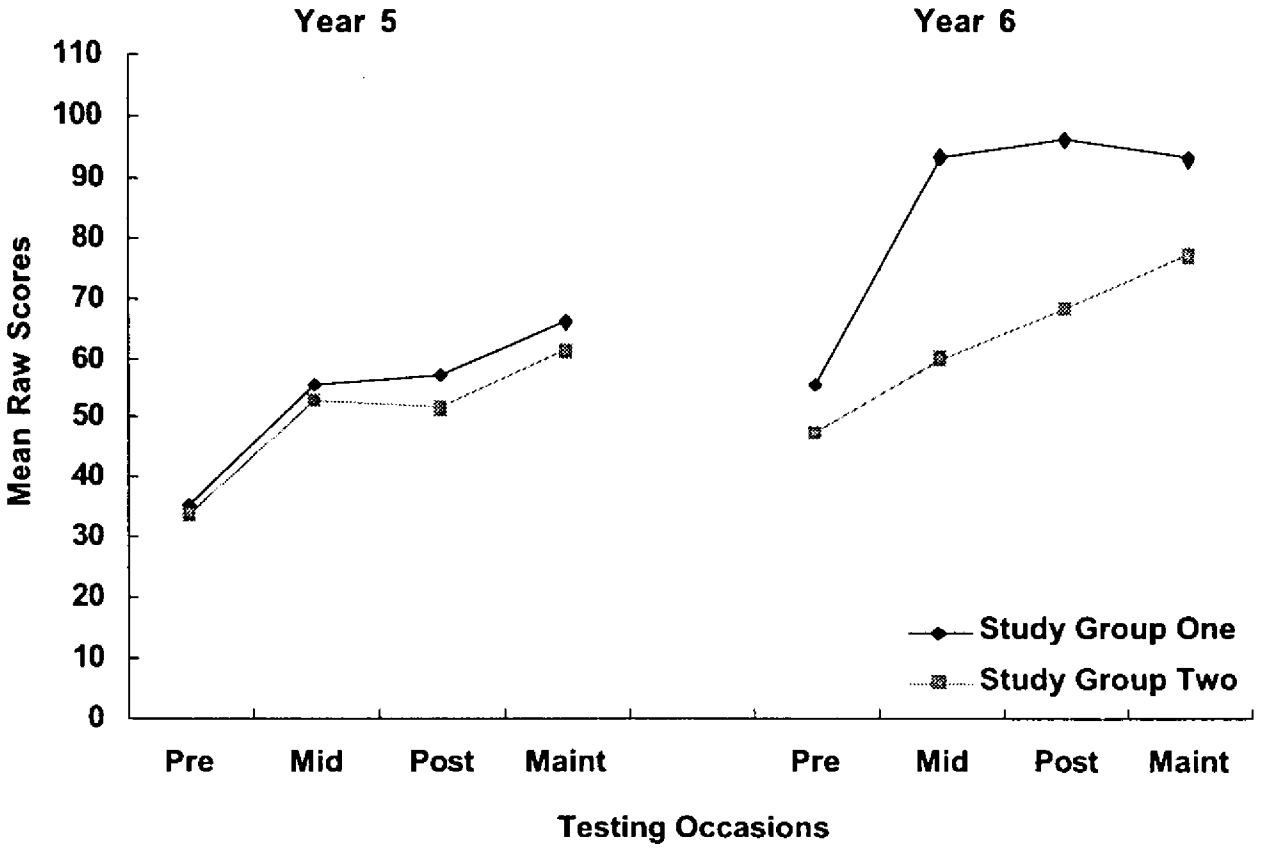
Summary of findings

There are several findings and implications arising out of this study.

1. The metacognitive word identification program was clearly more effective than traditional methods of teaching word identification for improving the skill of recognising words in isolation, although not for word recognition in context. The finding for word recognition in isolation supports the view that the hallmark of a good reader is the ability to read words accurately in isolation (Gough & Tunmer, 1986; Perfetti, 1986; Stanovich, 1986a), and automatic and accurate word identification is likely to enhance reading comprehension (Adams, 1990; Eldredge et al., 1990; Gough & Tunmer, 1986; Juel, 1988; Näslund & Samuels, 1992; Perfetti, 1986; Stanovich, 1986a, 1992).

2. An important component in the effectiveness of the word identification program appeared to be the metacognitive awareness and monitoring of morphological and orthographic cues. This is consistent with research findings which suggest that poor readers need direct and systematic training in recognition of irregularly spelled words and segmentation of word parts (for example, Adams, 1991; Alexander & Pate, 1991; Barker et al., 1992; Goswami, 1994; Henry, 1993; McCormick & Becker, 1996; Moustafa, 1995; Treiman, 1992).

Figure 6. Mean words per minute of the Year 5 and Year 6 subjects in the two study groups for the Burns/Roe IRI across testing occasions



3. The metacognitive word identification program was effective for improving the words read per minute of study group one, but more so for the Year 6 subjects. The Year 6 subjects in study group one showed marked improvement on these two measures after the first training phase, but not so the Year 5 subjects. This result could suggest that Year 5 subjects are not sufficiently mature to effectively use a metacognitive approach (Cross & Paris, 1988).

There were some limiting factors in this study, which could form the basis of future research. First, the fact that all the training was done by the experimenter may be a limitation, as many teachers have experienced difficulty in applying research-based strategies in the regular classroom (Chapman, 1997; Gaskins, Gaskins, Anderson, & Schommer, 1995; Gersten & Brengelman, 1996; Malouf & Schiller, 1995; Pressley & El-Dinary, 1997; Wong, 1997). A classroom-based model of implementation may be more successful when teachers have responsibility for its implementation. Teachers who have responsibility may feel a greater *ownership* of the program, leading to more faithful implementation of each of its components (Coley et al., 1993; Gersten & Brengelman, 1996; Malouf, & Schiller, 1995; Marks et al., 1993).

Second, while this study did provide teachers with useful preliminary information about the effectiveness of a metacognitive method of word identification, there is a need to more clearly identify what is cognitive and what is metacognitive in the approach used. Further study is needed to compare a more sophisticated cognitive approach to word identification, with the same sophisticated cognitive approach plus metacognitive techniques. Without such a comparison, it would be difficult to validly assess the effectiveness of the metacognitive component in comparison to the cognitive component.

Third, there was a small subject sample drawn from only two schools, and the results may not be readily generalised to larger populations in other school districts. Replication in other areas would help add validity to the results.

Metacognitive approaches to teaching have been identified as effective tools in the search for methods to assist children with reading difficulties. This study has helped verify their value. More study is needed, however, of the nature of modifications necessary for effective implementation in the regular class, and the optimum length of intervention.

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